Learning and Support of ‘older adults’ in the use of Information and Communications Technologies: A framework to enhance technology engagement

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Copyright statement

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Abstract

This research provides independent and in-depth knowledge and understanding of 'older adult' learning (those aged 50 and over) and Information and Communications Technologies (ICTs) with respect to the new dynamics of ageing (e.g. changing motivations, requirements, preferences and 'learning capacities'). From this knowledge, understanding and synthesis, learning strategies and recommendations within a framework consisting of different categories are proposed. A mixed methods' methodology was used which is underpinned by the principles of participatory action research and has a qualitative emphasis. It comprised semi-structured in-depth interviews, focus groups and research diary workshops as the qualitative methods. It was complemented quantitatively by two primary source surveys for ICT and Non ICT users and a secondary source 'digital engagement' themed questionnaire. The research focuses on the learning and engagement of ICTs and new learning and support to be used. It also identifies aspects that comprise learning mechanisms, and their relationships with gender and age groups.

In terms of contribution to knowledge, the research delivers previously unreported knowledge and understanding of substantial significance on the learning and support of 'older adults' and ICTs with respect to the new dynamics of ageing. Further, the study provides innovative and unique learning strategies within a framework consisting of different categories of various digital technologies. This is imperative to encourage and further the engagement between older adults and ICTs to promote autonomy and

independence. It is a comprehensive study that encompasses a multitude of factors that support and influence an older adults’ engagement with ICTs. The learning strategies and recommendations are expansive and are based upon a wide variety of learning modes. The research is imperative in breaking down the barriers to the older adult learning uptake of ICTs, and providing solutions in the form of learning strategies and recommendations to social policy, research, design and practice. The discipline in which the thesis is located is the ‘educational studies’ field, as ‘learning’ is the central theme.

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1. Thesis Introduction

The purpose of this chapter is to introduce the key components of the research, namely the background of the research and why the research is required, the aim of the research and its subsequent objectives, the research methodology used to fulfil the aim and objectives, an outline of the original contribution to knowledge and finally a chapter by chapter guide to the thesis. It should be noted that the key topics within the chapter described will be elaborated upon in further sections of the thesis such as the methodology section. The following section begins by introducing the background to the project.

1.1 Background to the project

An increase in knowledge and understanding is required on the learning and support needs and requirements of older adults (those which the project defines as aged 50 and over, as explained later) and Information and Communication Technologies (ICTs). This is to promote autonomy and independence with regards to the new dynamics of ageing (e.g. changing motivations, requirements, ‘learning capacities’ and aspirations). It is an area where research has been neglected previously. The promotion of autonomy and independence can be achieved by furthering engagement with ICTs. The utilisation of ICTs enables older adults to increase their access to information, goods, services, leisure, education as well as social networking opportunities.

Such benefits also allow older adults to maintain their independence and social connectedness.

It is therefore important to understand the relationship between how older adults learn in relation to ICTs, and to establish effective learning and support strategies to further their engagement with them. The knowledge and understanding can be used to inform organisations such as Age UK as well as social policy, research, design and practice. From the demographic statistics there is a lack of engagement between older adults and learning and ICTs as separate entities. A review of the literature also reveals that studies on the older adult learning of ICTs tends to be small scale and focus on one particular ICT device at one point in time without reference to user context, relevance or purpose. Much of the research does not focus on various digital technologies. The literature is limited in considering and exploring what may be considered 'new' and 'emerging technologies' (such as social networking platforms on mobile devices). The literature review section expands fully on such themes, as well as exploring recent work in the field of the learning of technologies by the older generation.

The New Dynamics of Ageing is an inter-disciplinary research programme. It aims to advance understanding of the dynamics of ageing from a multidisciplinary perspective (New Dynamics of Ageing 2012). There is a key distinction between the capitalised "New Dynamics of Ageing" and the lower case "new dynamics of ageing". The New Dynamics of Ageing is a unique project consisting of the collaboration by five research councils: the Economic and Social Research Council (ESRC 2012), Engineering and Physical Sciences Research Council (EPSRC 2012), Biotechnology and Biological Sciences Research Council (BBSRC 2012), Medical Research Council (MRC 2012) and Arts and Humanities Research Council (AHRC 2012). In the context of the programme, this research considers the influences of ageing (e.g. behavioural, biological, cultural and social factors) on the learning and support of ICTs. From this, strategies are to be proposed as solutions to such factors, to enhance and further the engagement between older adults and ICTs. The New Dynamics of Ageing comprises a number of research projects, one of which is the SUS-IT (Sustaining IT use to promote autonomy and independence) project. Other projects within the New Dynamics of Ageing include rural ageing, landscapes, working, poverty, music and mobility (New Dynamics of Ageing 2012). The outcomes of this PhD feed in to work package 5 within the SUS-IT project which explores the learning structures, relationships and capacities of older people with technology. The new dynamics of ageing consists of factors that influence the learning of older adults with technologies such as changing needs, requirements and motivations. The SUS-IT project has the ultimate goal of improving the quality of life of older people by promoting autonomy and independence via the use of ICTs.

Various challenges are presented for older adults due to such new dynamics of ageing (how changing requirements and motivations have influenced the learning uptake of digital technologies), which many of us take for granted. This is coupled with the changing nature of ICTs. Older adults are differentiated by a number of factors such as gender, ethnicity, wellbeing and health, culture, social class and financial resources (Vincent 2007). A thorough understanding and knowledge is therefore required between the learning and support of older adults in relation to ICTs. From this, learning strategies related to older adults and technology is proposed.

The following sub section provides key demographic statistics on ageing and learning, as well as justifying why the research is required in order to set the context.

1.1.1 Ageing demographics

The UK population is ageing. The 65 and over age group is forecast to increase to 24 % of the overall UK population by 2034 (Office for National Statistics 2010). This is shown in Figure 1.

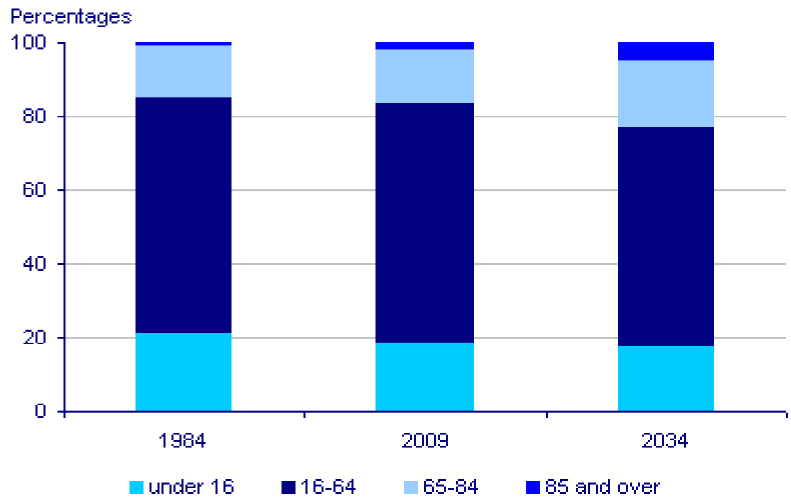

Figure 1.1: A graph to show the ageing demographics in the UK (Office for National Statistics 2010). *Permission to re-produce: Office for National Statistics licensed under the Open Government License v.1.0. Link to license:* http://www.nationalarchives.gov.uk/doc/open-government-licence/version/2/

Such statistics indicate that the older generation is a prominent group and moreover they have been described as less likely to use ICTs than other age groups (Ofcom 2010). Older adults could benefit from the uptake of learning ICTs in a number of ways. These include the promotion of social inclusion by forming friendships to learning in general for pleasure and fulfilment.

The definition of what age constitutes an ‘older adult’ is however subjective. For the purposes of this research, older adults will be considered as the age of 50 and above. This decision is influenced by the UK public policy for the NHS (Anderson 2008) as well as the National Service Framework for Older People (NFS 2006). The World Health Organisation (WHO) also defines an older adult to be 50 and above (World Health Organisation 2010). The 1993 Carnegie Inquiry into the Third Age for statistical purposes defines older adults to be 50 with an upper age limit of 75. They also categorised this as the ‘third age’, and such an age definition was considered for their statistical purposes (NIACE 2012). The term “age” is a concept denoting a particular stage in an individual’s life, which is defined by the length of time having lived. It is measured and referred to as such in years. It is important to assign objective ages (in years) to individuals for the purposes of regulation in health and leisure industries, as well as for directing services to those at a certain age to maintain welfare in terms of social policy. For example, an individual above a certain age (say 65 years) may be entitled to certain welfare benefits to help sustain a standard of living. Similarly, the term ageing is a concept in which people’s characteristics change as they get older e.g. cognitive or physical. Although objectively measured, ageing is also considered subjective, and such characteristics are influenced by environment and culture.

The following sub section describes the nature of older adult learning in relation to ICTs.

1.1.2. Older adults and learning in the context of ICTs

The learning of older adults is a complex issue. There are a wide range of reasons why older adults do not engage with ICTs including:

- Situational factors (e.g. the uptake of learning being prohibited by a particular social environment or geographical location)
- Institutional factors (e.g. some learners may have preconceived notions about the nature of the programme and be discouraged from learning)
- Informational factors (e.g. where there is a limited awareness on the learning opportunities available)
- Psychosocial factors (e.g. related to individual attitudes and perceptions when it comes to learning) (Findsen 2002).

However, such factors do not consider personal needs and requirements.

In the context of this research, ICTs are defined as 'digital technologies' and can be wide ranging. However, new technologies may well come into inception in the future due to longevity, which can result in learning methods adapting and evolving. Such technologies can range from the desktop PC to ubiquitous devices. Figure 1.2 shows that as age increases, the use of ICTs decreases.

Graph removed due to copyright restrictions

Figure 1.2: A graph to show the age group distributions and corresponding media usage (Ofcom 2010)

To define the nature and scope of the project, the aim is provided in the following section.

1.2 The research aim

The aim of this research is to provide in-depth knowledge and understanding of the learning and support needs and requirements of older adults with ICTs, with respect to the new dynamics of ageing. From this a learning strategies framework of different categories is produced for older adults to utilise in relation to ICTs. Such a framework will also be used to influence social policy, research, design and practice.

This will be used to increase and promote the autonomy and independence of older adults by enhancing technology engagement. It will also aim to increase the awareness of learning opportunities that are presented with ICTs, as well as to provide the research participants the opportunity to engage in reflection and evaluation of their current learning and support mechanisms and usage of technologies, and consider others.

In order to meet the aim, a number of objectives are to be fulfilled which are provided in the following section.

1.3 The objectives of the research

The three specific research objectives used to meet the research aim are as follows:

1) To identify and elaborate upon the learning and support mechanisms that older adults currently use, and how they are engaged with ICTs

2) To identify potentially new learning and support mechanisms to further older adults' engagement with ICTs by also considering aspects of established successful learning methods and platforms

3) To formulate a platform and learning strategies and recommendations framework consisting of different categories to provide guidance and direction to help older adults continue to learn how to use, enable, be

aware of and further their engagement with ICTs which will also be used to inform social policy, research, design and practice.

These three research objectives comprise six research questions as follows:

1) What learning and support mechanisms do older adults currently use?

2) To what extent are older adults engaged with ICTs?

3) What new learning and support mechanisms could be used to further older adult engagement with ICTs?

4) What aspects of established learning and support mechanisms which were considered effective could be considered to inform new learning and support?

5) How can learning strategies be formulated to help further and enhance older adult engagement with ICTs?

6) What learning strategies can be used to help further older adult engagement with ICTs and provide social policy, research, and design and practice recommendations?

The research methodology to achieve the aim and objectives is described as follows.

1.4 The research methodology to be utilised

To achieve the research aim and objectives outlined above, a mixed methods research methodology was used which focused on the collection of qualitative data. It was underpinned by the principles of participatory action research in combination with a desktop study (e.g. the empirical based literature review).

The participatory approach is unique which involves working collaboratively with older adults (also considered as 'research partners') in an ethical manner to co-construct the knowledge and understanding. It also allows the older adult research participants to embrace in learning reflection and evaluation in order to create learning and support mechanisms that they would explore, consider and adopt in a spirit of reciprocity.

The mixed methods research methodology consists of a number of data collection methods to be employed. These are briefly described in following sub section.

1.4.1 Empirical based literature review on older adult learning in the context of ICTs

An extensive literature review (the desktop study) was carried out. The literature reviewed was derived directly from experiments. The review drew on academic and research documents and surveyed various learning styles, empirical studies, andragogy (the principles of older adult learning) and pedagogy (the art of instruction and learning) associated with older adults, and lessons learned from other age group learning (e.g. post 16 learning). Key demographic statistics were also included such as the extent older adults are engaged with learning and ICTs, as well as philosophical propositions with regards to the 'networked society' and the methodological approaches previously utilised.

1.4.2 Quantitative data analysis 1 – Secondary analysis of learning questions within the 'Digital Engagement' themed questionnaire

This consisted of quantitatively analysing and comparing 253 learning question responses from a 'digital engagement' themed questionnaire (obtained from the Sustaining IT use to promote autonomy and independence (SUS-IT) project which this PhD is linked to). The SUS-IT project's aim is to sustain IT use of older people to promote autonomy and independence. It is a unique consortium of academic institutions, each with a particular role in the project, from strengthening capacity of effective participation to the dissemination of findings. The project comprises a number of work packages from 1 to 7. The SUS-IT project is one of a number of projects that is part of the New Dynamics of Ageing which is an eight year multidisciplinary research initiative with the ultimate aim of improving the quality of life of older people. Its aim is also to advance understanding of the new dynamics of ageing from a multidisciplinary perspective. The PhD is part of workpackage 5 within the SUS-IT project which explores the structures, relationships and working environments of older people's use of technology. However, both the PhD and the SUS-IT project are independent from one another in terms of fulfilling their objectives and vice versa. However, the learning questions from the 'digital engagement themed' questionnaire were used as part of the PhD to strengthen the argument and enhance validity and reliability. Additional work was carried out for the SUS-IT project which involved searching for literature and adding it to the database. The PhD utilised a key resource from the SUS-IT project e.g. learning questions from the secondary source 'digital engagement' themed questionnaire. The findings in the thesis are related to components of the SUS-IT project. For example, the PhD inadvertently strengthened capacity for effective participation of older people in ICT research. It was also part of investigating potential of and barriers to sustained use of technologies by older people, and their solutions, as well as generating outputs to influence policy, research and design. There is also KT equal which is a consortium of UK researchers which extend the quality of life for older and disabled people. It sets out how ageing and disability research can make a difference to people's lives (KT Equal 2013). It brings together researchers, policymakers and service users to focus on issues that are important to older and disabled people. It influences regulations and good practice such as product design, and gathers knowledge and expertise about people's well-being, independent living, self-management and quality of life. It as such seeks the perspectives and involvement of older and disabled people (KT Equal 2013). A KT Equal workshop was attended "Who is the User?" to as part of the research, which assigned the user to the role of the developer. The quantitative analysis was complemented by qualitative descriptors which consisted of analysing the data and inferring other ideas and propositions.

It was decided to design and formulate two new questionnaires. The 'digital engagement' questionnaire was constructed for exploratory work, and did not use a scale to measure the effectiveness of factors such as learning methods. It was also limited as it used a number of categorical answer responses. As such, the two new questionnaires (one for Non-IT users and the other for IT users) incorporated a scale to measure the extent of various factors relating to learning and technology usage. It also considered other factors to take into consideration such as the environment. The second quantitative component (comprising the two surveys) is described in the following sub section.

1.4.3 Quantitative data analysis 2 – IT users and Non IT users questionnaire with SPSS analyses

The two new questionnaires were designed and produced and sent to Age UK organisations with instructions for the respondents and a stamped addressed envelope (SAE) to return the self-completed questionnaires. Correspondence and agreement was established prior to the distribution of the questionnaires by contacting each organisation. The questionnaires were organised around two main themes: how older adults who used ICTs learned to use them and why older adults who do not use ICTs do not use them. The answers to the responses were coded so that the SPSS quantitative analysis could be applied. The statistics program SPSS was used to carry out the analyses to test hypotheses and to sort qualitative responses. The following sub section briefly outlines the semi-structured in-depth interviews and their subsequent analyses and interpretations.

1.4.4 Qualitative data collection and analysis 1 – semi-structured in-depth interviews with coding and framework analyses

This consisted of conducting 10 semi-structured in-depth interviews with older adults (based upon a pilot interview), about topics encompassing learning and support mechanisms associated with using ICTs with respect to the dynamics of ageing. The questions were informed by the empirical based literature review, quantitative data questions and responses, as well as the objectives. The data was analysed via both coding and framework analyses. The following sub section describes the focus groups and analyses carried out.

1.4.5 Qualitative data collection and analysis 2 – focus groups with coding and framework analyses

This comprised 3 focus groups with older adults based at the Nottingham Elders Forum. The question topics were carefully formulated and were informed by questions and findings from both the empirical based literature review and semi-structured in-depth interviews to help evaluate and reinforce existing findings as well as to explore new learning and support topics.

The aim was to gain new insights with the focus group stage, and to reinforce any repeated themes as well as explore new ones. As such, its aim was to also produce different data sets from the question points and topic areas in relation to the objectives. The data sets from the focus groups were a lot broader than the interviews allowing for different avenues of topics to be explored.

The following sub section outlines the cultural probe workshops that were carried out.

1.4.6 Qualitative data collection and analysis 3 – cultural probes and research diaries with affinity diagramming analysis

This stage involved older adults actually learning to use an Apple iPad and Cisco Flip Camera, and for them to document and record their findings, independently, in the form of research diaries at a cultural probes workshop. A cultural probes approach was used which encompassed recording the challenges, motivations and aspects of the digital technology that enabled effective and progressive learning. The topics of discussion were used to help structure the responses in relation to the objectives as well as reinforce and test existing findings and also explore others. This method is not considered as traditional as other qualitative and quantitative research methods such as surveys and interviews yet it allows the research participants to use and engage with new technology. It allows older adults to explore such technologies independently, and record them in a non-experimental setting which they are comfortable and familiar with. This can enhance the validity of the results as it occurs in a naturally occurring setting.

Each of these methods, along with the methodology has been explained further (including their validity) in the Methodology section. The next sub section justifies the methodological approach taken.

1.4.7 Why the methodology was chosen

The methodology adopted comprises a mixed methods approach and uses a combination of a desktop study and data collection that is underpinned by the principles of participatory action research. It is also complemented by a quantitative approach. This is unique in that it collaboratively works with older adults to co-construct knowledge and understanding about their relationship with ICTs in an ethical manner by working with them and minimising the barrier between the research participant and researcher. It allows both the researcher and research participants to work collaboratively together, exchanging dialogue and topics of discussion. As such it aims to extract reliable data sets regarding the learning and support of older adults with ICTs. It uses a combination of quantitative and qualitative research methods which complement one another, and are different in nature due to their distinguished paradigms (which is discussed in section 3.5). In particular it uses triangulation to address the research objectives and subsequent aim of the research.

The older adult research participants also engage with two prominent mobile technologies to explore their learning and support mechanisms, and consider new ones that may be effective in furthering their engagement with other ICTs. The learning styles inform the learning and support mechanisms and strategies, and the link between theory and practice has been established. Further evaluation and justification of why the methodology was chosen is elaborated in Chapter 3 in the Research Design and Methodology section, along the drawbacks of it in the context of this research.

The original contribution to knowledge which extends the forefront of the discipline is summarised next.

1.5 The original contribution to knowledge

There is a lack of knowledge and understanding in the learning and support of older adults and ICTs with respect to the new dynamics of ageing (e.g. changing motivations, requirements, 'learning capacities' and aspirations). In particular there is minimal research that considers the impact of such ICTs on older adults' attitudes, preferences, reservations, and changing circumstances that are part of the new dynamics of ageing. Further, there are no learning strategies within a learning framework consisting of different categories which have been proposed, that take into consideration the new dynamics of ageing in relation to the learning of ICTs. The research provides independent and in-depth knowledge and understanding on how older adults learn to use ICTs, how older adults are engaged with ICTs, as well as new and potential learning and support mechanisms to consider. The methodology used to achieve this is unique in the context of this study and works with older adults. As such, learning strategies have been formulated based upon this allowed. Further elaboration on the original contribution to knowledge is provided in the conclusions section.

The next section briefly outlines the guide to the thesis.

1.6 The discipline in which the thesis is located

The PhD could be described as multi-disciplinary due to the mixed methods methodology, as well as the nature of the study which focused on learning in the context of how older adults learned to use digital technologies (three key entities). The methodology used both qualitative and quantitative methods.

The main component of the thesis resides predominantly in the ‘educational studies’ field due to the ‘learning’ component which was the key area of the study. However, some aspects may also be described within the social sciences and humanities domains, due to the wider implications of the thesis and the relationships between people and technology learning. Overall as the ‘learning theme’ was central to the thesis, it is best to describe it within the ‘educational studies’ field.

The thesis consists of a total of 7 chapters. This one (Chapter 1) sets the scene and introduces some background, explains why the research is required and outlines the research aim, objectives and methodology. Chapter 2 provides a comprehensive coverage of the empirical based literature in the field, as well as key learning styles that underpin the learning strategies and methodological approaches that have been used previously. The third chapter (Chapter 3) details the methodology that was chosen, and the individual methods that comprise it. Chapters 4 and 5 present the quantitative and qualitative data collection findings and analyses respectively. Chapter 6 synthesises this data from the analyses presented in the previous two chapters in relation to the objectives. Finally, Chapter 7 presents the categorical learning framework and recommendations, along with the conclusions.

The next chapter provides the empirical based literature review.

2. Literature Review

An increase of knowledge and understanding is required on the learning and support of ‘older adults’ with Information and Communications Technologies (ICTs) with respect to the new dynamics of ageing (e.g. changing motivations, requirements, preferences and ‘learning capacities’). However, ageing is associated with various changes, such as motivations, requirements and ‘learning capacities’. This may reduce or inhibit the successful learning of ICTs (Digital Inclusion Panel 2005). On the contrary, learning opportunities and motivations may arise as a result from such a process, and the successful learning of ICTs may be enhanced.

Research literature surveyed has consisted of topics such as barriers that are imposed on the initial engagement with ICTs (Loges and Joo-Young 2002), as well as support mechanisms embedded solely within ICTs (Deibel 2007). In particular, the empirical based studies critiqued consider the usage of ICTs, rather than the actual learning of them. Such studies tend to be small-scaled and focus on the use of one particular ICT device at one point in time without reference to user context, relevance or purpose. It is therefore imperative to generate new knowledge and understanding between the learning of ‘older adults’ and ICTs with respect to the new dynamics of ageing, and from this, formulate a learning framework consisting of different categories. There are a small number of studies and research that generates knowledge and understanding of the learning and support of older adults and ICTs with respect to the new dynamics of ageing. Also, no learning strategies within a framework consisting of different categories have been produced by previous studies. The learning strategies to be proposed are based upon the knowledge and understanding of learning various digital technologies (and not just one) which is unique to the field. These learning strategies are informed by previous learning and support and technology usage, current usage and new learning (and aspects that make learning and technologies effective and ineffective). There are no learning strategy frameworks available in the context of this study. The learning strategy framework is based upon a number of different categories from influencing pedagogy and andragogy based settings to making learning easier via usability and accessibility, which also considers disability groups. Their purpose is to further older adult engagement directly and indirectly.

The purpose of this literature review is to critically appraise key and relevant theories and studies within the field of 'older adult learning' with respect to ICTs. The literature review covers a number of key areas that are directly related to the research objectives, which also reinforces previous assertions about why the research is required. Such theories and empirically based studies have been evaluated in relation to the research aim and objectives.

This chapter begins by outlining key ageing demographic statistics in the UK. It then considers statistics regarding the engagement between older adults and learning and Information and Communications Technologies (ICTs) as two separate entities. The social changes in society as a result of increasing technological prevalence is then evaluated, which also explores factors that influence older adults and learning. Learning styles that underpin learning mechanisms proposed by key learning practitioners, academic researchers and educational psychologists are considered. The optimisation techniques of classroom environments by Noel Entwistle who is a leading UK educational psychologist are proposed. The three main umbrella terms, pedagogy, andragogy and independent learning which encompass the methods associated with 'older adult learning' are addressed and how particular learning methods (and aspects of these) relate to them. Why the research is required, which includes identifying and elaborating upon gaps in the existing field of knowledge, is discussed. Finally, a conclusion is given which synthesizes the chapter and relates it to the research outcomes.

The next sub section describes the two literature review approaches and the development of a theoretical framework.

2.1 Approaches to the literature review and the development of a theoretical framework

The literature review consists of a number of themes within a theoretical framework, the following of which were applied:

1) A review and evaluation of empirical based works published in the field of 'older adult learning' of ICTs with respect to the new dynamics of ageing; and
2) A contextualisation of the relationship between the empirical based findings

The conclusion section links the research findings to the appropriate theories and empirical based studies in the literature review section. The first objective consists of establishing theoretical positions, statistics, methodologies utilised and empirical based works which justify the need for the research by identifying gaps in the field. The second objective consists of relating the studies with one another, as well as with the findings. The latter relationship is discussed in the conclusions section.

The review of the literature has been used to both formulate and refine the research aim and objectives. The aim and objectives are outlined as follows:

The Aim: *To formulate a framework of learning and support strategies for older adults to learn how to use digital technologies (ICTs) effectively and to realise the benefits they can bring with respect to the new dynamics of ageing*

Objective 1: *To identify and elaborate upon the learning and support mechanisms that older adults' use, and how older adults are engaged with ICTs*

Objective 2: *To identify new learning and support mechanisms to further older adults' engagement with ICTs by also considering aspects of established learning methods and platforms*

Objective 3: *To formulate a platform to interpret and synthesise the data to produce appropriate learning strategies to help older adults' learn how to use, enable and further their engagement with ICTs.*

The following key words for the literature review were included: *Pedagogy, andragogy, independent learning, older adults, learning, ICTs, technologies,* *ageing, learning styles, technology and society, learning and support available, potential learning and support, informal learning, formal learning, virtual environments and learning*.

The research literature reviewed has been identified for its reference to the aim and objectives, and is guided by them. The review has also been used to formulate and refine an appropriate methodology. The theoretical framework of themes for exploring directly related topics and studies in the field is shown in the table on the next page:

Theme categories	Theme details
Theories	Social changes due to technology, learning styles, pedagogy, andragogy, independent learning, classroom environment optimisation
Statistical demographics	UK ageing demographics, learning and ICT engagement demographics
Empirical based studies	Older adults' use of ICTs, lifelong learning, digital lifestyles, ageing influences on experiences of ICTs, technology enabling techniques, older adults' use of computers, online practice based informal learning, e-learning and the third age (older adults), pervasive system learning, University of the Third Age virtual learning, previous learning and support utilised, Automated Teller Machine learning
Methodological considerations	Key methodologies utilised in the context of older adult learning and technologies
Justifications for research	Evaluation of the theories, statistics, empirical based works and methodological considerations to identify gaps to justify why the research is required

Table 2.1: A framework to show the key themes and categories surveyed and their descriptors

The next sub section discusses ageing demographics in the UK, as well as the lack of both older adult engagement with learning and ICTs as two separate entities.

2.2 Learning engagement and age perceptions

Older adults are less likely to use ICTs than any other age group (Ofcom, 2010). Figure 2.1 shows that the 55 and over age group use the computer, mobile phone, landline phone and handheld device far less than any other group. This does however exclude other technologies such as information kiosks and their applications.

Graph removed due to copyright restrictions

Figure 2.1: A graph to illustrate the age group distributions and corresponding media usage (Ofcom, 2010)

In addition to the decreased ICT usage compared to other age groups, ‘older adults’ are also less likely to engage in learning as a separate entity. The age is inversely proportional to the participation in learning. In other words, adults over the age of 50 are less likely to participate in learning courses and activities with respect to Anderson’s (2008) report. Such learning may include self-directed learning (e.g. learning independently) or formal based learning courses. Examples may include partaking in vocational or non-vocational courses such as history, gardening, cookery and sport. It often means the learner will identify a set of values and outcomes that can be ascertained prior to partaking in the learning course. These may be for personal benefits or have wider implications or both. The term ‘learning’ however has a number of definitions used to describe it.

This is illustrated in the table:

Table removed due to copyright restrictions

Table 2.2: A table showing participation in learning in 2007 from 45 to 75 years of age and above (Anderson, 2008).

Such a lack of learning participation is associated with economic, social and personal benefits (Aldridge and Tuckett 2002). In addition, barriers to learning include physical limitations (e.g. dexterity issues), cognitive factors, ‘learning capabilities and capacities’ and previous educational experience (Kirsti et al 2008). Motivations for learning that increase with age are linked to and associated with passion for the subject, pleasure of learning, improving self-confidence and opportunities for social contact. Motivational factors for learning that decrease with age are based upon work, qualifications and personal development (Anderson 2008). Participation in learning is also related to internet access. Aldridge and Tuckett (2002) found that those with internet access are twice as likely to learn compared to those who do not have such access. It has not however been established whether this is a correlation or causal relationship. For example, a wider range of learning opportunities may be available as a result of the internet (and thus ownership of a computer). In terms of formal and informal learning (as learning approaches), informal learning is utilised more frequently than formal learning among older groups. In a study by Withnall (2008) which involved constructing learning logs kept by nine older people for an average period of seven weeks, it was found that a great deal of later life learning takes place informally. Less than a third of learning took place in formal learning environments (Withnall 2008). This may be because of the lack of availability of formal learning in later life e.g. appropriate and relevant courses or external factors such as limited access to transport reduce such opportunities. There is generally more flexibility with informal learning, as well as what in particular is learned. With formal learning, there may be aspects of the programme that are not of interest or relevance to the older adult learner. In particular, other researchers have argued that in order to formulate a learning strategy for older adults, it is necessary to consider a range of factors that affect 'older adults' in relation to learning and set them into the context of both leisure and learning (Tooby 2006). However, despite such evidence, the literature does not explore learning needs and requirements, in relation to various digital technologies. This is another key reason why the research is being conducted.

The perception of ‘young and old age’ should also be considered. For example, while some policy and research reports define ‘older adults’ to be set at a particular age, some older adults may not consider themselves as ‘old’. These age perceptions are illustrated in Figure 2.2:

Chart removed due to copyright restrictions

Figure 2.2: A chart showing the percentages of participants who, at specific age groups, considered ‘youth’ had ended and ‘old age’ started (Abrams et al, 2009)

From this chart, a significant proportion of older adults over the age of 60 (and in particular the 60 to 74 age range) consider themselves to be of ‘old age’. Such age perceptions play an important role in influencing factors such as requirements and motivations that may be assumed with certain, specified ‘objective’ age categories. This may therefore induce a slight influence on relationship validity between individual variables e.g. proposing that a certain age category prefers to learn by a certain method, and potentially establishing a mismatch or misrepresenting an age group. However, an 'objective' approach to categorising age groups is required in order to enhance the validity and integrity of the findings, to enable relationships between different age groups to be ascertained as well as to draw valid comparisons when evaluating learning and age groups.

So due to the combination of an ageing population, a lack of learning and ICT engagement, as well as empirical based studies demonstrating this, knowledge and understanding between older adults and learning ICTs with respect to the new dynamics of ageing is required. With this, effective learning strategies are to be formulated to be used in furthering older adult engagement (both directly and indirectly) with ICTs and inform social policy, research, design and practice.

The next sub section details the changes in society that have occurred as a result of the inception of such technologies.

2.2.1 The social changes within society in terms of the human-computer relationship

Castells (2000) argues that Information Technology has transformed modern society, and that the technology revolution has presented complexities in the modern world. This has influenced the economy, society and culture with new and revolutionised communication methods. This argument also applies to learning mechanisms. Castells (2000) also argued that 'technology is society' and that society cannot be understood coherently without the utilisation and presence of technology (Castells 2000). This statement however is over exaggerated as technology cannot equal or be society. Technology is certainly integrated into society and transforms the way we communicate (with a digital emphasis) but technology is always a component of society. Further, society can still be understood coherently without the use of ICTs, just in a different context e.g. reverting back to “conversing in person” communication methods.

Technology is therefore integrated into society and is fundamental to it as well as providing opportunities. Technology is used to enhance knowledge and understanding. The Greek philosopher Aristotle argues that wisdom is about generating scientific knowledge and understanding, and not with action (e.g. that is perhaps associated an invention or generation of something) (Scharff and Dusek 2003). However, action is still considered a pre-requisite for generating knowledge and understanding. The wisdom can be related to philosophies of learning which is generated by an understanding (and the learning method or methods required to generate this understanding). The knowledge can then be acquired from the causes and principles (e.g. identifying a potentially successful learning mechanism as a result of learning reflection and evaluation) from the learning approach and mechanisms that comprise it. This knowledge is then referred to as wisdom. As such, society itself has become increasingly embedded by such technological change including pervasive and ubiquitous systems. It can be argued that it has become ‘intelligent’ as a result. However, there are various forms of ‘intelligence’, and while such intelligence within society is gained, it may not necessarily improve the quality of life. This is due to increasing demands that are as a result of virtual methods of contact and the prevalence of mobile technologies. The inception of ICTs has influenced society which has allowed new forms of learning to take place, including the creation of new and potential learning mechanisms and learning philosophies to be considered and applied by learners. For example, social networking platforms allow many learning opportunities to take place. This could be informed by philosophical approaches to learning such as the incorporation of facilitated instructional modular design to allow structured and systematic learning including the setting of goals of particular ICTs within a community based virtual environment. As a result it is important to explore learning approaches and mechanisms to allow ICT engagement opportunities to take place.

The next section describes some of the complexities involved in both the older adult population, and learning itself. It also considers learning styles proposed by theorists and educational psychologists. Such learning styles underpin ‘older adult’ learning strategies as discussed next.

2.3 ‘Older adults’ and learning; theories, styles and studies

As mentioned in Section 1.1.2, older adults and learning is a complex issue. The situational, institutional, informational (as well as dispositional) factors that influence older adult learning are also re-iterated by a literature review of lifelong learning (Anderson 2008). There are further complexities associated with personal learning and support needs and requirements, which also include motivations.

Learning styles can provide rich and valuable lessons to be learned by older adults when utilising ICTs, as well as to underpin learning in practice. These comprise the principles of Pedagogy (the art of instruction and learning), Androgogy (the methods, principles and strategies associated with adult and older adult learners) and independent (self-directed) learning. The philosophical principles can inform potential learning and support to be used (e.g. using instructional modular design in virtual environments). Such learning styles are proposed by leading educational psychologists and learning theorists including Honey and Mumford and Jan Vermunt.

A number of terms are used throughout the thesis, and definitions are provided. These are based upon an own settled definition from reading around the literature as a whole.

1) Learning – The term learning has various definitions. In the context of this study it refers to knowledge that has been acquired in a particular field or instance. This wisdom (a direct product of knowledge) can then be applied to other similar fields or instances.

2) Learning styles – A learning style is defined as a theoretical or conceptual method of gaining knowledge based upon an individual learner's preferences and non-preferences e.g. a cognitive or experiential style proposed in Honey and Mumford's learning style

framework are two common styles among learners. A learner may also follow more than one learning style, therefore combining them

3) Learning approaches – A learning approach is an umbrella term used to describe the way learners go about learning from a “generic” level e.g. pedagogical or informal based learning. In the context of this study, it is also used as an umbrella term in association with other terms such as: methodological, philosophical, pedagogical, andragogical, authoritative, self-directed, integrated and strategic.

4) Learning and support mechanisms (methods) – A term to denote an older adult’s methods of learning as described and provided by them, comprising varying levels of detail

5) Learning strategies – A learning strategy is defined as the practice of a specific method (or methods) used to learn a technology effectively or its application. It is based upon previous, current and potential learning and support, as well as what makes such learning and support effective and ineffective. It may involve utilising more than one method such as the combination of an instruction document and web based learning. The strategies can be used directly and indirectly (e.g. through the use of recommendations) and inform social policy, research, design and practice

6) Epistemology – This is a philosophical term which describes the study of knowledge which includes its nature, methods and limits. Such human

knowledge can be obtained via different types of inquiry and methods of investigation

7) Ontology – This term describes how we interact in the world we are in, and how entities in existence and reality can be grouped according to similarities and differences, particularly with regards to research involving people. It refers to the form and nature of reality and what can be known about it. In the educational studies domain (as well as others) it includes two key terms: positivism and interpretivism. The former refers to the use of scientific based, objective quantitative methods, while the latter uses qualitative, subjective methods.

8) Pedagogy – This term is used to describe the methods and practices of teaching and in particular the relationships between the learners and the facilitator. It typically includes groups of learners of all ages

9) Andragogy – This is similar to pedagogy (and the terms can often overlap) and refers to the methods and techniques used to teach adult (including older adult) learners. The key difference between pedagogy and andragogy is that the latter involves adult learners

10) Age – The term “age” is a concept denoting a particular stage in an individual’s life, which is defined by the length of time having lived. It is measured and referred to as such in years. It is important to assign objective ages (in years) to individuals for the purposes of regulation in health and leisure industries, as well as for directing services to those at

a certain age to maintain welfare in terms of social policy. For example, an individual above a certain age (say 65 years) may be entitled to certain welfare benefits to help sustain a standard of living. Similarly, the term ageing is a concept in which people's characteristics change as they get older e.g. cognitive or physical. Although objectively measured, ageing is also considered subjective, and such characteristics are influenced by environment and culture.

11) Disability – This is a very broad term, and in the context of this study it is used to describe those who consider themselves to have the inability to learn and use technology effectively, or to their own personal satisfaction levels

12) Adult learning – This term is the process by which individuals seek to improve their knowledge, experience and competence base in a particular field or subject, either independently, in groups or within institutional settings.

13) Learning process – The learning styles, approaches and mechanisms which the learners use to achieve the outcomes of the learning experience

The learning styles which describe the key ways an individual prefers to learn are described next.

2.3.1 Learning styles

There are various learning styles that describe the way an individual prefers to learn in practice. These are based upon pedagogy, andragogy and independent learning umbrella terms. The first four (experiential, cognitive, reflector and pragmatist) are from Honey and Mumford’s learning framework (Honey and Mumford 1989) and are widely acknowledged today. They are outlined below:

Experiential learning – Where the user engages with the experience

Cognitive learning – About processing information and not engaging with the experience e.g. reading over an instruction document to become familiar with a technology device

Reflector learning – About providing understanding of good and effective ways to further the learning process by using an analytical approach e.g. considering aspects of the experience that were considered favourable and not so favourable

Pragmatist learning – A practice based learning approach in which methods are tested (e.g. associated with independent learning and trial and error) (Honey and Mumford 1989)

Other updated learning theories in relation to learning and ICTs include:

The multimedia learning theory – The combination of video and audio to present information (Mayer 2005)

The collaborative learning theory – Sharing experiences with other learners and working together (Mitnik et al 2009)

The democratic learning theory – Deciding and setting a goal (and sub goals) amongst a group of learners (Qvist 2010)

The connectivism learning theory – Combining already established learning theories (e.g. using at least one) to learn and reach the end goal (Siemens 2005)

Humanist learning – Identifying learning for self-fulfilment (Kurtz 2000)

Behavioural learning – Detecting successful learning outcomes as a result of changes in learning behaviour e.g. establishing success as a result of optimising or modifying ways of learning (Shelbourn 2002).

There have also been other learning styles identified by Vermunt (1994). Such learning styles made use of interviews with university students. The learning styles identified were:

- Cognitive processing – Identifying relationships between key concepts and theories
- Learning orientation – For self-fulfilment and enrichment
- Affective processes – For pleasure and interest
- Mental model of learning – Exchanging dialogue with experts to provide stimulation
- Regulation of learning – For interest purposes and answering own questions (Vermunt 1994)

The learning styles can overlap e.g. there may be at least one learning style associated with a learner. For example the individual may prefer to use a combination of both experiential and cognitive processing as learning styles. Two of the styles identified by Vermunt (1994) are relatively similar (learning orientation and effective processes) and could be categorised as one learning style. This could consist of following documented instructions in hard copy format while engaging with the technology device. Further, the instructor and learners can collaborate and discuss changes to the way the teaching is delivered in the learning environment. (Learning and Skills Research Centre, 2004).

According to Sadler-Smith (2001), learners should question their habitual behaviours and consider new ones that could benefit their learning. This is related to a central theme of this thesis with regards to the reflection and evaluation process. They should further consider the learning of other learners. Establishing dialogue between the learner and instructor for effective learning is also considered important (Learning and Skills Research Centre 2004). A “matching” technique can also be employed in which the learning styles of the students should be similar to the learning styles of the instructor. This notion is reinforced by a study conducted by Smith et al (2002) which found that learning is effective when there is a match rather than a mismatch. Contrary to this however, the mismatching has also proven an effective way to learn. Here the student’s learning styles differs to the instructor’s teaching methods. This aims to encourage the learner to take responsibility for the content, process and outcomes of their learning (Learning and Skills Research Centre, 2004).

Research regarding learning styles can be found dating all the way back to the 1950s. In particular, research has been conducted on learning approaches and strategies for a quarter of a century in the UK. This has been led by Noel Entwistle who defines a "strategy" as a way a learner deals with a specific task (Entwistle, 1998). Entwistle (1998) aimed to produce a heuristic model (e.g. based on experiential techniques) to enhance the teaching and learning process. This encompasses engaging in guidance of critical reflection and he suggests that departments within educational institutions should adopt this approach (Entwistle, 1990). However, reflection does not have to be part of the heuristic model and can be used as a separate entity altogether. From this, aspects of the teaching provision can be re-designed and adapted to improve the learning experience and outcomes.

Pask (1976) suggested that learners adopt either a holistic (wholist) or serialist (partist) method. However this may depend on the nature of what is being learned, and one approach may be better suited than the other. For example, those who prefer a formal approach to learning may find the serialist method suitable, whereas those who prefer informal learning may find a holistic method suitable. The serialist (partist) approach uses step by step learning, which includes a narrow and simple hypothesis relating to one characteristic at a time. As such, it is a structured approach and attempts to build understanding from the details of activities, facts and experimental results instead of making conceptual connections. It therefore formulates theories from practice. The holist (wholist) approach aims to form a complex hypothesis relating to at least one characteristic simultaneously. It aims to build a broad view of the task relating it to other topics as well as real life experiences (Pask, 1976).

The next sub section describes Entwistle et al's (2001) approach for proposing strategies to be implemented in classroom based settings and how such environments can be optimised, to enable effective learning.

2.3.2 Optimisation in classroom environments

Entwistle et al (2001) proposed strategies to curriculum design, teaching and assessment to enhance the learning process. These are:

- Providing a statement about the purposes of the course
- Designing a course which takes into account the student's current knowledge base
- Issuing feedback to learners on what they need to do to make progress
- Delivering materials to help overcome gaps and common misunderstandings
- Issuing realistic assignment requirements and workloads
- Encouraging learners to adopt a relative approach e.g. to establish how it relates to other topics or real life experiences
- To make use of factual knowledge with problem based criteria
- Offering opportunities for peer discussion (Entwistle et al, 2001).

It should be noted however that such strategies have a teacher-delivery focus, and are not so much learner centred. Considering any needs or requirements of the learner should be imperative before classes are delivered.

In addition to these strategies the course design is also something to consider. Taylor et al (2004) conducted a study which found older adults who used application training preferred an informal structure, instead of a formalised and linear class structure. This may suggest inadequacies or non-preferences in application training with formal approaches. This curriculum design can be applied to older adult learning of ICTs. Some of these attributes may pertain to certain individuals than others. From this, the learning experience should be tailored to the needs and aspirations of the learner. Identifying this is key and such a structured discussion should if necessary be considered prior to the learning commencing. It does not necessarily involve being taught in a class based setting, and can generalise to other settings and forms of learning e.g. learning in virtual environments. It is important to consider these activities when designing teaching and learning methods for older people and learning ICTs.

The next sub section describes the three main umbrella term approaches which encompass key learning methods (and aspects of learning methods) of 'older adult learning' and ICTs: pedagogy, andragogy and independent learning.

2.3.3 Pedagogy, andragogy and independent learning

The three terms; pedagogy, andragogy and independent learning underpin the learning mechanisms of 'older adult learning' with respect to ICTs. It is important to understand the meaning of each of these, as they are key conceptual, umbrella learning domains.

Pedagogy is defined as "the study of the methods and activities of teaching" (Cambridge Dictionaries Online 2013). In other words, pedagogy can be described as the art of instruction and teaching, as well as providing effective teaching and learning strategies. A diagram of a pedagogical approach is shown in the diagram below:

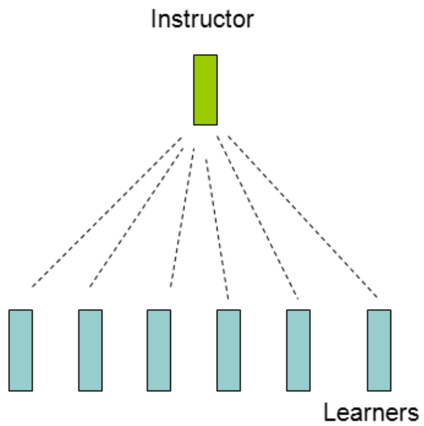

Figure 2.3: A diagrammatical representation of a general form of a pedagogical approach to learning

A key characteristic of pedagogy is that there is minimal collaboration between the learners, and the instructor utilises an authoritative approach in delivering material and conversing with learners. The teacher has full responsibility for what material will be learned, how the material will be learned, when the material will be learned and if the material has been learned. It is also referred to as ‘teacher directed instruction’ (Hiemstra and Sisco 1990). Further, Leach and Moon (1999) define pedagogy as “the practice that a teacher, together with a particular group of learners creates, enacts and experiences” (pp. 267). It is as such a joint activity in which the learner has an active role.

Andragogy is defined as “the art and science of helping adults (and older adults) learn” (Knowles 1980). In other words, it considers all adults, both considered to be of the ‘younger’ and ‘older’ adult age generation. In particular, key assumptions or characteristics about the individual learners include:

- The learners are self-directed in their approach to learning, requiring facilitation rather than instruction
- They make use of previous experience to build upon learning
- Their readiness to learn becomes increasingly associated with the developmental tasks of social roles
- Their time and curricular perspectives change from postponed to immediacy of the application and to performance centred-ness (Knowles 1980).

  A diagram to illustrate an andragogical approach to learning is as shown:

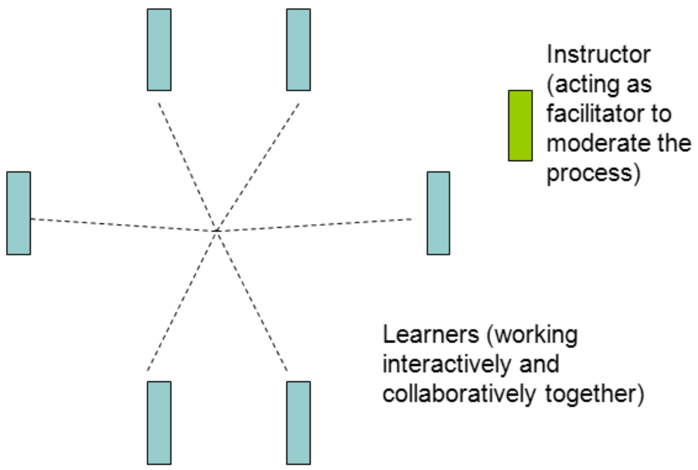

Figure 2.4: A diagrammatical representation of a general form of how andragogy can take place

A key characteristic of andragogy is that the learners collaborate with one another. The instructor acts as a facilitator, moderating the learning experience with an integrated approach. Knowles (1980) considers Andragogy to be a specific theoretical and practical approach, based upon the humanist conception of self-directed and autonomous learners and teachers as facilitators of learning.

However, Pedagogy and Andragogy can be considered as two sides of one continuum as suggested by Knowles (1980). Pedagogy and Andragogy represent a continuum ranging from teacher-directed to student-directed learning and that both approaches are appropriate with children and adults, depending on the situation (Knowles 1980).

Independent learning is described as “the ability to take charge of one’s learning” (Holec 1981). A key characteristic of independent learning is that it is self-directed and provides responsibility for work or learning. Such an approach also allows the learners to make informed choices and take on responsibility for deciding what they need to do in order to learn. As such, the learners need to:

- Engage in learner centred decision making
- Reflect upon their own current learning mechanisms
- Consider whether the learning has been effective or whether they need to take another approach (The Quality Improvement Agency for Lifelong Learning 2008)

A diagrammatical representation of independent learning is illustrated below:

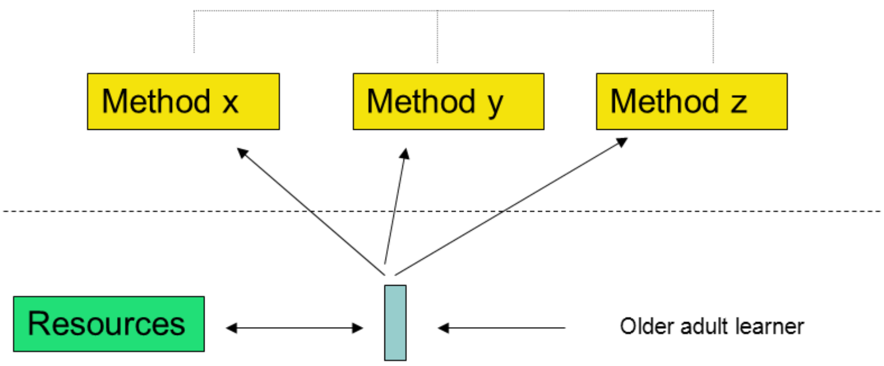

Figure 2.5: A diagrammatical representation of how independent learning takes place

The independent older adult learner embraces at least one learning method, while also consulting appropriate resources, if appropriate.

A diagrammatical representation of learning approaches and mechanisms obtained from the literature review has been provided in Figure 3.6. They have been categorised by three levels. This increases in complexity as the levels increase from 1 to 3. This is illustrated in the diagram:

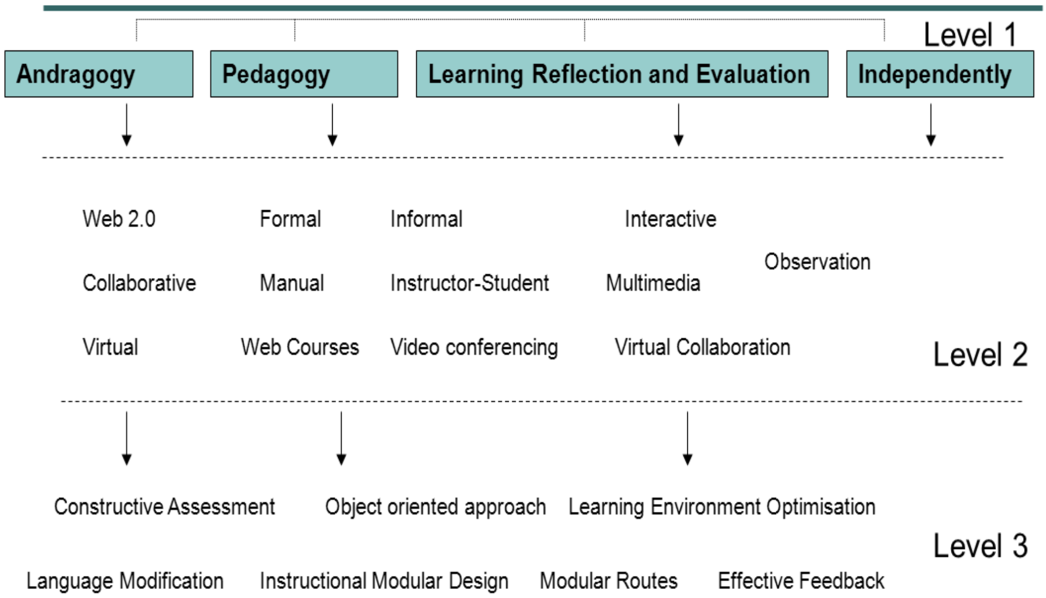

Figure 2.6: A 3 tiered learning model showing how the three main umbrella term approaches (in addition to learning reflection and evaluation) are related to further approaches and mechanisms

The purpose of this diagram is to represent how learning mechanisms and approaches obtained from the literature relate to one another. Each level 1 approach may overlap (e.g. Pedagogy and Andragogy). An older adult may combine more than one mechanism or approach from each of the three levels. An example may be using interactive virtual collaboration (mechanism) following informal (approach) interaction with other members of the group complemented by an instruction manual (mechanism).

The next section discusses empirical based studies on the learning of older adults with ICTs which is underpinned by the learning styles considered next.

2.4 Empirical based studies on 'older adult learning' in relation to ICTs

Various empirical based studies have been conducted in the field of 'older adult learning' with ICTs. Key studies mostly related to the aim and objectives will be critically evaluated. The literature review explores key topics in relation to the 'older adult learning with ICTs' field. These empirical based studies relate directly to the research outcomes, in surveying what is available in the field in terms of the theoretical and conceptual positions, methodological approaches and findings from such studies. The studies, along with key demographic statistics (as described previously) support the argument as to why further research, knowledge and understanding is required in the learning of various digital technologies with respect to the new dynamics of ageing (e.g. changing motivations, requirements and 'learning capacities'). A mixed methods approach that incorporates a substantial element of participatory action research (PAR) is a unique approach in the field to generate appropriate knowledge, understanding and address the research outcomes. PAR has its foundations set in the work of Lewin and Friere. It was Kurt Lewin who began with an idea which was attributed to action research. It was expressed in the Tavistock Institute of Human Relations, and his initial work on action research was related to community action programmes (Lewin 1946, 1952). As such, Lewin's work provided action research recognition in various disciplines. As a result of such work, various rationales and practices emerged within different disciplines. It was participatory action research that gained popularity. It aimed to address individualism, disenchantment and the prevalence of instrumental reason. It allows own views to be reinterpreted as they develop practically, theoretically and pedagogically (Kemmis and McTaggart 2007). In addition, the work of Paulo Freire involved forwarding a model of action research as liberation. It was Freire and a group of Chilean literacy educators who began thematic research projects. Freire (1970) considers action research to be a highly inductive process as the research is considered a form of social action. In such research it is the generative themes or issues that are of considerable importance to community members while studied in a collaborative fashion (Herr and Anderson 2004). PAR is considered a description of social research in terms of its assumptions, collectivist nature, its action consequences and driving values. It involves reflexivity and creative enquiry. It is about using social and collective processes in reaching conclusions, and what the implications are for change (Wadsworth 1998). The empirical based studies support the formulation of the research aim and subsequent objectives that are required to provide the appropriate knowledge and understanding.

The next sub section evaluates key empirical based studies pertaining to the research aim and objectives. These are derived from published academic works and policy and government reports.

2.4.1 Older adults' use of ICTs in everyday life

Selwyn et al (2003) conducted a study on older adults' use of ICTs in everyday life which examined the extent and nature of ICT access by older adults. The findings showed that using a computer was a minority activity amongst older adults, and it is a highly stratified activity according to age, gender, marital status and educational background. This is due to older adults considering such technologies to be of little relevance. This should not however be considered the only barrier to the use of ICTs. They did not however explore what older adults' would prefer in terms of specific usage of technology, and what could be done to enhance learning engagement. The study also focused upon whether the participants had access to particular digital technologies, which was not related to the learning of them. It maps factors such as age and gender to different 'access levels' with such technologies (e.g. core or public access to computers). This study is similar to the Digital Lifestyle's (2009) report on the usage of ICTs, although it places less emphasis on the learning of them.

While Selwyn et al (2003) used a combination of interviews and surveys, they only considered those who had not used a computer in the past 12 months. As such it excluded 'older adults' outside this boundary. It also excluded 'older adults' as being aged 50 to 59 from the study. While what is defined as an 'older adult' is subjective (regardless of policy and government sources) this research project defines 'older adults' over the age of 50. A key drawback of Selwyn et al's (2003) study is that it is limited in exploring the new dynamics of ageing factors (e.g. motivations, requirements and 'learning capacities') in relation to learning ICTs. It does not consider potentially new learning and support, nor does it offer any strategies or potential solutions for increasing the learning of ICTs, by overcoming any barriers or challenges. The methodological drawbacks included the interviews not being analysed and interpreted. This is particularly important for turning the data into meaningful (and valid) information and establishing potential links and relationships between variables. Another drawback was not making use of a quantitative method by informing, testing or reinforcing previous findings. This study relates to both situational and psychosocial factors as proposed by Findsen (2002) with regards to learning reduction by older adults. The 'learning orientation', 'affective processing' and 'regulation of theoretical learning' styles identified by Vermunt (1994) underpin the practical usage of ICTs by older adults in the study.

2.4.2 'Older adults' and lifelong learning

Findsen (2006) wrote a paper that focused on empirical based works of 'older adults' and lifelong learning in Scotland. Part of this study also included responses to 'third age' learning and technological innovation. The paper argued that a strategy to get older adults to learn should be holistic. This may indicate that there is a preference for unstructured learning as opposed to structured and linear learning which is associated with a serialist approach. It also argued that learning in later adulthood is best achieved in relaxed arrangements with self-directed senior groups. The use of facilitation however should not be disregarded. It also argued that encouragement is required to further learning, as well as emphasising equal opportunities to train. The study proposed that vocational and expressive forms of learning are important in sustaining learning as a whole. However, the paper also argued that the government is pivotal in providing formal educational opportunities to cater for older adults' learning needs and requirements in Scotland. A key finding proposed was that there was a pre conceived notion that older adults tend to be cautious when engaging with technology. SeniorNet which provides 'older adults' access and education to computer technologies to share knowledge and wisdom however found the opposite (SeniorNet 2012). They suggested that older adults are mainly interested in ICTs for communication purposes. This study does not focus on the actual learning and support mechanisms, but wider implications instead. The paper is based upon findings from other empirical based studies, and is limited in terms of its exploration with various digital technologies. The study of various digital technologies is central to the research project. Most of the paper placed emphasis on older adults and learning, and not in the context of ICTs.

This paper draws on key motivational factors from other empirical based studies. As such it is psychosocial factors identified by Findsen (2002) that would deter such engagement with ICTs. Such a holistic approach was proposed by Pask (1976) which takes a 'broader' stance and draws upon links between other entities and topics. This study was based upon an andragogical approach to learning, combined with independent learning. It was also influenced by institutional and informational factors as proposed by Findsen (2002). At a societal level, better information on an ageing society is required, as well as to avoid assumptions about older adults. The study is underpinned by the 'affective processing' learning style as proposed by Vermunt (1994).

2.4.3 Digital lifestyles report

A digital lifestyles report on older adults aged 60 and over found that older adults are less likely to want to learn about digital technologies than younger age generations (Digital Lifestyles 2009). An interest in learning is limited to those in their 60s rather than those who are 70 (who showed interest to learn). The report showed that there was no gender difference between older male and older female learners (e.g. those aged 60 and over) regarding the learning provision of digital technologies. This was opposite however with the general population. The older adults main preference for learning was through friends and family. In other words, collaborative learning should take place with those who are known to the learner. Other than this they are unlikely to utilise a particular method for engaging with and learning digital technologies. Other key methods for learning included: reading the manual, through trial and error, the supplier or store and going to a class. There were differences established in two socio-economic groups (ABC1 and C2DE). The ratio of digital radio and digital technology usage was, for example, "higher" for the ABC1 group than the C2DE group. It should be noted that socio-economic class is a complex field of various definitions and perspectives so the groups identified should not be considered as completely separate entities.

This report made use of quantitative data and made gender comparisons on socio-economic comparisons as well as age group comparisons (e.g. the 60 to

69 and 70 and over age groups). It should be noted however that socio-economic class is a complex subject with differing philosophical, political and statistical perspectives. The report provides statistics on older adults' use of digital technologies rather than the actual learning of them. However, the potential solutions for furthering older adult engagement with ICTs were limited. There were also limited justifications regarding such differences in terms with the engagement of digital technologies. Statistical comparisons were made instead. As the study was quantitative in nature (followed by qualitative descriptors) it did not elaborate upon the reasons for such learning preferences, such as why older adults preferred or did not prefer a particular method. The report was also limited in terms of considering theoretical underpinnings such as learning styles, and focused on learning in practice. There was limited focus on older adults' needs and requirements, and how they previously used technologies. The report was also limited in exploring factors relating to learning via digital methods. Potential learning and support mechanisms were not explored in this report, as well as strategies for furthering engagement with ICTs via learning. This report was similar to Findsen's (2006) study in terms of ICT engagement and use although Findsen's (2006) study focused on key older adult interests with technology, as well as generic forms of learning e.g. expressive and self-directed forms designed to meet their requirements. This study was underpinned by both andragogical and pedagogical approaches to learning. The learning was limited by situational factors, as learning is preferred to be carried out with those who are known to the learner in an appropriate and comfortable environment. The learning

mechanisms reflect both cognitive and pragmatist styles of learning, as identified by Honey and Mumford's (1989) theoretical framework.

2.4.4 Ageing influences on the experience of using ICTs

Mederios (2008) conducted an empirically based study that proposed that ageing leads to functional loss as well as behavioural changes. However, there are also advantageous aspects of ageing such as experience, wisdom and the increase use and consideration of learning approaches and practices. The findings suggest that older adults are less likely to want to learn to use products and technology, as a result of this ageing. In terms of the functionality, it was found that both 'young' and 'old' older adults have different needs and expectations in terms of learning. With 'younger' older adults, computers and mobile telephones were not limited just to communication uses. Other uses included work, leisure and online shopping. With 'older' older adults computers and mobile phones were rarely considered joyful or satisfying. These differing needs and expectations influence both motivation to learn to use the technology, as well as the level of previous experience. Such factors generate feelings of excitement, frustration, fear, avoidance or motivation. Participants were used from a University and the University of the Third Age (U3A).

Most of the participants studied at higher education level. A total of 6 'younger' older adults and 8 'older' older adults took part in the study. A combination of semi-structured interviews, notes and photographs were used to collect the data. The notes were obtained from audio recordings. The key strength with this study is that ageing influences of ICTs could be generalised to the target population of 'education' and 'literature oriented' individuals, as well as identifying differences in the needs of 'younger' and 'older' older adults. The sample used, however, was biased in that 'literate' and 'education oriented' participants were used as individuals were located within a higher educational setting. The sample would also be considered 'small' and should therefore not be generalised to the overall population. Also, the study relied primarily on the participants' perspectives, as well as the utilisation of contextual observation from the researcher. The study could be improved by utilising a diverse and larger sample. It also relied on participants making use of self-reporting and contextual observation from the researcher. This study lacked a quantitative approach which could be used to test, reinforce or inform qualitative findings. Variable comparisons could have also been established, as well as focus groups exploring and elaborating upon the issues in detail. This study did however make use of a cultural probe approach (e.g. via self-reporting), in utilising notes and photographs. This may be considered a 'different' approach when compared with traditional data collection methods such as interviews and surveys. It is an interpersonal approach which can be part of a participatory action research approach. The study used a combination of formal (semi-structured interviews) and informal (notes and photographs produced from self-reporting) methods of data collection. This study focused on the needs and requirements and was informed by the new dynamics of ageing which is directly related to the research project. However, there was less emphasis on the 'learning' component, and on the actual 'usage' and previous experience of ICTs. According to the research, the 'learning orientation', 'affective processes' and 'regulation of learning' styles identified by Vermunt (1994) are associated with the two groups of differing attributes (according to each group). It encompasses the needs, requirements and desires to utilise ICTs.

2.4.5 Techniques for enabling the older population in technology

Bean (2004) carried out a classroom based case study which reiterated the notion that learning computer skills becomes difficult with age. Based on gerontology issues, the staff at a library modified materials and techniques to create a beginners level computer course for the older adult participants. The course consisted of lessons and the participants comprised those in the "middle ages" to those aged 80 and over. A total of 80 participants took part in the course. The course was considered resource intensive but was successful in furthering the engagement between older people and technology. Recommendations for class improvement included increasing the number of classes to 5. It found that classes were most effective when there is a 3:1 student: trainer ratio. A smaller class size (e.g. with 6 maximum) can limit the amount of older adults who are trained by an instructor at each session. Recommendations based upon observation and participant feedback included producing a different and accessible free e-mail provider. The paper concluded that training should be tailored towards older adults' 'capabilities' rather than their needs or requirements. The success of such computer classes showed that with changes in training technique, older adults can achieve e-Literacy and become competent with learning technology. This included the instructors collaborating with older adults with regards to their needs, requirements and preferences in relation to learning and achievement.

This study is an in-depth case study that used a small sample size which focused on various aspects of one particular digital technology (e.g. computer based software and hardware related). As such it did not consider various digital technologies, which are a core component of this research project. The study provided rich data on older adults' use of both software and hardware applications associated with a personal computer (PC), as well as recommending improvements to be made in the training classes. It was not broad however and the sample size was limited so findings should not be generalised. Certain applications and hardware were assessed in terms of their usability. As a result, rich justifications were provided as to why a particular application was deemed complex and challenging for the older adult to learn how to use. With the email clients, there were complexities associated with navigability. Some of the buttons for example led to complexity issues e.g. buttons which are unrelated to the email client. Simplicity and layouts that were not distractible were therefore considered key to learning success. A possible solution to achieve a 3:1 student: trainer ratio is to incorporate the use of artificial intelligence, or a pre-programmed avatar to direct, instruct or assess the older adult learner to improve their learning performance. Collaboration can then occur between the learners.

This was a virtual based study, which considered learning via a computer and was therefore just one form of learning. Various aspects of this particular learning experience were modified to design and create a 'beginners level' computer course for the older adult learners. The study was pedagogically based, with the 'regulation of interest' (for interest purposes and curiosity) being the key learning style as identified by Vermunt (1994). In addition, the study is underpinned by Entwistle's (2001) proposition of optimisation techniques in classroom environments.

2.4.6 Older adults' use of computers: A survey

Goodman et al (2003) conducted an investigation in Scotland to find out how older adults interact with and learn to use a PC. In particular it placed emphasis on the requirements of older adults when learning how to use just one digital technology. It also took into consideration the design of computers to meet such requirements. A questionnaire survey was carried out with participants aged 50 and over. It elaborated on the results from a design and marketing perspective, as well as emphasising simplicity and an application's perceived usefulness. The results showed that:

- Computer use is inversely proportional to age
- About half of participants owned a computer
- About 74 % used a computer (as a digital technology)
- Undertaking a course was the most popular method of learning how to use a computer (47%) followed by work (28.6%), being self-taught (14.5%) and from a relative or friend (14.1%)

- Both community based and college courses were popular methods of learning

The most common method to learn to use a computer was via a course at an institution (47%), followed by work (28.6%). This however contradicts results from surveys conducted in the USA which found that being self-taught was the most common method (Adler 1996). This may be attributed to places of learning being a reasonable distance away from the older adult learner, or limited mobility and access to transport. One survey conducted by Morell (2000) found that being self-taught increased with age. Such differences may be attributed to cultural disparities in the courses, as well as in the sampling methods and population.

Barriers and difficulties regarding the disengagement with computers included:

- Applications and accompanying documents being too complicated
- Too much jargon and inadequate support

Reasons for engagement included:

- Commonly used applications having practical purposes
- Applications that were deemed useful

The prominence of computer courses showed that the design should be considered. This paper provided interesting and useful results using an adequate sample size of older participants which focused primarily on computers. It did not however consider other technologies, or the influences of ageing. It focused directly on learning perspectives and reasons for engaging or not engaging with a computer, as well as identifying learning methods. It was however limited in terms of the number of questions asked, as well as exploring them further (and considering other related and justifiable questions). It was also limited in terms of exploring the learning of other digital technologies other than the traditional desktop PC, a limitation found with other studies. This was another study focusing on one particular application or technology, similar to Trentin's (2004) study on Automated Teller Machine (ATM) learning.

Another key aim of this study was to find out how older adults interact with computers. In particular it placed emphasis on the requirements of older adults when learning to use them. It also took into consideration the design of computers to meet such requirements. A questionnaire and interview survey was carried out with 353 participants aged 50 and over. It provided the results from a design and marketing perspective. It emphasised that simplicity was imperative as well as an application's perceived usefulness.

The study also lacked quantitative data collection, analysis and interpretation. The study was influenced by institutional factors (e.g. some having pre-conceived notions or misunderstanding about the nature of the course and being deterred by it). The barriers relate to the cognitive processing of material, namely the jargon and documents associated with learning. The 'regulated learning' style proposed by Vermunt (2004) applies to this study in which the learning of computers was undertaken to answer own questions and for interest purposes. Finally, the learning carried out was based on the experiential learning style as proposed by Honey and Mumford’s (1989) conceptual learning framework. This study did not take into consideration the effects of ageing. It also utilised one data collection method and although it was successful in achieving the aims, it could have been complemented by other methods to explore such issues further from the initial findings.

2.4.7 An analysis of automatic teller machine (ATM) usage by older adults: A structured interview approach

Trentin (2004) carried out a study which found that there was evidence to suggest that some users have difficulty in using the widely pervasive ATM system. The study focused on ATM usage by older adults. The data collection methods consisted of telephone interviews along with individual structured interviews. The aims were to establish the problems that were encountered using the systems, to determine how ATMs might be better designed including identifying the training requirements associated with older adults. The data obtained compared three variables: Age, sex and ATM usage. It also addressed the issue of non-adoption and concerns of users and non-users. Reasons for the non-uptake of ATM systems included:

- Not having a requirement to use one
- Safety issues associated with them
- Using the bank instead
- Preferring to consult with other people
- Not having sufficient knowledge on the utilisation of ATMs

Difficulties included:

- Hardware issues e.g. if a mistake or error was made
- Social factors e.g. intimidation from queues
- Previous negative experience inhibiting uptake

It does however state that users of all ages can have difficulty in using an ATM. It suggests that a training programme should therefore be developed, specifically tailored to ATM training. Training ideas include part task training, tutorials and guides, memory aids and external cues for utilising the system. Other training principles could include mechanisms that further the retention after periods of non-use. Older adults state that there should be a specific training programme for utilising the particular technology.

This study was conducted in 1996 so is somewhat dated. However, ATMs have not changed by a significant amount and are still prevalent in today's technologically revolutionised society. Other digital technology usage such as with mobile phones and train information kiosks (which are considered relatively prevalent currently) may have better equipped older adults with additional technological experience. This could result in knowledge and experience transfer and enhancing learning progression in using ATMs and makes the engagement rewarding. The study provides rich data on the barriers for the non-uptake or limited use of ATM systems. It uses a structured interview process which generates rich data but its breadth is limited. It also only investigates one particular technology, an ATM system. The methodology also imposes 'structured' answers, and prohibits the participant from elaborating upon any answer. Due to the nature of the telephone interviews, a participant may not answer as reliably and with as much integrity as with other methods such as semi-structured face to face interviews. This study of learning to use an ATM is underpinned by the experiential (Honey and Mumford 1989) and behavioural learning styles (Shelbourn 2002). There are situational factors pertaining to the learning of such a technology (Findsen 2002). Any potential training methods to be implemented are within classroom based settings which draw on Entwistle et al's (2001) strategic approach to curriculum design. Such strategies within an approach should be considered, within a pedagogically based setting when developing a training programme for a specific application.

2.4.8 E-learning and the third age

This study (Trentin 2004) used the 60 and over age group to define older adults who have entered the "third age". It asserts that contemporary society offers a range of opportunities including that presented by ICTs. The study was based in Italy and its purpose was to train about 600 over 60s in using ICTs. The results of the e-learning activities were analysed. The e-learning activities comprised a series of exercises. The objectives of the activity were to propose short, online learning modules on the use of the internet for older users. It also aimed to survey older users' attitudes to e-learning as well as to analyse the follow up of distance training activities.

It was found that:

- 26% completed all exercises

- 32% completed about ¾ of the exercises
- 18% completed no exercises
- 15% completed about ¼ of the exercises
- 9% completed about half the exercises

There was not a significant difference in the completion rates; the completion rates were approximately evenly distributed. Just over half of participants completed at least ¾ of the exercises.

Qualitative analysis showed that the following choices were popular regarding the utilisation of the digital technology included:

- Checking for news updates
- Engaging with local authorities (e.g. councils)
- Engaging with government bodies
- Engaging with associations (e.g. sports and voluntary groups)
- Financial reasons

In terms of learning, older adults prefer direct personal interaction compared to younger people. Reasons found were that practical learning methods were used when there was unfamiliarity and uncertainty with the device and learning methods should embrace emotional and social factors.

As such, it is not feasible to propose purely e-learning training approaches. A blended solution would seem appropriate in which individual and group e-learning can be combined on the internet. It should also be noted that the response times, motivations and needs of older people differ to that of younger people. There is a need for specific training for the designers of e-learning for the third age and for the online tutors. This was another study similar to Trentin's (2004) and Goodman et al's (2003) studies which focused on one particular technology or application device. The participants considered the teaching method utilised to be effective, despite some disorientation and uncertainty about communication via the internet. It emerged that six months after the course, most participants continued to use the internet, as well as to increase their knowledge of ICTs. It focused on e-learning activities using the traditional PC desktop paradigm. From the results it is clear that the e-learning process should be enhanced to enable ease of learning. This group distribution (of success rate) may also be attributed to a lack of previous experience with technology in general. The study focused on a teaching and learning setting which was e-learning with one particular technology. The study used quantitative data and exercise experiments to base its assertions and make comparisons between statistical data sets. The study was limited in terms of qualitative data, so there was less exploration of a number of other related topics. It also excluded those 'older adults' in the 50 to 59 age group. There may also be cultural differences which reflect the findings as the study was based in Italy rather than the UK. This study was underpinned by a pedagogical approach in a virtual domain. The learning is related to situational factors as proposed by Findsen (2002). The learning styles are a combination of experiential and pragmatist based learning, in addition to democratic learning, as proposed by Honey and Mumford's (1989) learning framework. In terms of Vermunt's (1994) learning styles, it is underpinned by a dialogic theoretical approach (e.g. the dialogue exchanges that occurs in the virtual setting). It was underpinned by an independent learning approach in a virtual environment, yet with structure (e.g. the exercises that were set).

2.4.9 U3A online: A virtual university of the third age for isolated older people

Swindell (2002) conducted a U3A online programme providing courses of an intellectual and virtual nature for older adults. It was aimed towards older adults who are restricted by distance and logistics to traditional U3A venues. This was achieved via e-learning. Two studies were conducted that revealed the characteristics and aspirations of participants that took part in the programme. Telephone interviews and questionnaires were used as the data gathering methods. The studies showed that older adults, who do not partake in courses via the conventional and traditional learning and teaching method in classrooms, showed purpose and excitement from the virtual U3A courses and communities. The paper presents the notion that various benefits can be gained by older adults with online access, coupled with intellectual learning and conversing informally within community groups. It has often been the case that the social aspect of learning is a key motivator for the uptake of learning activities, and such virtual learning offers this.

Qualitative responses included:

- Fulfilment being achieved by being part of an online community and keeping in contacts with other participants after the course
- Enjoyment from communicating with other members of the group
- Enjoyment of learning and being part of the group

- Forming relationships with other members
- The notion that learning also carries a “discuss and share” element to it

The preferred learning method statistics that were established are as follows:

- 68% of participants preferred to have some contact with the course instructor and colleagues
- Just 12% preferred not to have contact with the course instructor and colleagues
- 20% of participants preferred to have considerable contact with the course instructor and colleagues

The first statistic indicates that the combination of a pedagogic and andragogical approach may be effective, although informal or formal based approaches should be ascertained. The study was however biased in that it focused on members who were likely to value education and learning, similar to Mederios’s (2008) study on ageing influences on the experience of ICTs. In the study 80% of respondents had completed high school or higher level education. However, it should be noted that there were various other forms of learning (both vocational and non-vocational) that were taken up by a wide variety of participants, irrespective of former background and culture. The name of the study which contains “university” may also influence a potential new learner’s perception on the type and nature of the learning available. The U3A initiative provides a good platform for achieving learning outcomes in a virtual setting. As a result, other organisations and learning centres may adopt this approach into a course (or courses). This study did not take into consideration U3A members' prior technological experience. This could have had an influence on perceptions and attitudes to the uptake of virtual distance learning. A combination of pedagogical, andragogical and independent approaches were utilised. The older learners collaborated with the instructors, other learners, as well as independent learning. The data collection methods were somewhat structured, and the study may have benefitted from a personable, 'open ended' and unstructured approach to data collection, such as through the use of self-reporting via research diaries. Also, as this method involved actually engaging with a computer, structured observation may have been necessary in complementing the two existing data collection methods.

While the data provided was considered rich for the specific study, it did just focus on e-learning and its preferences and non-preferences. Further, both situational and institutional factors influenced the use of learning in a virtual environment based upon Findsen's (2002) styles. A multimedia based mechanism, underpinned by a collaborative (Mitnik et al 2009) and possibly democratic learning style (Qvist 2012) theoretically underpinned the preferred learning practices in the study. The learning preferences within this study are based upon the styles of both 'affective' processes as well as a 'dialogue process' of providing stimulation during the learning process (Vermunt 1994). An 'andragogical' approach was used, as collaboration occurs with other learners, as well as the instructor, although in a 'facilitated' teacher directed approach.

2.4.10 Informal learning in an online community of practice

Gray (2004) conducted a study based upon informal adult learning in an online environment. The adults participated in an online community of practice which was designed to support informal work based learning. Participants engaged with the skills and culture surrounding such practice, while the practitioners themselves expressed their own perspectives of their work. Motivations to participate included:

- Learning new skills
- Learning new work practices
- Establishing social and professional connections
- Reducing isolation

The paper focused on virtual community learning outside the teacher and student model. It was important to understand how online communities can serve an organisation as well as the learning and participation involved in these voluntary contexts. The purpose of the study was to establish to what extent participants' experiences in a virtual environment constituted a community of practice. A theoretical framework based upon the concepts of adult and workplace learning was used. It proposed that people learn about and explore intricacies of their job as well as providing continual professional development. An anthropological perspective was used relating to how adults learn through social practices.

The methodology used a multimethod approach of qualitative enquiry. The data collection included online communication transcripts such as email. A survey was also used which consisted of 16 multiple choice and seven open ended questions. A total of 11 participants were selected. These were selected from both ends of the spectrum of job experience, technical skills, and comfort in using online technologies, participation patterns and geographical location. The data was then analysed using a communities of practice framework. The study found that online learning can be used as a community of practice and it can also be used for informal learning.

There were also challenges presented. These included technical challenges related to the processing of the computer. The participants also stated that they would prefer to utilise simpler technologies such as an electronic mailing list. There was also a perception of being overwhelmed with the technology, after inactive participation. Overall the virtual learning accommodated both newcomers and experienced practitioners. However, the Australian study conducted by Swindell (2002) found that some participants wanted to engage and participate in online interaction whereas others did not.

This paper demonstrated that learning can successfully be achieved via less conventional ways. It emphasised the idea of engaging with a virtual community of people to learn from one another. Such informal learning has proved effective and has been considered by many as an entertaining way to learn. An advantage of this approach is that members of varying experiences, ages and genders can participate. However, the disadvantage with such learning is that it does not have as much structure, as say, formal learning methods. It is another study which focused on one particular technology. Learning informally in a virtual environment with the collaboration of an instructor and other students could prove a very successful way to learn. It does however assume that the participants are ICT literate (e.g. to have previously utilised virtual platforms). For this reason it may exclude those who have not used ICTs before, or much at all. The participants do not for example have a personal instructor to assist and support them through the learning process. A "virtual assistant" could however prove quite popular, and be used for training, development and learning purposes. While such a study has shown an interest in learning via informal virtual methods, other studies such as that by Goodman et al (2003) have produced results which contradicted this (e.g. via a pedagogical approach with a traditional course). The sample size that took part in the surveys would be considered relatively small so the findings should not be generalised to the overall population. The study also lacked a quantitative approach for reinforcing or testing previous qualitative findings, or exploring further findings found from the qualitative data. The learning methods and attributes of these in practice are underpinned by the 'learning orientation' and 'regulation of learning' styles (Vermunt 1994). There were also individual attitudes and perceptions with such learning (Findsen 2002). This study also revolved around an andragogical approach to learning, in which collaboration and dialogue occurred between the learners, as well as the instructor providing appropriate facilitation.

2.4.11 Older adults and e-learning: Opportunities and barriers

Githens (2007) produced a paper which discussed the dynamics of learning and work for older adults, as well as myths about the engagement between technology and older adults. It also discussed different types of e-learning programmes for older adults. Finally it provides barriers to older adults' participation in e-learning.

E-learning is used for 27% to 38% of all formal learning programmes in organisations. For personal growth and social change, learning providers include community education programmes, the U3A, lifelong learning institutes, community colleges and university programmes. For workforce development programmes learning providers include community colleges and workforce development centres. With workplace learning programmes, the learning providers include employers and volunteer organisations. The barriers to participation range from negative stereotypes to usability issues. They include:

- Negative perceptions: Experiments were conducted in memory recall with young and older adults. They were exposed to two studies: One portraying positive stereotypes regarding 'older' older adults and another portraying negative stereotypes with 'younger' older adults. With the older adults the negative stereotypes had reduced memory performance, where positive stereotypes increased memory performance. With the ‘younger’ older adults there was no significant effect on the memory performance. It was also found that:

- There was a lack of training opportunities for older adults in workplace settings.
- An online medium would provide opportunity for privacy and safety.
- Technical problems: Even with programs such as the U3A, technical support guides should be provided. Findings from Githens (2007) study indicated that some methods of virtual communication may be suitable for older adults.
- There are a number of usability issues that the National Institute on Ageing and National Library of Medicine has recommended. These included a number of usability standards for older adults.
- A method to provide a less structured online learning course is through interpersonal interaction and dialogue, both in person and virtually
- Problematic new technologies such as games based learning have been incorporated into e-learning programmes. This could be considered an entertaining and effective way to learn. However, the needs of older adults have not been considered through the design and development phases of the games based platform. Mobile devices and mobile learning also present challenges to older adults. These include the displays and keyboards being too small to use.

A key finding from this study was that appropriate guides and instructions should be supplemented with virtual forms of learning. This reflects the cognitive learning style within Honey and Mumford’s (1989) learning framework. Such e-learning should also be conducted in the workplace, as there is a lack of it. This lack of engagement is underpinned by institutional factors as identified by Findsen (2002). The 'dialogue model' theory is also utilised in virtual environments, as proposed by Vermunt (1994). Another key issue was to identify the needs and requirements of the older adult learner, in terms of learning ICTs. The 'learning orientation' and 'affective processing' styles identified by Vermunt (1994) both theoretically underpin such requirements.

2.4.12 Studies comparing learning and support mechanisms previously utilised by older adults

The most widely used learning and support mechanisms that older adults utilised, in ascending order, according to the Digital Lifestyles Ofcom (2009) report are:

1. Informally by asking friends, family or work colleagues
2. Reading the manual
3. Through trial and Error
4. Through the supplier or store
5. Going to a class (Ofcom 2009)

However, according to a study by Goodman et al (2003) learning methods and preferences for learning to use ICTs by older adults gave the following:

- Participating in a course (47%)
- Using ICTs within a work setting (28%)
- Being self-taught (14%)

- From a relative or friend (14%) Goodman et al (2003)

The surveys do not however go into detail as to the particular learning methods. Both surveys indicate that all modes of learning (and aspects associated with these methods) should be of importance when considering the learning provision of older adults and ICTs. Moreover, the repeated themes reinforce some of the learning and support mechanisms that older adults use. The surveys also suggest that further research is required into establishing previous learning and support mechanisms that have been successful or not so successful.

This chapter provided key statistics and empirical based studies on ageing, learning and ICT engagement of 'older adults' to justify why the research was required. The review was to formulate both the research aim and objectives as well as choosing and refining a suitable methodology for achieving the aim and objectives of the research project.

The next section provides justifications as to why the research is required. The justifications are based upon the evaluation of the theoretical, statistical and empirical based studies. It identifies and elaborates upon the key reasons to carry out the research.

2.5 Justification of why the research is required to provide an original contribution to knowledge

The demographic statistics show there is a lack of both engagement between older adults and learning and ICTs as separate entities. A review of the literature reveals that studies on 'older adult learning' and ICTs tend to be small scale and focus on a particular ICT device at one point in time without reference to user context, relevance or purpose. It does not therefore focus on various digital technologies. The literature is limited in considering and exploring what may be considered 'new' and emerging technologies (such as new mobile devices and social networking platforms). There is a lack of knowledge and understanding in the learning and support of older adults that takes the new dynamics of ageing and ICT usage and development into consideration. In particular there is minimal research that considers the impact of such ICTs on older adults' attitudes, preferences, reservations, which also examines factors such as changing circumstances that are related to the new dynamics of ageing. Independent and in-depth knowledge and understanding will be provided on how older adults learn to use ICTs, how they are engaged with them, as well as new and potential learning methods and strategies to consider. The study will consider aspects of traditional and virtual learning methods as well as those with minimal use or do not use ICTs. There are no learning strategies within a framework consisting of different categories which have been proposed, that take into consideration the new dynamics of ageing. This new dynamics of ageing refers to how changing motivations and requirements have influenced the learning uptake of digital technologies. It as such considers what makes the learning of them effective and ineffective. This is with the over 50 population. Many other studies do not take into consideration those over the age of 50. While the age definition of an 'older adult' is subjective, limited studies have included those above this age. Most of the research surveyed does not consider the new dynamics of ageing such as changing motivations, requirements and 'learning capacities'. Those who have limited or no experience of ICTs are important in providing the appropriate understanding to contribute to the formulation of learning strategies within a learning framework consisting of different categories. The literature reviewed has been surveyed to support the arguments of establishing appropriate knowledge and understanding between older adults and ICTs. Such themes established within the secondary source literature may for example be re-iterated or explored further. There are other studies that focus on the utilisation of ICTs for learning, such as Kirsti et al's (2008) study.

As mentioned previously a study by Goodman et al (2003) and Ofcom (2009) produced different findings on learning and support mechanisms previously utilised. While these studies are several years apart, it is due to studies such as this that further work is required regarding the learning of older adults with ICTs. Most of the studies have used a qualitative interview approach, surveys or both (e.g. using interviews to follow up on survey data or vice versa). The triangulation utilised within such methodological approaches is limited however.

In terms of the methodological approaches, there were no studies in the context of this research which were underpinned by participatory action research (PAR). Further, there were minimal studies that utilise a mixed methods approach consisting of both quantitative and qualitative methods (including that of self-reporting cultural probe research diaries) that had been applied to generating knowledge and understanding of the older adult learner and ICTs.

This will be achieved using a unique mixed methods methodology which is underpinned by the principles of participatory research as well as a desktop study. It is unique in this field because it collaboratively and actively engages co-researchers (the research participants) in creating dialogue to explore the challenges, opportunities and motivations that older adults are presented with when learning how to use ICTs. The questions and topics of discussion will depend on previous responses elicited by the research participants. The methods employed are considered different in nature.

The next section provides the conclusions and summarises the chapter.

2.6 Literature review conclusions

To conclude, the literature review explored and evaluated empirical studies of what has already been established and is known within the field of older adult learning of technologies with respect to the new dynamics of ageing. The styles that underpinned such learning approaches and mechanisms were also surveyed. The review explores and evaluates the research methodologies (and methods that comprise them) that have been utilised in the field, as well as relating studies and theories. The theoretical and empirical based studies consider learning theorists, learning practitioners or educational psychologists. It was required to identify gaps in the research, and propose a project that considers the learning of various digital technologies (ICTs) by older adults with respect to the new dynamics of ageing (e.g. changing requirements, motivations and ‘learning capacities’). Core components of the research, not considered in previous studies, include the learning and support needs and requirements of older adults with ICTs that take into account various digital technologies, with respect to the new dynamics of ageing. Moreover, many studies lack a ‘mixed methods’ approach, with a participatory action research emphasis.

In order to meet the research aim and objectives, a suitable and appropriate methodology is to be utilised, which is described and evaluated in the next chapter.

3. Research Design and Methodology

To achieve the research aim and subsequent objectives that were fundamental to this research project, a particular research design and methodology was chosen. It was based on its problem solving nature and approach to working collaboratively with older adults in an ethical manner. This was a mixed methods methodology with a qualitative bias and underpinned by the principles of participatory action research (PAR). It puts those taking part in the research at the forefront of the study and engages them as research partners. It produces knowledge and understanding by the co-working of older adults taking part in the research. The methodology comprised semi-structured interviews, focus groups, research diary workshops and quantitative surveys. The analyses for the qualitative and quantitative consisted of coding, framework, affinity diagramming and SPSS respectively.

This chapter begins by describing the key problems that are to be addressed, and then describes the nature and composition of the multi methodological (mixed methods, qualitatively biased) approach which was used to achieve this. The methodological approach is then evaluated in terms of its advantages and disadvantages, and why it was chosen to fulfil the research outcomes, followed by a discussion to consider validity issues. This chapter then considers some of the philosophical propositions that the research is underpinned by, namely epistemological considerations. It then details the data collection methods (questionnaire surveys, semi-structured in-depth interviews, focus groups and research diaries) that comprise the overall mixed methods methodology, and how they relate to the aim and each of the individual objectives.

The next section describes the research participants taking part in the research, including strategies used for recruiting and establishing rapport and trust with them. The ethical issues and how they were addressed are then discussed. The self-reflection and evaluation process which is integral to participatory action research is then discussed. The key stages of the research process are summarised in diagrammatical form which is followed by a detailed description of the nature and composition of the qualitative and quantitative data collection methods, and how each question and topic relates to the research objectives and subsequent aim. Three analysis methods were chosen to interpret and turn the data into information: framework, coding and affinity diagramming as these are described. The SPSS analyses that was carried with the quantitative survey data is then described. This was key to interpreting, understanding and establishing relationships between the data sets produced. Triangulation and interpretation are then discussed in relation to aim and objectives and formulating appropriate learning strategies. Finally, a discussion is provided including any difficulties that were encountered during the research.

The next section provides an overview of the problems to be addressed which are encapsulated in the research aim and objectives.

3.1 An overview of the problems to be addressed (the research aim and objectives)

The research problems (as outlined by the aim and objectives) must firstly be addressed.

The aim and objectives of this research are based upon deductive theory, that is, a hypothesis that is deduced from empirical scrutiny about works that are and are not already available. As such, the aim of this research is:

To formulate a framework of learning and support strategies consisting of different categories for older adults to further engage with digital technologies (ICTs) and to realise the benefits they can bring

To fulfil this research aim, three fundamental research objectives will need to be achieved. These are:

1) *To identify and elaborate upon the learning and support mechanisms that older adults currently use, and how they are engaged with ICTs*

   The first objective was addressed by questions and topics pertaining to learning mechanisms used and ICT engagement contained in the 'digital engagement' themed questionnaire, semi-structured in-depth interviews, focus groups, cultural probe workshops and the IT users' survey. It identified and elaborated upon what learning and support mechanisms older adults used to learn to use ICTs, as well as specific technologies pertaining to this learning.

2) *To identify new learning and support mechanisms to further older adults' engagement with ICTs by also considering aspects of established learning methods and platforms*

The second objective was addressed by questions pertaining to new and alternative learning and support, as well as successful aspects of learning methods and platforms within the semi-structured in-depth interviews, focus groups and cultural probe workshops.

3) *To interpret and synthesise the data as a platform for formulating appropriate learning strategies to help older adults learn how to use, enable and further their engagement with ICTs*

For Objective 3, a method was deduced based upon the aim and objectives 1 and 2 to interpret and synthesise the findings into producing a framework consisting of different categories. The analyses and interpretations comprise the successful implementation of objective 3. It was a combination of the accumulation of facts and deductive hypotheses that were used to achieve objectives 1, 2 and 3 and the subsequent aim of the research. Objective 3 was also achieved via the analyses and interpretation of the data, which was then used to fulfil the aim of the research of formulating learning strategies that also consider other variables (e.g. differences in learning with respect to age groups). In addition objective 2 was also informed by the Non IT users' quantitative survey (of why those who do not use ICTs do not use them, and what could be done to further their engagement with them).

From these research objectives, in-depth knowledge and understanding between 'older adult learning' and ICTs with respect to the new dynamics of ageing will be formulated. The findings from each of the topics of discussions (e.g. within the data collection methods) will be interpreted and synthesised.

From this, a learning framework consisting of different categories will be produced as a document which will also inform pedagogy (the art of instruction and learning) and andragogy (the principles associated with older adult learning). A framework is described as a formal statement that provides context and broad guidance in relation to various themes (TBS-SCT 2012). In the context of this research, the term "themes" may comprise different methods and environments with regards to learning. The framework will synthesise, clarify and condense the findings from each of the topics of discussion within the data collection method. This will comprise objective 3. To clarify, the framework will also consider a number of related themes including how pedagogy can be optimised (e.g. learning ICTs in formal class based settings) or how learning in different contexts (e.g. with collaborative learning) can be improved. Recommendations can then be provided to social policy organisations such as Age UK, as well as informing research, design and practice in the context of learning technologies. Objective 3 will be combined with objectives 1 and 2 to meet the aim of the research in formulating learning strategies.

As stated, in order to meet these objectives, a methodology is required that fulfils the aim and objectives of the research. It has been designed to produce appropriate validity and reliability. As such, it will generate appropriate data which can then be turned into information that will answer fully each of the research objectives.

The next sub section describes the mixed research methods' methodology that was used.

3.2 The mixed methods research methodology that was utilised

A mixed methods methodology is "*one in which different approaches (e.g. data collection methods) are applied at any or all of a number of stages through the research*" (Tashakkori and Teddlie 1998). In other words, the methodology comprises at least one data collection method, each of which is either qualitative or quantitative in nature. The mixed methods methodology used in this research has a qualitative emphasis and is underpinned by the principles of PAR by engaging the research participants as 'research partners' and working collaboratively with them to co-construct knowledge. As such it is led substantially by the participants. That is, the questions and topics of discussion are formulated based upon the previous findings and questions or topics of discussion (Bryman 2012). They are integral to the process of shaping the nature and composition of the questions and topics of discussion.

The data collection methods were used in systematic combination with one another, to maximise the validity and reliability of the data and thus findings.

The mixed methods approach consisted of:

a) A desktop study of secondary source empirical based literature

b) A qualitative (PAR) approach

c) A quantitative (survey) approach

A substantial part of this mixed methods approach was underpinned by the principles of Participatory Action Research (PAR). The PAR approach co-constructs knowledge and understanding about a topic, problem or project by the co-working of the researchers and participants (or 'research partners'). While those taking part in the research were considered as 'research partners', 'older adult volunteers', 'project co-workers' and the 'researchers' themselves, for the purposes of this thesis, those taking part in the research will be referred to as 'participants'. As such, the research was qualitatively biased, but also complemented quantitatively.

The PAR approach may comprise different individual methods, but its main focus is about establishing rapport and trust between the researcher and those taking part in the research, to maximise the validity and reliability of the data produced.

McIntyre (2008) defines PAR as the following:

1) *"a collective commitment to investigate an issue or problem"*

2) *"a desire to engage in self and collective reflection to gain clarity about the issue under investigation"*

3) *“a joint decision to engage in individual and/or collective action that leads to a useful solution that benefits the people involved”, and;*
4) *“the building of alliances between researchers and participants in the planning, implementation, and dissemination of the research process”* (McIntyre 2008).

The desktop study consisted of locating and critiquing, in the context of the objectives, empirical based topics around:

a) Learning styles
b) Pedagogical (the art of instruction and teaching) and andragogical (the principles of adult or older adult learning) approaches e.g. in teaching environments
c) Individual studies on specific digital technologies, and usage and engagement

The qualitative PAR data collection methods consisted of:

a) 10 Semi-structured in-depth interviews
b) 3 Focus groups
c) 3 cultural probe workshops which produced 11 research diaries

The quantitative methods consisted of:

a) The construction of two quantitative surveys; one which was designed for those who already use and are engaged with ICTs and another for those who do not use ICTs

b) The quantitative analysis (supplemented by qualitative descriptors) of learning questions of a ‘digital engagement’ survey linked to the SUS-IT (Sustaining IT Use to Promote Autonomy and Independence) project.

The next section evaluates the mixed methods methodology that was utilised.

3.3 An evaluation of the mixed methods methodology

This section evaluates the mixed methods methodology and the methods that comprise it, including their advantages and disadvantages in relation to the research. It is important to evaluate the methodology chosen, as it can influence the validity of the research. Any potential influences should be addressed to minimise this. The advantages of the mixed methods approach are discussed next.

3.3.1 Advantages of the mixed method’s methodology

There are three key distinct advantages with the ‘mixed methods’ research approach. The first is that the combination of a quantitative and qualitative method for obtaining data provides a complete account of an issue, to support an argument. This is especially apparent when contrasting the use of just one method (Bryman 2012). The second is that the findings from one method are linked to the design of another. For example, the findings from the semi-structured in-depth interviews would influence the design of the focus groups

(Bryman 2012). The third advantage is that triangulation can be used to enhance the validity and integrity of the findings. This is when at least one method is used as part of the validation process (Campbell and Fiske 1959).

Along with the associated advantages of the data collection methods utilised within the mixed methods' methodology, a number of other key positions and ways qualitative and quantitative methods are combined are integral to the outcomes of this research which are briefly outlined below:

- Triangulation – In which qualitative and quantitative methods are combined to reach a goal and to also reinforce and validate findings using at least two methods
- Offset – An apparent weakness in one method is complemented by the strengths of another method
- Completeness – This allows for a detailed overview of the topics being researched. It should be noted that some learning topics will overlap, as this is also reflected by overlapping questions set and subsequently answered by the participants.
- Credibility – Using at least one method within the methodology will improve the credibility of the findings (Bryman 2006)

The methods comprising the mixed methods methodology were strategically chosen to maximise the validity, honesty, integrity and depth of the research. Both qualitative and quantitative methods were used. Relying on just one method may give rise to bias, in that the data collected are not artefacts of one specific method of collection (Lin 1976). Also, if methods are contrasted with one another the outcome will be confident, assuring and reliable results. In this case, the findings from the focus groups may reinforce findings from a topic of discussion in the semi-structured in-depth interviews. This would increase the topic or theme's validity (Lin 1976). The disadvantages of the mixed methods approach are described next.

3.3.2 Disadvantages of the mixed method's methodology

There are also some disadvantages with a mixed methods approach from an epistemological perspective. Two such disadvantages are the embedded methods and paradigm (a cluster of propositions) arguments. The former is that research methods carry epistemological commitments in that it is not just about collecting the data. If two data collection methods (quantitative and qualitative) are utilised to study social reality, for example, irreconcilable views will be held about how it is studied. This is because of the epistemological positions of qualitative and quantitative data collection research methods (Smith 1983). The latter is an epistemological position in which such mixed methods research represents differences in paradigms and natures. The qualitative and quantitative research methods are considered separate entities or paradigms (Bryman 2012). For example, the semi-structured in-depth interviews and surveys would be considered 'incompatible' and based on such epistemological considerations not really combined. This is because qualitative and quantitative are of separate paradigms (e.g. being classed within 'subjective' and 'objective' domains).

The next sub section identifies and elaborates upon the weaknesses associated with the methodology and addresses them.

3.3.3 Identifying any potential methodological weaknesses and addressing them

There are some fundamental weaknesses with the mixed methods methodology, in terms of the actual methods utilised. With the semi-structured interviews and focus groups, there is likely to be some bias in understanding and interpreting each answer provided by each participant. In other words, interpretations are likely to differ from researcher to researcher (BCU 2012). To minimise bias and keep the findings objective in relation to the question, logical assertions were maintained throughout which were based closely to the answers provided. Another disadvantage is that respondents must answer within the question category, and this may be perceived as somewhat limiting or even impersonal (Patton 1980). However, it was imperative that appropriate responses mirrored such question sets to provide knowledge and understanding on particulars of older adult learning and technologies. The structured questions drew on various aspects of learning in relation to ICTs.

<u>Research diaries at cultural probe workshops</u>

Research diaries are mechanisms for obtaining recordings based upon actions and behaviour e.g. learning. Such diary studies are considered appropriate methods of achieving valid and reliable data. However, certain factors such as the frequency of different forms of behaviour are required. Other disadvantages with such a method include the process of attrition due to the participant lacking interest, as well as becoming less diligent over their recordings (Bryman 2012). However, a solution to this has been for the researcher to record the actions of the researchers (due to the workshops being hosted at the *Nottingham Elders Forum*) and recording observations without any interruption. This was agreed upon prior to any engagement with the mobile technology devices.

Quantitative surveys

With the secondary analysis of learning questions within the 'digital engagement' themed questionnaire, the drawbacks with such a method include the unfamiliarity with the data (Bryman 2012). However, this was achieved by reading over and studying the learning questions, and gaining familiarity and responses to them. Another drawback is attributed to the complexity of the data (Bryman 2012) and this was true with the volume of the questionnaire. However, it was managed by applying a coding analysis, as well as being supplemented by qualitative descriptors. The third drawback was not being able to design the questionnaire, which influenced data quality (Bryman 2012). This was overcome by designing two, appropriate questionnaires. The final drawback was the omission of key variables to be researched (Bryman 2012). However, appropriate variables were included in the IT and Non IT users survey. It should also be noted that a limited sample size was used, so the results produced from the quantitative surveys were used to inform the research, as well as reinforce or test findings found from the previous qualitative methods e.g. interviews, focus groups and cultural probe workshops.

With the quantitative surveys, there might not be additional assistance to prompt or help the respondents, should they have difficulty in answering a question (Bryman 2012). However to minimise this, the questionnaires were designed to maximise accessibility and read coherently. An instruction and information document was also provided. Also specific answers cannot be elaborated upon which can give some very important and useful feedback (Bryman 2012). However, at the end of each question, participants could if they wished, elaborate or provide any other information in relation to what has been asked. It took participants about 3 to 5 minutes to complete the questionnaire. While the length of the questionnaire was kept reasonably short the number of A4 pages was 10 and 12 for Non IT and IT user's survey respectively. Although the questionnaire was kept reasonably short while also answering the key research questions, this page quantity perception may have deterred potential respondents from completing them. This may thus influence the response rate and therefore sample size. However, it was necessary to use that specific format, and coherent instructions were provided to assist with the completion of the questionnaires.

The next section describes further validity issues, associated with the research, which are central to it.

3.4 Further methodological issues to be addressed

The following key terms are explained: Reliability, Generalizability, Transferability and Validity as well as ways to address methodological issues.

Reliability

The term reliability refers to results which are considered consistent over a period of time and are an accurate representation of the total population under study, as well as results being produced under a similar methodology (Golafshani 2003). If there is consistency with answers provided by the qualitative and quantitative methods at two different times, then the research methodology and its methods are considered to be reliable. It is as such determining whether the results are replicable.

Generalizability

Generalizability refers to the ability to generalise the findings from the sample population to the overall population to which it was drawn. Such generalizability may not be absolute, but is considered statistically probable. It requires obtaining data from large populations which is more associated with quantitative research. The larger the sample, the more generalizable the results are (CSU 2013).

Transferability

Transferability is similar to external validity in that it refers to the extent of which findings can be generalised (UniSA Institutional Repository 2013). As such it refers to whether findings and relationships found with a specific population, at a specific time and place would be observed with other populations, at other times and at other places (Maxfield and Babbie 2001). This includes various sub groups, the current time era, settings and not the overall population (in which generalizability refers). Such sub groups with this research context include disability groups which in the context of this thesis is a broad term defined as those who consider themselves with an inability or limited capacity to use technology. Both Lincoln and Guba (1985) emphasise the need for providing the appropriate data to allow for such transferability to take place rather than an index for it.

Validity

The term validity refers to whether the research measures what it was intended to measure and whether such results are accurate. It considers the integrity and therefore validity of the findings generated from the research. In other words it is assessing the accuracy of the results provided. As such the term validity can be described by a number of terms including trustworthiness, worthy, relevant, plausible and confirmable, credible or representative. Further, the term validity should also consider a 'realist' approach (Denzin and Lincoln 1998). This is whereby validity is determined represents accurately the phenomena that are intended to describe, explain or theorise (Hammersley 1997). Validity is of considerable importance in producing findings of integrity and making the research effective and contributing to knowledge.

There is no “state” of validity as such, but validity should be considered as a matter of degree instead (Gronlund 1981). While methodological strengths and weaknesses have been evaluated pertaining to the validity of the different data collection methods used in this research, the concepts and types of validity of the entire methodological approach to the research are also of importance. Issues that pertain to validity (and how they were a potential issue with the research) included:

- Ensuring that resources were adequate
- Choosing an appropriate methodology
- Selecting appropriate instrumentation
- Using an appropriate population sample
- Devising an appropriate instrument
- Minimising bias (Cohen et al 2005)

Each of these issues was addressed at the design stage of the research and the ways in which these were met via solutions are described.

Adequate resources

Adequate resources were made available for the quantitative surveys by providing appropriate instructions, explanations, the actual questionnaires in print format, a SAE to return the questionnaires while also allowing an appropriate amount of time to complete the questionnaires (e.g. in the lunch clubs). Each Age UK lunch club was contacted via telephone and consent was obtained prior to any questionnaires being sent out, with the research itself being fully explained. With the interviews, focus groups and cultural probe workshops, papers and pens were made available, should those involved prefer to write down notes or observations based on their experiences and discussions. The interviews were kept within a reasonable timeframe (the maximum duration of 10 minutes) while still eliciting all the necessary data so that it could be turned into information. Any further discussion or explanation about specific aspects of the research at the participant's request was provided by the researcher at his discretion. Any clarification or explanation about a question asked was again provided by the interviewer as it was absolutely paramount that, in order to maximise validity, the question should best be understood.

Appropriate Methodology

The methodology was chosen due to its problem solving nature approach by combining both qualitative and quantitative methods to answer the research questions with appropriate validity via triangulation. A substantial part of it also involved working interactively and collaboratively with older adults in an ethical manner, while still being an excellent problem solving approach. Each data collection method or stage was designed to fulfil the individual objectives and aim, while also incorporating triangulation (as discussed in the next section) to answer the aim and objectives while maximising validity. A key component of the methodology allowed and encouraged the participants to self-reflect their learning methods and consider new ones or aspects of methods that influenced learning as a spirit of reciprocity. Finally, putting users at the forefront of the research was considered imperative to elicit data to understand the ways in which older adults learn to use or could use technologies with collaborative learning and not necessarily in experimental based settings.

Instrumentation

The methodology incorporated a number of strategically chosen instruments (also known as methods) to collect, analyse and interpret the data, exploring both related and unrelated topics to answer the objectives and aim of the research while trying to reach consensus. They were mainly qualitative methods complemented by a quantitative method. They allowed the participants to project their views, document their experiences (with the researcher assisting such documentation) as well as answering the self-completion questionnaires. To re-iterate the data collection methods consisted of semi-structured interviews, focus groups, and cultural probe workshops. Both coding and framework approaches were utilised to analyse and interpret the data. A platform was formulated to interpret and synthesise the data into producing learning strategies within a learning framework consisting of different categories.

Population sample

An appropriate population based on a convenience sample approach was chosen to participate in each of the 10 interviews, 3 focus groups, 11 research diaries and the surveys. The population consisted of any person over the age of

50. This population was sub-divided into further categories which were differentiated by a) gender and b) age categories (e.g. 50 to 59, 60 to 69 and 70 and over) and c) their previous experience of technologies.

The convenience sample strategy

The convenience sample strategy was used because data can be gathered efficiently due to wide availability of the population sample (those over the age of 50) for both qualitative (e.g. interviews and focus groups) and quantitative (e.g. surveys) methods. It involves the selection of the most accessible participants (Marshall 1996). This is because most, if not all, people who are over 50 will be situated at the Age UK lunch clubs and Nottingham Elders Forum. As such it is readily available and cost effective, as any member of the over 50 age population can participate in the research.

Devising a platform for producing the framework

The formulation of a platform was important in producing a framework of effective learning strategies. It involved taking the analyses from each question in each data collection method. So question 1 for example in the semi-structured interview was answered 10 times by 10 different participants. The answers were analysed via coding and framework analysis. The findings were compared in relation to the question. The key to the platform was its simplicity, in processing the outputs from the framework and coding approach, into producing meaningful information in a structured and framework consisting of different categories as a document. The platform was required for the aim yet objectives 1 and 2 were pre-requisites.

Minimising bias

As discussed previously, it was important to maintain a neutral and supportive stance when engaging with all participants, yet not to influence any answers provided by the participants. This was especially important when conducting the interviews, as well as interpreting the data. Bias can result in both the qualitative (e.g. interviews, focus groups and cultural probe workshops) and quantitative (e.g. surveys) methods. Key causes of bias in interviews and focus groups include the characteristics of the interviewer, respondent and nature of the questions (Cohen 2005). In particular it was important to be both neutral yet supportive.

To minimise bias with the interviews and focus groups (that is the data collection through to the interpretation) the following was applied: a) a neutral and opinion-free approach b) no answers were sought that supported any preconceived notions and c) any potential misunderstandings were addressed, both with the questions that were being asked by the interviewer and the answers provided by the respondent. With the quantitative surveys the main drawback was the sample size. Both questionnaires received a total of 66 responses. While this was not necessarily generalizable to the older adult population, the findings were used as an indicator and as such for informing, as well as testing or reinforcing previous findings. There was also some bias in the cultural probe workshops with observations and the recordings obtained. This is due to interpretations being present. The presence of the researcher may also have influenced the learning of technologies by the older adult participants and therefore the findings.

Statistical significance (of the quantitative data and findings) which is about the estimation of confidence that the results can be generalised to the overall population is also of importance. In the context of this research it determines whether there is a significant relationship between at least two variables to explain phenomena. It involves setting up a null hypothesis and establishing a level of 'acceptance'.

The next section describes some philosophical epistemological considerations. Such considerations underpin the research design and strategy in providing knowledge and understanding with appropriate validity and integrity.

3.5 Epistemological and ontological considerations

Epistemology is defined as "the study of knowledge" which consists of studying both the nature and extent of human knowledge (Truncellito 2007). Such knowledge can be obtained from various methods of inquiry and methods of investigation. This research project is concerned with studying and understanding the ways in which people learn in relation to a specific context (ICTs). As such, it draws upon a number of methods to collect data, either via 'real time' face to face interviews, written questionnaires or through constructing data by experiencing and using a technology (also known as constructivism). It is important to consider such a research design and strategy in order to provide ‘acceptable’ knowledge and understanding (Bryman 2012).

Due to its mixed methods nature, this research is rooted in three predominant epistemological positions: the realm of interpretivisim, positivism and empirical realism. The term interpretivism is about understanding a subjective perspective on social action, and less about scientific (or quantitative) based methods (Bryman 2012). The term positivism encompasses scientific methods (e.g. the rigorous and quantitative and objective nature of the surveys). The term empirical realism is an epistemological position that considers the use of appropriate methods (e.g. those taking part in interviews, focus groups and expressing their own views through constructivism) so that reality can best be understood. This understanding is based on the accumulation of facts accordingly (Bryman 2012). It is to provide knowledge and understanding in relation to older adults learning ICTs. Empirical realism encompasses elements of both a deductive and inductive approach to the research (Bryman 2012). The research design and strategy employed are based upon the three epistemological elements described.

There are also ontological considerations with regards to the mixed methods methodology. Ontology can be defined as “the theory of the nature of social entities” (Bryman 2012). It is a term denoting how people interact with the world in which they live in.

The research process has used mostly an inductive approach (generation of theories based) complemented by a deductive (testing based) approach. The latter can be used to generate theory (e.g. a learning strategy within the framework consisting of different categories) while the latter can test or reinforce theories or findings. The deductive approach is illustrated in the flowchart below:

Flowchart removed due to copyright restrictions

Figure 3.1: A flowchart to show the key stages in the deductive approach (Adapted from Bryman 2012).

The inductive process is shown:

Flowchart removed due to copyright restrictions

Figure 3.2: A flowchart to show the key stages in the inductive approach (Adapted from Bryman 2012)

The fact accumulation process (using interviews as an example) is illustrated in the flow chart on the next page:

Flowchart removed due to copyright restrictions

Figure 3.3: A flowchart showing the facts accumulation process using three interviews focusing on one topic question of discussion (Adapted from Bryman 2012)

All of these processes have been incorporated into the research design at varying levels. The first 'scientifically based' approach was incorporated into the quantitative aspects of the research (e.g. the surveys). The second, 'constructivist based' approach, was incorporated into the qualitative aspects of the research. The findings were then contrasted and compared appropriately. The third, 'findings gathering' approach, was an accumulation of facts from all data collection methods in reaching consensus on a number of themes.

The research participants were key to leading and directing the research. The next section describes how the research participants were recruited, invited to take part and integrated into the research.

3.6 How the research participants were invited to take part in the research

The research participants were recruited for the semi-structured in-depth interviews, focus groups and questionnaire surveys. The vast majority of research participants that took part in interviews and focus groups were members of the Nottingham Elders Forum. This is a voluntary organisation that seeks to ensure the voices and needs of older people are heard, in terms of services offered, as well as influencing policy and decision makers (Nottingham Elders Forum 2012). The Nottingham Elders' Forum was visited a number of times, and included friendly and informal conversations with its members as part of building rapport and trust with them (which will be described in detail later). The sampling strategy used was convenience which is described as "a sample that is simply available to the researcher by virtue of its accessibility" (Cohen et al 2005). In other words, it is a sample selected because of its availability to the researcher and is a form of non-probability sample. A local library in the town of Colchester was also used to invite participants to take part in the research. The locations consisted mostly of the 60 and over age group, with a higher portion of females in attendance. This reflected the population sample which consisted less of the 50 to 59 age group, and more of the 60 to 69 and 70 and over groups (reflecting retirement age). Also, the sample population recruited from the Age UK lunch clubs, Nottingham Elders Forum and local library are increasingly likely to want to participate in such interviews and questionnaires due to the organisations being concentrated around raising an older adults voice and trying to influence social policy in meeting their needs. The members choose, volunteer and are part of the Age UK and Nottingham Elders Forum. It could be argued that those who attend the library have an increasing interest in topical issues, whether gathered through books, audio, videos magazines or via the computers. The Age UK and Nottingham Elders Forum focus on topical issues and debates related to raising the voices of older adults' social care needs. This poses limitations in terms of the convenience sample due to factors such as age, gender as well as cultural constraints. Cultural constraints were present in not considering members of the overall population and thus other cities and towns in the UK as well as countries. The sample obtained from the local library was likely to be literate oriented individuals seeking to gather information in the form of books, magazines, newspapers and the computers. These factors may therefore give rise to bias in terms of the population sample. The findings are only transferable to that particular population and not in other cities and countries, thus establishing generalizability as well as cultural differences. The findings are transferable rather than generalizable to the population sample used.

The number of interviews and focus groups was decided upon by the project timeframe, including the quantitative methods, as well as seeking to provide a diverse set of answers and responses with appropriate rigour and trustworthiness. The data analysis and interpretation was an inherent part of the interviews, focus groups and research diaries. In terms of selecting the number of interviews and focus groups, the aim was to explore previous and current learning and usage of ICTs and aspects that made them effective and ineffective in relative depth. As such, 10 interviews and 3 focus groups were carried out. It was also decided that no further interviews and focus groups would be necessary, as the findings and analyses had answered the research questions sufficiently. The design of the question sets also allowed for breadth to be ascertained. The participants who completed the research diaries comprised 7 females and 4 males who were members of the Nottingham Elders Forum. The rapport and trust was built up with them by informal friendly conversations by explaining their importance in this research. The cultural probe workshops were hosted at the *Nottingham Elders Forum*. Two prominent mobile technologies were utilised: The *Apple iPad* and the *Cisco Flip Camera*.

A different strategy was used for obtaining responses for the two questionnaire surveys. To obtain questionnaire responses for the Non IT survey, 20 Age UK lunch clubs were contacted to obtain permission and consent to sending a pack containing 10 questionnaire surveys with a Stamped Addressed Envelope (SAE). Each pack contained an A4 sheet with information explaining what the research was about and instructions advising the participants how to complete them. Each questionnaire was to be distributed to each member who had not used digital technologies before during the lunch hour. Whoever was willing to take part was invited to fill in a questionnaire which was then placed (with any others to be completed) in the SAE to be returned. A total of 200 Non IT users surveys were subsequently distributed to Age UK organisations via the post. The local library of *Colchester* was also used to invite any 'older adults' interested to take part. A total of 37 surveys were completed.

To obtain questionnaire responses for the IT survey, the strategies consisted of contacting those who were known from previous research events, older adult community forums and social networking platforms. The surveys were sent electronically to any other older adult who was interested in the project who had previously been known via ageing and related conferences. Prior to any distribution of both IT and Non IT surveys, a pilot study was carried out and minor modifications were made prior to distributing the final version of each survey. It was very important to make sure the questionnaire was reliable, valid and practical (Oppenheim 1992). To achieve this, a front cover succinctly explaining the research, nature of the questionnaire and providing coherent instructions to the respondents to complete it were provided. Further, a web address was also included to provide the opportunity for online access to the questionnaire. A Stamped Addressed Envelope was provided to return any completed questionnaires. A pilot questionnaire was carried out to make sure the wording of the questions were easily readable, coherent, accessible, of clarity and that the respondents were confident on how to complete it. It was designed not to take too long to complete (the pilot questionnaire distributed to respondents took a few minutes to complete). The questions had multiple choice responses in the form of Likert and numerically rated scales which were then used for SPSS analyses. Other matters considered with the pilot questionnaire were making sure the clarity was coherent including layout and instructions, making sure it was accessible and readable, as well as gaining any generic feedback on how it could be improved (Oppenheim 1992). A total of 9 Non IT and 14 IT users' surveys were also completed at the local library in Colchester and the Nottingham Elders Forum.

The data collection methods and their venues are summarised in the table below:

Method	*Venue 1*	*Venue 2*	*Venue 3*
Interviews	Nottingham Elders Forum	Colchester library	-
Focus Groups	Nottingham Elders Forum	-	-
Cultural probes	Nottingham Elders Forum	-	-
Surveys	Age UK lunch clubs (mostly)	Nottingham Elders Forum	Colchester Library

Table 3.1: A table to show the data collection methods, and where they were based

Once the data was collected, the analyses and interpretations were carried out. However, a key component of this methodology was about building rapport and trust with the participants which is discussed next.

3.7 How rapport and trust was established with the 'older adult' research participants

It was very important to develop and work on rapport and trust with those in the research. In the context of service loyalty, a study by Gremler et al (1996) found that five specific relationship dimensions (familiarity, care, friendship, rapport and trust) were found to have significant influence on service loyalty. Such dimensions were considered and applied when conversing and working with the older adult participants in this research.

Prior to any engagement and dialogue (as with the interviews, focus groups and cultural probe workshops) the older adult research participants were informed that they would be key to leading and influencing the direction of the research. The older adult participants were informed they would be integral to forming important knowledge and understanding between older adult learning and ICTs, not previously established. They would be considered as “research partners” and the “researchers” themselves of the project, and were also encouraged to provide any additional comments, outside of the core topics of discussion (e.g. as with the qualitative methods). An informal approach was used at all times, and any clarification on the question was provided where necessary. Those taking part in the research were informed that there were no right or wrong answers, and they could come and go from the interview or focus group as they pleased (although this may induce a slight effect on validity). The participants were duly thanked for their participation, and were also invited to take part in any further research methods (or provide any other comments) in relation to this.

Ethics is an important component of this research project and is central to it. It is therefore important to describe and discuss the ethical principles and potential issues that are key it in relation to PAR, as well as ethical clearance that was sought. The next sub section describes the ethical considerations and addresses potential issues.

3.8 Research ethics

The ethical concerns and considerations were of paramount importance throughout the entire research process (and beyond). There were a number of strict ethical principles that were to be adhered to.

The participants were:

a) Informed about the nature of the study including what it was about, their own role in the data collection method, as well as how the results would be disseminated (e.g. contained in the thesis) as well as via an article publication in the journal (contained within the Appendix).
b) Informed that they could withdraw from the study at any time
c) Informed that they would remain anonymous and that any data would be removed subject to their request
d) Asked to sign a consent form
e) Reassured that their interests were of paramount importance with regards to participating in the research (Social Research Association 2003)

Ethical clearance with the University (Joint Inter College Ethics Committee) has been sought which included outlining solutions to any potential ethical issues, as well as an enhanced criminal records bureau check.

In relation to the PAR approach a number of additional ethical considerations were addressed. These were that:

a) The researcher participates *with* the participants in the PAR approach in an informal yet structured manner, including contributing resources (e.g. pens and paper to write down notes) and knowledge (e.g. helping to clarify any issues or answer questions)
b) That barriers between researcher and participant were minimised, such as minimising formality and increasing dialogue between the two
c) That researchers are trustworthy and responsible for the well-being of all those involved (McIntyre 2008)

The older adults who were participating in all research methods were given the researcher's contact details, should they wish to enquire, explore, or request any data to be removed in relation to the findings of the research.

The next section describes a key component that the PAR methods embraced: the learning self-reflection and evaluation process.

3.9 Self-reflection and evaluation

One of the key components of PAR, is that allows the participants to self-reflect and evaluate their learning methods in a spirit of reciprocity (McIntyre 2008). The participants can review their current learning methods, and consider entirely new ones altogether, in a recursive process enhance their learning mechanisms. They can then apply the learning mechanisms to other ICTs. An original flowchart was constructed from such learning reflection and evaluation. Such an approach is illustrated in the flow chart:

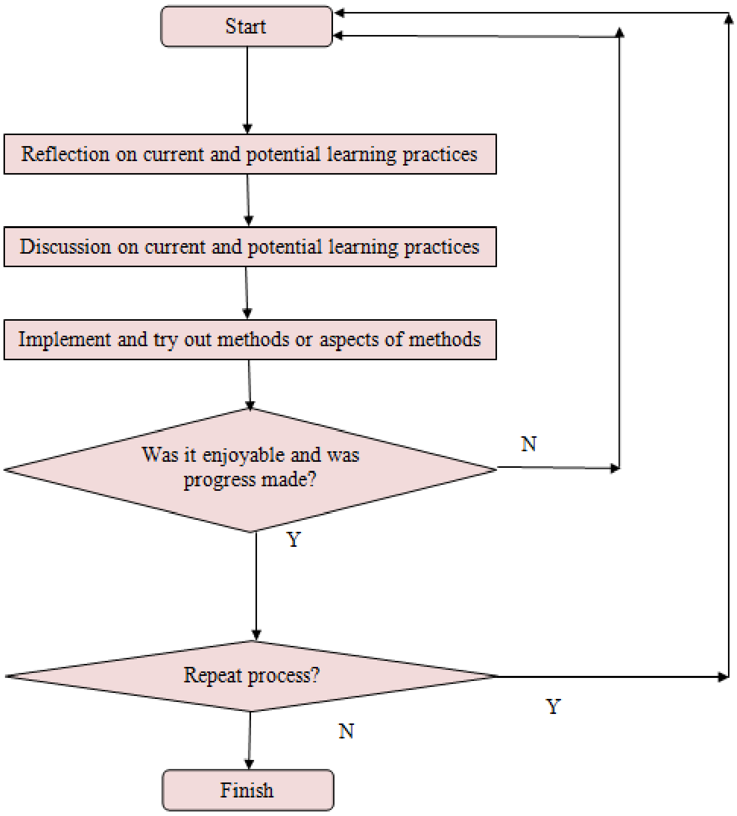

Figure 3.4: A flowchart showing key stages in the learning reflection and evaluation process

It considers both current and potential ways to learn, and is a recursive process. The process enables the learner to articulate their requirements, and consider new learning methods to support or fulfil such requirements. The self-reflection and evaluation process is particularly important in enhancing understanding of learning and carrying out alternative methods (or aspects of these) in practice. Also, if collaborative learning is to take place, the current and potential methods can be discussed with others.

The next sub section outlines the key stages of the research, as it is important to map out such processes and stages involved, including the order in which they were to be carried out.

3.10 The key stages in the research

The key stages in the research are diagrammatically represented in Figure 3.5:

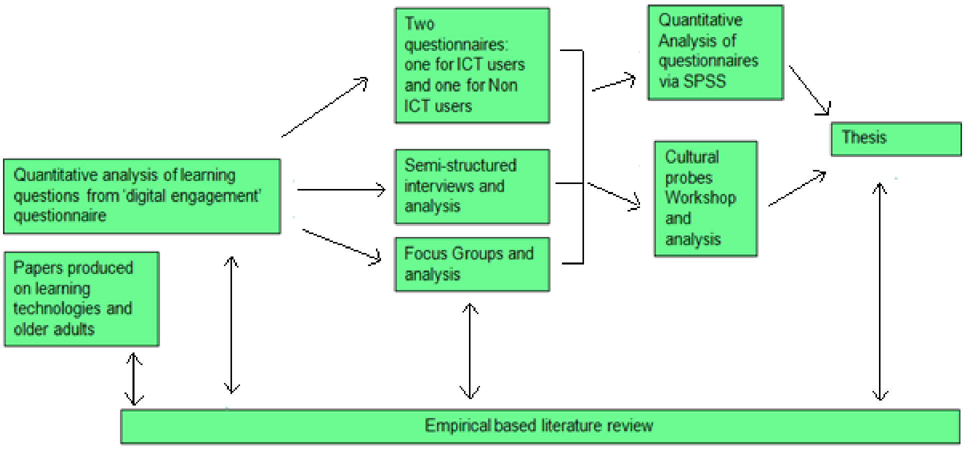

Figure 3.5: A diagram to show how each core stage in the project relates and is a pre-requisite to another.

The key stages during the research process are pre-requisites to one another. They have been systematically designed in accordance with previous findings e.g. to reinforce findings or explore new concepts, challenges or avenues in relation to learning. Each of these stages will be explained in detail in the next sub section.

3.11 The nature and composition of the qualitative and quantitative data collection methods

An appropriate set of data collection tools were to be selected based upon the population engaging in the research, timeframe as well as the research objectives. The qualitative methods consisted of:

- 10 x Semi-structured in-depth interviews
- 3 x Focus groups
- 11 x Research diaries constructed at 3 cultural probe workshops

The quantitative methods consisted of:

- 253 x 'learning questions' within a 'digital engagement' themed questionnaire
- 66 x participant responses of the IT and Non IT users' survey

It should be noted that the quantitative methods were also complemented by qualitative descriptors. As such, the mixed methods approach was qualitatively biased.

Each of the data collection methods contained questions and topics of discussion on a number of different themes. Some of these themes were related, and some were different from one another, and explored different avenues (in relation to the research objectives) altogether. They were designed to maximise the data's richness, honesty and validity. A key part of the mixed methods approach incorporated the use of 'triangulation' which sought to fulfil the objectives by using at least two methods, as well as to strengthen the validity of the results.

The nature and composition of the individual data collection methods is now discussed and how these relate to the research objectives (as indicated in the brackets).

3.11.1 Semi-structured in-depth interviews

The 10 semi-structured in-depth interviews that were carried out averaged 15 minutes in duration and consisted of questions and topics of discussion on the following topics and themes:

- Factors that make successful and unsuccessful learning experiences (Objective 1)
- Previous learning and support methods used and what made them ineffective or effective (Objective 1)
- Main reasons for not wanting to use ICTs (Objective 2)
- What learning and support could be considered to improve successful learning of ICTs (Objective 2)
- Potentially entertaining learning and support (Objective 2)
- Any specific learning needs or requirements when learning how to use ICTs (Objectives 1 and 2)
- Any additional needs or requirements when first learning to use ICTs (Objectives 1 and 2)
- Specifics about what furthers engagement with ICTs (e.g. motivational factors) or inhibits engagement with ICTs (Objective 2)

- Learning virtually (Objective 1)

A pilot interview was conducted prior to carrying out the interviews. As a result, amendments were made to the wording, so that it could best be understood by the 'older adult' population. This was achieved by receiving assistance from them, and requesting feedback so as to improve the interview. Personal questions included the age group, gender and whether ICTs have been used previously in a study, work or leisure setting.

The next sub section describes the nature and composition of the focus groups that were carried out.

3.11.2 Focus groups

Three focus groups were carried out, the first two of which contained the same questions and topics of discussion, derived from the interviews, and the third which was on virtual technologies. The first focus group contained four participants, the second focus group seven and the third focus group two. The lady who runs the Forum provided assistance in organising and getting together members of the *Nottingham Elders Forum,* which was greatly appreciated. The focus groups averaged about 1 hour 15 minutes in duration.

Focus groups 1 and 2 consisted of questions and topics around the following:

- General opinions about ICTs (Potentially fulfilling objectives 1 and 2)
- What makes older adults want to learn to use ICTs (Objective 2)
- How older adults would best like to learn to use ICTs (Objectives 1 and 2)

- How ageing e.g. motivations, attitudes, preferences, requirements and 'learning capacities' influenced learning and use of ICTs (Objective 1)
- Specific or generic challenges associated with ICTs (Objective 2)
- Previous difficulties experienced (Objectives 1 and 2)
- Alternative methods not considered previously to further engagement with ICTs (Objective 2)
- Virtual platforms influencing learning of ICTs (Objectives 1 and 2)

Focus group 3 consisted of questions and topics around the following:

- Whether virtual learning methods were used previously (Objective 1)
- Perceived difficulties of using virtual technologies to learn with (Objective 1)
- What in particular made virtual technologies difficult to use (Objective 1 and 2)
- Successes of learning with technology (Objective 1 and 2)
- How virtual technologies could be improved to learn with (Objective 2)
- Common accessibility issues with many virtual technologies on the market (Objective 1 and 2)
- Ways of learning to use virtual technologies (Objective 2)
- What makes effective feedback (Objective 2)

Objective 3 was about formulating a platform with which to produce learning strategies within a framework consisting of different categories (which was the aim of the research). Objective 3 was formulated from the aim and also logically took into consideration Objectives 1 and 2 as well as the analysis and interpretation frameworks. Moreover, it was imperative to produce a platform that took the data and interpretations from objectives 1 and 2, into producing learning strategies within a categorical framework. The learning strategies were a result of objectives 1, 2 and 3.

Personal questions included the age and gender of the participants in the interviews and focus groups. The next sub section details the construction of research diaries within the cultural probe workshops.

3.11.3 Cultural probe workshops constructing research diaries

Research diaries are considered 'researcher driven' in which data is collected and recorded based upon actions, and can be thought of as the equivalent to 'structured observation'. Such actions are recorded contemporaneously with activities (Bryman 2012). The behaviour is being observed by the individual completing the actions as well as the researcher. The research diary in this case would be considered both a 'structured diary' and 'time use' diary (Corti 1993). This is because there are a number of set topics and themes about which to record actions and interpretations.

Three cultural probe workshops were carried out producing 11 research diaries. Cultural probes also known as diary studies are a way in which people gather information about their activities. In the context of this research it is how 'older adults' learned to use two prominent mobile technologies: The Apple iPad and Cisco Flip Camera. It is an effective approach as it allows the ‘older adults’ to use the technologies with minimal influence on their actions (Gaffney 2006). It allowed older adults to use and experience the technologies. They could use whatever learning methods were at their disposal, including asking other members of the *Nottingham Elders Forum* in the workshop. Topics included:

- Preferences and non-preferences about the technology and what was liked and disliked about it
- Specific difficulties related to accessibility
- Changing circumstances that may have influenced the learning of and engagement with the mobile technologies
- How the mobile technology device could be improved after completion of the workshop.

The next sub section describes the nature and composition of the quantitative data collection methods which have complemented the qualitative methods.

3.12 The nature and composition of the quantitative data collection methods

These entailed secondary analysis of learning questions from a ‘digital engagement’ themed questionnaire and Non IT and IT users’ surveys that were designed and distributed. The secondary analysis for the learning questions within the ‘digital engagement’ themed questionnaire work is discussed next.

3.12.1 Secondary analysis of learning questions from a ‘digital engagement’ themed questionnaire

Secondary analysis is when there is no involvement in the collection of the data (Bryman 2012). It involves using existing data, collected for the purposes of a prior study in order to pursue a research interest which is distinct from that of the original work (Heaton 1998). It can entail both quantitative (Dale et al. 1988) and qualitative (Corti et al. 1995) data, but for this project it will entail quantitative data from the ‘digital engagement’ questionnaire. This is a quantitative based questionnaire provided by the SUS-IT project (a consortium of universities working collaboratively together to improve the quality of life of older people using ICTs). The learning questions (which were formal and informal based) were quantitatively analysed and complemented by qualitative descriptors. This meant the responses were coded, counted and frequencies of the variables were compared via the data in ascending order. Qualitative descriptors and hypotheses were provided to enrich this quantitative approach, reflecting the nature of PAR. This was to allow for an easier understanding and interpretation of the findings while providing a voice for them. While this questionnaire was useful for exploring types of informal and formal learning, it was considered too ‘limited’ in terms of the option choices available to respondents, as well as not incorporating a scale. As such, two new surveys were designed and implemented: One for those who use ICTs and another for those who do not.

As such, the nature and composition of the IT users’ survey is described next.

3.12.2 IT Users' Questionnaire

The IT user's questionnaire was designed to find out how those who use ICTs learned to use them, which also reinforced or tested any previous findings found in the qualitative methods of the research. It should be noted that this survey was used to inform, mainly due to the somewhat limited sample size that was used.

- Learning and support of ICTs e.g. course at an institution, one to one personal teacher, video tutorials
- Different influences of learning ICTs e.g. structured approach, course duration and pace, formal and informal learning
- Virtual learning e.g. online communities, web based instruction, social media, mobile technologies
- Aspects of virtual learning e.g. complicated, not being sure where to start, limited access and security and content issues

The next sub section describes the Non IT users survey, which was produced in the same format as the IT users survey.

3.12.3 Non IT Users Questionnaire

The Non IT user's questionnaire was designed to find out why those who do not use ICTs do not use them, and what could be done to further technology engagement. The topics and themes were based around the following:

- Non-use of ICTs – e.g. not being sure where to start, not having any use for them, too complicated etc.
- External and environmental factors influencing use – e.g. access, cost of equipment, training courses
- Personal aims or aspirations to learn how to use ICTs – e.g. communication, job help, internet bookings, news

An advantage with the surveys is that they could also be used to identify potential relationships between variables such as any gender or age group differences between learning mechanisms or aspects of learning mechanisms. This also allowed for explanations in terms of relationships between individual variables to take place. It should be noted that the quantitative and qualitative methods will be combined, and not merely considered as separate entities. Each analytical approach for each data collection method varied according to its nature and is described in the next section.

3.13 The analysis of the qualitative and quantitative data

Three fundamental approaches were used to analyse the qualitative data; *framework, coding* and *affinity diagramming*. An affinity diagram is a tool and method in which individual instances are identified and grouped together by being written down. The structure and relationships are illustrated (Maguire and Bevan 2002). Such an approach represents the instances in a diagrammatical form. It makes use of data reduction to coherently illustrate the related instances in each theme.

The framework and coding approaches were used to complement one another (the former a qualitative method, and the latter quantitative) for the interviews and focus groups. With the research diaries, affinity diagramming was used to understand and interpret the data. The SPSS program was used to analyse the quantitative data obtained from the IT and Non IT surveys. Each of the three approaches will be explored in detail in the next section which the framework analysis is discussed.

3.13.1 Framework analysis (interviews and focus groups)

Framework analysis involves a number of distinct yet interconnected stages (Rabiee 2004). It is a 'qualitative' yet structured approach.

The distinct steps include:

- *Familiarisation* with the data (listening to the audio recordings and reading the transcripts in their entirety)
- *Identifying a thematic framework* (identifying themes and concepts from the data)
- *Indexing* (highlighting and sorting out quotes that answer or are related to the question)
- *Charting* (considering the quotes in a different context related to the question and objectives)
- *Interpretation* (establishing links between the data) (Rabiee 2004).

A print screen is shown in Figure 3.6:

Q1A	Factors that make a successful learning experience in general
	Quotes that are related and answer the question
	Quotes that are related and answer the question but are sort of contradictory in context
Line #	Transcription
1	I would say part of what I would regard as a successful experience
2	would be an interactive learning experience whereby I could feel comfortable in
3	participating in the learning and training environment. It's purely from a
4	personal level, I learn more if I feel comfortable and if I am encouraged to

Figure 3.6: A print screen showing a snippet of the framework approach

This approach is qualitative in nature, less structured and allows for a greater degree of summarisation and interpretation of the findings. To complement the framework approach, coding analysis was utilised which is quantitative in nature and is described next.

3.13.2 Coding analysis (interviews, focus groups and 'digital engagement' themed questionnaire)

This is a numerical and coded approach to analysing data. It involves counting the number of responses to each question and listing them in ascending order. The most popular and least popular methods are then sought. The coding allows links to be established between the data, and can also be considered as heuristic devices to allow further understanding of the data (Coffey and Atkinson 1996). This can complement the framework approach, which is qualitative in nature. Basit (2003) argues that coding approaches are required to organise and make sense of the data. One of its distinct advantages is that it allows the researcher to communicate and connect with the data to facilitate the comprehension of emerging phenomena and generate theories (e.g. those influenced by philosophical inquiry) (Basit 2003).

An example is shown in the print screen below on factors that make older adults want to use ICTs:

In order of occurrence and frequency comparisons:

Maintaining social contact: 2 / 13 = 15 %

The internet being a key motivator: 2 / 13 = 15 %

The other instances = 13 % each

Figure 3.7: A print screen to show an example of data coding in which instances are coded then counted to produce a frequency table

The next sub section describes affinity diagramming which was applied to the research diary data constructed at the cultural probe workshops.

3.13.3 Affinity diagramming analysis (research diaries)

An example of an affinity diagram is shown:

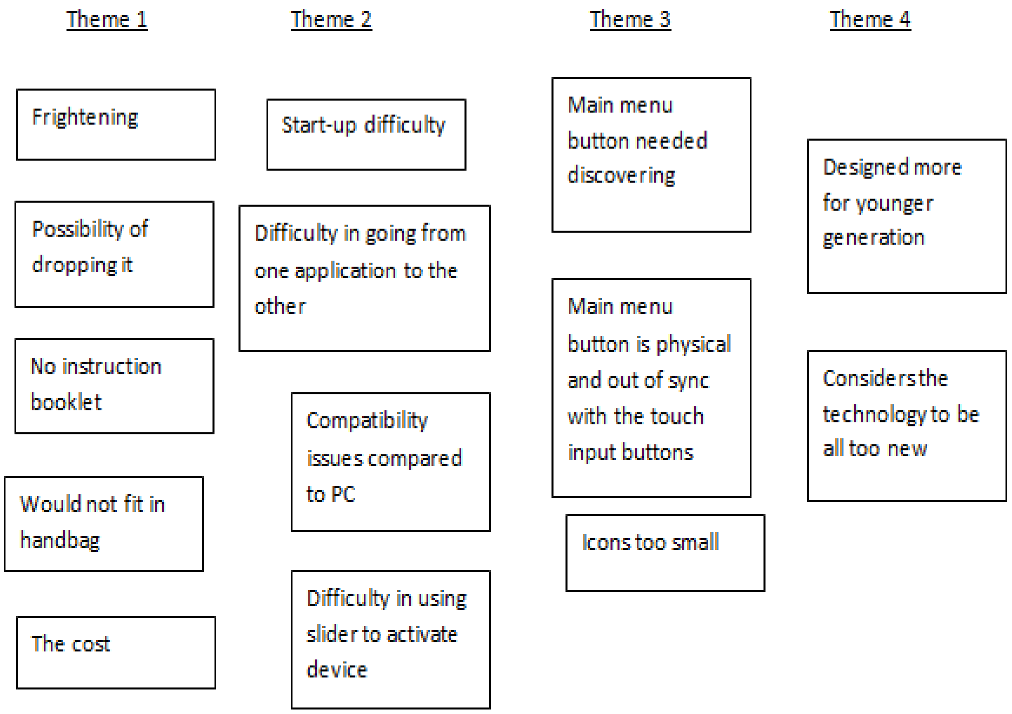

Figure 3.8: A print screen to show the grouped instances and their respective themes

The next sub section describes the SPSS analysis that was carried out with the IT and Non IT surveys.

3.13.4 Statistical Package for the Social Sciences (SPSS) for analysing the two quantitative surveys

SPSS offers a great deal of functionality in terms of comparing and analysing variables. The following SPSS functions were carried out on both IT and Non IT survey data:

- A generation of frequency tables and their subsequent graphical outputs to show the most popular and least popular choices
- Cross tabulations comparing age groups to different learning methods
- Cross tabulations comparing gender to different learning methods (or aspects of methods)
- Non parametric testing: The Kruskall-Wallis and Mann-Whitney test to determine differences in individual and singular variables with respect to certain groups (e.g. gender and age groups). This was limited to a specific target population e.g. the over 50s and not the population in general
- Case summaries and the construction of data sets (e.g. grouped numerical data) with respect to other categorical variables

The next section describes the key stages with the interviews, focus groups, research diaries and IT and Non IT surveys.

3.14 The key stages to completing the interviews, focus groups, research diaries and IT and Non IT surveys

The diagram below shows the key stages in the interviews and focus groups stage, from collecting the data to producing learning strategies within a categorical learning framework.

Digital audio record interviews and focus groups with participants

Transcribe interviews by typing up the dialogue

Transfer key dialogue phrases into Excel spread sheet

Apply framework and coding analyses

Interpret findings to inform learning strategies

Figure 3.9: A flowchart to show the key stages in the interviews and focus groups_process

The following flowchart summarises the key stages involved in constructing the research diaries at the cultural probe workshops.

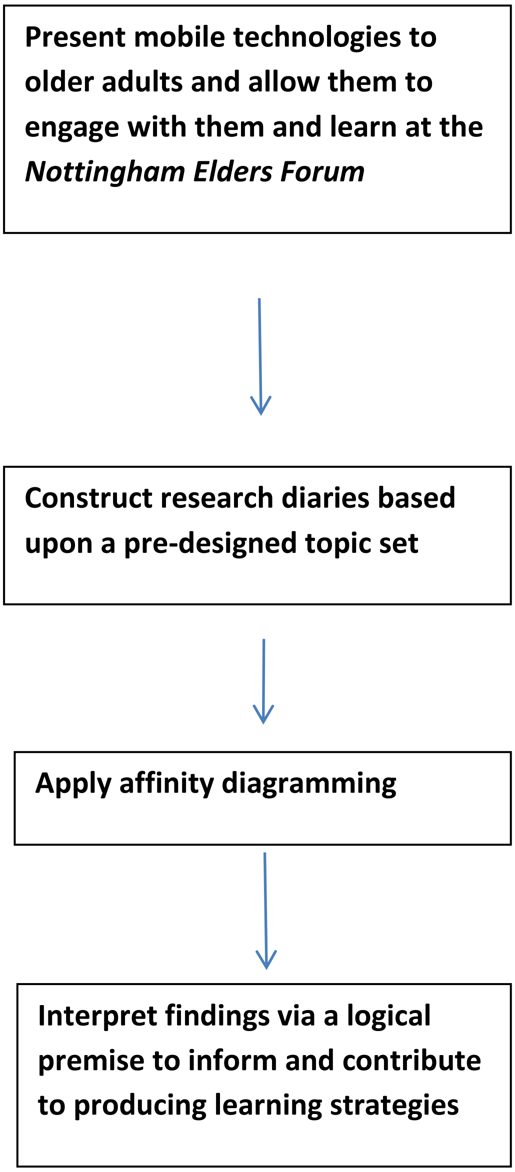

Figure 3.10: A flowchart to show the key stages in research diaries process

The key stages in the completion of the Non IT survey are illustrated below:

Design and print out 200 questionnaires

↓

Obtain consent from 20 Age UK lunch clubs about sending them a pack containing 10 questionnaires

↓

Send out 20 packs of 10 questionnaires with Stamped Addressed Envelope to lunch clubs

↓

Use SPSS to analyse data on filled in questionnaires

Figure 3.11: A flowchart to show the key stages in distribution and completion of the Non IT survey

The key stages in the completion of the IT survey are illustrated in the flowchart as shown:

Figure 3.12: A flowchart to show the key stages in the distribution and completion of the IT survey

The next section describes the application of triangulation which is a key component of the mixed methods methodology in fulfilling the research aim and objectives and maximising the validity of the data.

3.15 Triangulation and the learning strategies framework consisting of different categories

The primary definition of triangulation is that it is a "between methods" approach which involves at least one method in the pursuit and fulfilment of a given objective (e.g. the research objectives in question) (Denzin 1970). In other words, it uses at least one method to fulfil and answer the research aim and objectives. Triangulation also has a secondary definition in that it makes use of at least one method or source of data in a study so that findings can be cross checked (Bryman 2012). It attempts to map out or explain fully the richness and complexity behind human behaviour (e.g. in the context of this research learning in relation to ICTs) from at least one perspective (Cohen et al 2005). This research has utilised *methodological triangulation* which has used different methods on the same subject of study. It is an approach to combining methods, and has been applied to fulfil the aim and objectives. As such, similar questions or topics of discussion have been grouped. The findings from these, whether they derive from data collection method x,y or z have been contrasted and compared. These findings may occur within different stages of a particular data collection method and are therefore compared accordingly. A diagram showing how an example of triangulation has been integrated into the methodology is shown in Figure 3.13:

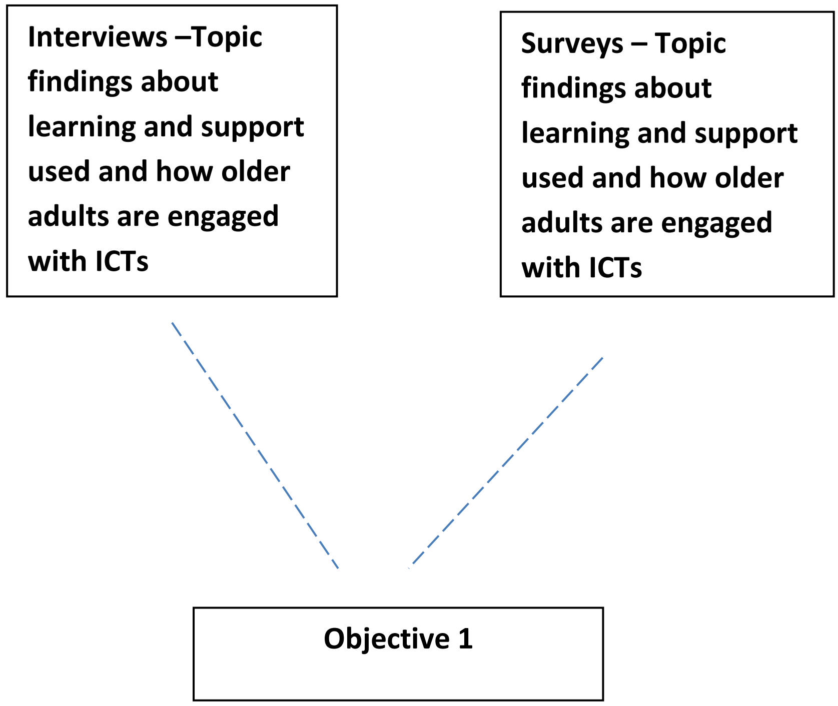

Figure 3.13: A diagram showing how the triangulation method is applied to fulfil the first research objective. The findings from both methods are contrasted and compared.

A learning strategies framework consisting of different categories has been formulated that considers the analysis and interpretations of each of the findings in relation to the research aim and objectives. This is a guidance document consisting of a number of categories based upon learning themes e.g. effective learning and support, aspects of methods and influencing pedagogy in classroom based settings or pedagogic learning in group settings (e.g. andragogy). The framework is based upon the knowledge and understanding obtained about older adults learning in relation to ICTs.

An original and unique diagram of the platform for formulating learning strategies within a framework consisting of different categories has been constructed and is as shown on the next page:

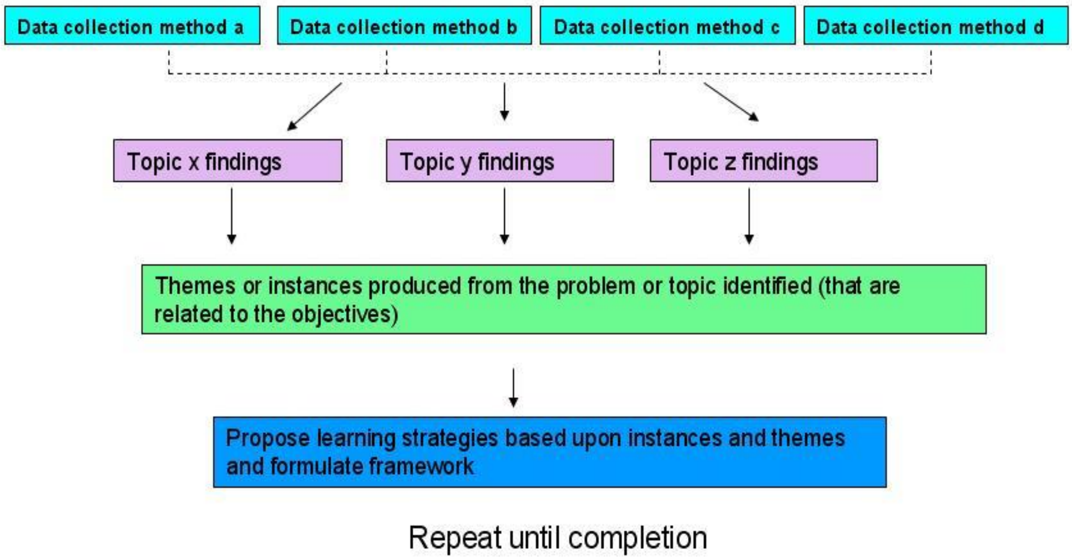

Figure 3.14: A diagram showing a platform for formulating a learning framework consisting of different categories

The framework will be categorically based and an example is shown in the table below:

Difficulties experienced (Cat. 1)	*Effective learning and support methods (Cat. 2)*
1. Category 1 Theme 1 details 2. Category 1 Theme 2 details 3. Category 1 Theme 3 details	1. Category 2 Theme 1 details 2. Category 2 Theme 2 details 3. Category 2 Theme 3 details

Table 3.2: A table showing an example of the categorical framework

The framework will consist of a number of different learning categories and themes related to each category. For example, one category might be entitled "optimisation techniques in pedagogical environments". Details of individual guidance themes would then be provided. The relationships between individual variables (such as the differences) will be explained after the learning strategies framework consisting of different categories has been devised.

The next sub section details the difficulties encountered during the research and concludes the chapter.

3.16 Reflexivity – the concept of reflections and my own influences and interpretations as a researcher

Although reflexivity has various definitions, it can generally mean the researcher should be self-critical as well as self-aware in making sure that the researcher's own experience does not influence or bias the research (Nurse Researcher 2006). Reflexivity can also be considered on a continuum. Denzin and Lincoln (1998) refer to this as the third stage of qualitative research. This put emphasis on the researcher's presence as interpretations can arise. In addition, the first type of reflexivity uses a positivist influence, while sustaining objectivity (Denzin and Lincoln 1998). The use of 'bracketing' for example tries to uphold all biases about the phenomenon being researched prior to collecting data. A seventh moment of qualitative research considers a human science perspective of inter-subjectivity where boundaries between the researcher and those being researched are minimised (Denzin and Lincoln 2000).

My background studies were in Information and Communications and Technologies and Display Technology. These disciplines used for the most part quantitative approaches. However, human factors and interface technology design elements were also studied within both disciplines which used qualitative approaches to identify requirements and draw up specifications. My part time work allowed me to gain valuable verbal communication experience in conversing with people. In addition, smaller team group projects also allowed communication to be developed to enable effective working and produce optimum outcomes. My own communication developed as a result of interviewing and carrying out focus groups with those taking part in the research.

My approach during the interviews, focus groups and research diaries was to compliment, encourage, and support the older people who took part in the research and subsequent data collection methods. I maintained a neutral and bias free approach throughout. While an informal and friendly approach was used, it was important to keep the discussions on topic, which meant intervention where necessary. Rapport and consensus about certain topics were encouraged, as were disagreements. With the qualitative analysis, I also utilised a coding approach which involved counting the number of instances, assigning them in ranked order for frequency comparisons. This aimed to minimise bias which can arise from a framework approach to analysing data. With the quantitative surveys, I designed them to be coherent and accessible by providing an introductory cover explaining what the research was about, and why the respondent was of considerable importance to the context of the study. The Age UK lunch clubs were also contacted via telephone prior to the distribution of the questionnaires. It was important to address two key factors: How the older adults would contribute to the research and the benefits they would gain as a result of partaking in the research.

3.17 Conclusions

The aim of the mixed methods methodology was to understand how older adults learned to use ICTs and were engaged with them, new learning and support mechanisms to be utilised as well as to formulate a framework of effective learning strategies in relation to older adult learning and ICTs. A triangulation method was employed in which different questions within the interviews, focus groups, cultural probe workshops and surveys were used to answer each of the research objectives and subsequent aim of the research as well as to maximise validity. This was considered a flexible approach, rather than, for example formulating all questions that answer objective 1 in two data collection methods, and all questions that answer objective 2 in two entirely different data collection methods. The mixed methods approach also allowed for findings to be reinforced and tested. It was an effective methodology in providing detailed and in-depth knowledge and understanding between 'older adult' learning and ICTs. A key reason why the mixed methods approach was chosen to supplement shortcomings in the various individual data collection methods. Where one data collection method had drawbacks of a particular nature, these shortcomings were supplemented by the advantages of another data collection method. For example, the structured nature of the questionnaire did not allow the respondents to explore other topics in relation to those being probed. To counter this, a focus group would allow the members of the group to explore and discuss other related topics. The methodology comprised unstructured (e.g. the focus groups) and structured (e.g. the semi-structured interviews and surveys) methods.

One of the most challenging aspects of the research process was the recruitment of participants. It was about inviting older people, yet obtaining their trust and understanding throughout the data collection process too. Most of the participants were members of the *Nottingham Elders Forum*, and most of the interviews, cultural probe workshops and focus groups were conducted there. This was advantageous in that the participants had familiarity with the surroundings and people, so could enhance the validity of the findings. Unfortunately some members dominated the focus groups, even though all members were encouraged to provide their input. However, the mixed methodology was in itself dominated by an independent approach to data collection. In other words, most of it involved either the participant completing a survey or partaking in an interview or workshop independently. Another challenging aspect of the research was recruiting participants to achieve the requirements of a particular sampling frame. In other words, it was challenging in selecting participants who were female, who used ICTs and whose age resided in a particular age category (e.g. 50 to 59). The target population for the recruitment was those aged 50 and over. Although the *Nottingham Elders Forum* was essential to the success of this research, there were limits in terms of participant availability. For example, the third focus group about virtual technologies comprised just two participants. Although rich views of fewer participants' were obtained, which gave a detailed understanding of fewer people and therefore focus, it was limited in considering other participants' perspectives too. The attendance was also based upon organisation. The lady who ran the *Nottingham Elders Forum* kindly emailed and telephoned members inviting them to take part in any interviews and focus groups that were run. This was therefore key to successfully completing the data collection methods. All those involved in the research (e.g. the older adult volunteers) considered it useful and that it reflected and evaluated their current methods as well as considering new ones. The next chapter represents the qualitative analyses and interpretations from the interviews, focus groups and research diaries.

4. The qualitative analyses and interpretations from the semi-structured in-depth interviews, focus groups and research diaries (cultural probe workshops)

This chapter presents the findings from the framework, coding and affinity diagramming data analyses. The data is then subsequently turned into information and is linked to the research objectives of the research. The formulation of strategies (which depend on the data synthesis and interpretation from the findings) will be used to achieve the aim of the research. The learning strategies (provided in chapter 7) will depend on the qualitative and quantitative synthesis which is presented in chapter 6.

The findings are presented in a logical and structured manner. This consists of summarising the interpretations and analyses achieved by the coding, framework and affinity diagramming approaches for each question (or topic of discussion) within each data collection method (which is part of objective 3). This has been directly related to the research questions, and any unnecessary data unrelated to it has been discarded. Any repeated themes, issues or discrepancies are identified and elaborated upon using an evaluative approach. Some questions (e.g. within the focus groups) have been linked to previous questions within at least two data collection methods to explore a particular theme in depth and consider any consensus reached or to contradict findings. A key approach of this was to produce non-redundant data. This means not duplicating and repeating data therefore producing unnecessary data.

This chapter focuses on the qualitative findings and subsequent analyses and interpretations of the data. It should be noted that it is very important to integrate and synthesise both qualitative and quantitative findings (even though they are considered as separate 'philosophical entities'), for the purposes of validity and triangulation as discussed in the methodology section. As such, the integration and synthesis of both qualitative and quantitative data is presented in chapter 6, and links are established in direct relation to the research aim and objectives. This will consist of providing the key themes that have emerged, as well as the relationship between any statistically significant variables.

It should be re-iterated that although a mixed methods approach was utilised, most of the findings were qualitative in nature (semi-structured in-depth interviews, focus groups and cultural probe workshops), supplemented by two quantitative approaches (primary and secondary source questionnaire surveys). Both qualitative and quantitative data collection methods and analyses have been used to answer the research questions and topics of discussion.

The findings have been prepared in light of the research questions. The research objectives and their subsequent research questions are reiterated:

> **Objective 1:** *To identify and elaborate upon the learning and support mechanisms that older adults use, and how older adults are engaged with ICTs*

Research question 1:

What learning and support mechanisms do older adults use?

Research question 2:

How are older adults currently engaged with ICTs?

Objective 2: *To identify new learning and support mechanisms to further older adults' engagement with ICTs by also considering aspects of established learning methods and platforms*

Research question 3:

What new learning and support mechanisms could be used to further an older adults' engagement with ICTs?

Research question 4:

What aspects of established learning methods and platforms could be considered to inform new learning and support?

Objective 3: *To interpret and synthesise the data as a platform for formulating appropriate learning strategies to help older adults learn how to use, enable and further their engagement with ICTs as well as to provide recommendations for social policy, research, design and practice*

Research question 5:

What platform can be created to formulate learning strategies that help furthers older adult engagement with ICTs and provides social policy, research, design and practice recommendations?

Research question 6:

What learning strategies can be used as a basis for furthering older adult engagement with ICTs as well as providing social policy, research, design and practice recommendations?

The chapter begins by presenting the analyses of findings from the affinity diagramming approach used for the research diaries.

4.1 Affinity diagramming of research diaries constructed from cultural probe workshops

A total of 11 participants took part in the research diaries at the *Nottingham Elders Forum.* Two specific mobile technologies were utilised: The Apple iPad and Cisco Flip Camera. The instances generated from the research diaries were coded, and similar instances were grouped into themes. The findings are presented:

Topic 1 – How the technology was learned

Theme 1

- Trial and error
- Experimentation

Theme 2

- Assistance
- Informal help

Topic 2 – What was liked about the technology

Theme 1

- Video quality high
- Sound quality high
- Effective keyboard

Theme 2

- Camera feature
- Fun software
- The internet
- Facility variety
- Games application
- Maintaining contacts
- Other applications

Theme 3

- Easy to use
- Readable screen
- It is light
- Not big and cumbersome
- Good when traveling
- Portability
- Clear, easy to read display layout and icons

Topic 3 – What was not liked about the technology

Theme 1	Theme 2	Theme 3	Theme 4
Frightening	Start-up difficulty	Main menu button needed discovering	Designed for younger generation
Possibility of dropping it	Difficulty in going from one application to the other	Main menu button is physical and out of sync with the touch input buttons	Technology considered all too new
No instruction booklet	Compatibility issues compared to PC	Icons too small	
Would not fit in handbag	Difficulty in using slider to activate device		
The cost			

Topic 4 – Any difficulties that arose when using the technology

Theme 1	Theme 2	Theme3	Theme 4
Starting and setting technology up	Icons too small	Manoeuvring mouse and keyboard is tricky	Naming convention issues
Shutting the technology down	Finding internet icon is challenging	Difficult to use touch element	Did not know what to do next
Figuring out how to access the internet	“Notes” application accessibility issues	The screen is not stationary and rotates as the iPad rotates	Experience is required
Different type of learning compared to the PC	Disparities between inputs	Prefers a physical button type system	
	A window prohibiting access to another feature so no other features could be accessed	Difficult to activate icons from the menu	
		Menu navigation difficult	

Topic 5 – Changing circumstances that have affected the learning of the technology

Theme 1	Theme 2	Theme 3
Motivation is important	Cognition in tune	Due to ageing, things cannot be processed as quickly
Such technology devices have no uses for older adults as such	Memory influence	Disparities between younger and older generation with technology changing

Topic 6 – How the piece of technology could be improved

Theme 1

- Icons could be made larger
- Buttons on side of iPad could be larger
- The location of the on and off switch could be made apparent
- Would prefer the iPad to be designed like a conventional computer, with a keyboard etc

Theme 2

- Coherent instructions necessary
- Audio instructions
- A quick help guide on the main screen

Theme 3

- Having a wi-fi cloud cover over a city to enable online access, rather than having to use 3G (which is also costly) and perhaps slower
- Having certain applications e.g. iTunes as main applications on the menu, and not having to obtain them externally
- That successful learning comes with children showing what such mobile technology is all about

The next section provides the coding and framework analyses carried out on the semi-structured in-depth interviews.

4.2 The coding and framework analyses from the semi-structured in-depth interviews

To re-iterate, a total of 10 participants took part in the semi-structured in-depth interviews. As described in the Methodology section (Ch 3), the individual answers to each interview question were assigned a number (and subsequently coded). The number of instances were then counted and put in ascending order. The findings were presented in a) numerical and descriptive form and b) a graphical output for focus groups 1 and 2. The purpose of the framework analysis approach was to qualitatively explore the findings relating to each of the topics of discussion. This is particularly important when there are differentiated individual instances (e.g. when minimal repeated themes emerge).

<u>Topic 1 - Factors that make a successful learning experience in general (coding approach)</u>

1) Maintaining dialogue in small groups with tutor facilitation 4/21 (19%)
2) Having a desire to learn 3/21 (14%)
3) Being encouraged to learn 2/21 (9.5%)
3) Incorporating modular design in the structure of the programme 2/21 (9.5%)
3) Being 'easy to learn' and intuitive 2/21 (9.5%)
4) The other instances 7/21 (4.5% each)

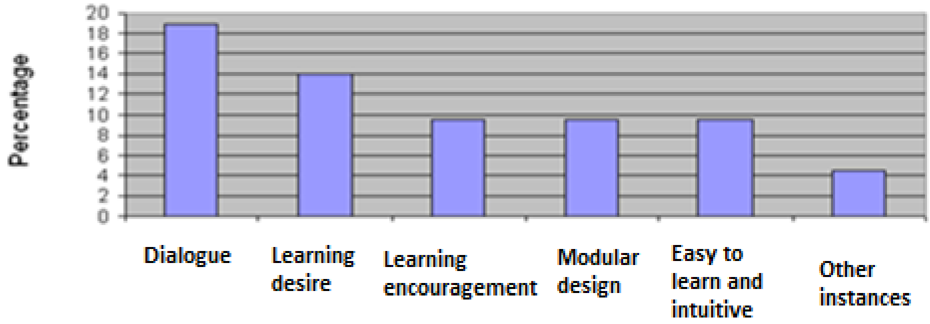

Figure 4.1: A chart to show the factors that make a successful learning experience in general

<u>Topic 1 - Factors that make a successful learning experience in general (framework approach)</u>

It was found that a combination of interactive and collaborative learning (with the same age group and same 'understanding level' was important, with 'small groups'), as well as combining multimedia, was an effective way to learn. This should be carried out in a comfortable environment in which the learner is encouraged by the facilitator.

Participant #1 stated "*I would say part of what I would regard as a successful learning experience would be an interactive learning experience whereby I could feel comfortable in participating in the learning and training environment*"

This reaffirmed the situational factors proposition put forward by the Digital Lifestyle's (2009) report in that learning is to be carried out in an appropriate and comfortable environment. Further, it is underpinned by Entwistle's (1998) heuristic model which is based upon experiential techniques to enhance the learning and teaching process. However, according to Adler (1996), being self-taught increases with age. This infers that minimal interactive learning takes place due to such independence.

The encouragement is considered a form of motivation. As well as encouragement, dialogue should be maintained in combination with an active (experiential) and trial and error mechanism to learning.

Participant #1 stated "*I like opportunities to explore through dialogue or any other interactive way to confirm my learning*".

This reiterates the notion as proposed by Findsen (2006) which found that vocational and expressive forms of learning are important. This also reflects the most popular method of learning and support as identified by the Digital Lifestyles Ofcom (2009) report by informally asking friends, family or work colleagues. This contradicts the most preferred learning method found by Goodman et al's (2003) study which was participating in a course where less dialogue takes place.

A successful learning experience involves previously identifying the needs of the actual learning process including producing interesting and relevant material. There should be a specific reason or reasons for wanting to learn. It was argued that a lot of successful learning is experience based (and less conceptually based), which suggests an active approach (possibly incorporating trial and error methods) to learning. A 1 to 1 learning method was considered 'best', although this was also 'resource intensive'. A virtual, avatar instructor could be used to provide 1 to 1 tuition.

Participant #4 stated *"A 1 to 1 situation is the right thing"*

While 1 to 1 learning offers the learner a personalised approach to learning, Bean's (2004) study found that learning is most effective when there is a 3:1 learner: trainer ratio with an optimum number of 6 learners. Also, the U3A study found that learning in community groups informally was a key benefit.

Within the actual learning, structure is required in terms of progressing stage by stage. Any technology devices should be easy to use, simplistic and accessible, as this is considered another factor that can complicate the actual learning process. Part of a successful learning experience involves exploring effective ways of doing things or learning, and the facilitator can play an integral part in assisting with this. A successful learning experience also depends on coherent and clear instructions, with clarity and non-jargon language, unambiguity as well as delivering the material at an appropriate pace.

Participant #8 stated "That things shouldn't be ambiguous, that the steps are clear, that there's no nonsense jargon and the thing does what it says it does on the tin"

This reflects findings in Goodman et al's (2003) study in barriers and difficulties regarding the disengagement of computers included too much jargon and inadequate support.

A better understanding is also ascertained from reading a book (e.g. cognitive learning) in which the stimulus is derived from an own, personal interest. The main features of what is being learned (e.g. a technology) should be portrayed adequately to allow older adults to get the best from the learning experience. The 'younger generation' can also help build an older adults' confidence due to the different learning speed disparities, and such an age generation mismatch can be considered an effective learning strategy. The learning itself can be achieved subconsciously and successful learning is achieved when the appropriate satisfaction levels are fulfilled.

Participant #10 stated "Now if you're asked to do something what's successful is reaching the satisfaction level".

However, according to Mederios's (2008) study, with "older" older adults, computers and mobile phones were rarely considered joyful or satisfying.

On the other hand, an ineffective learning experience occurs when a learner is asked or requested to learn something, rather than choosing to pursue it.

<u>Topic 2 - Factors that do not make a successful learning experience in general (coding approach)</u>

1) No facilitation (15%)
2) Language jargon (15%)
3) Other instances (7.7% each)

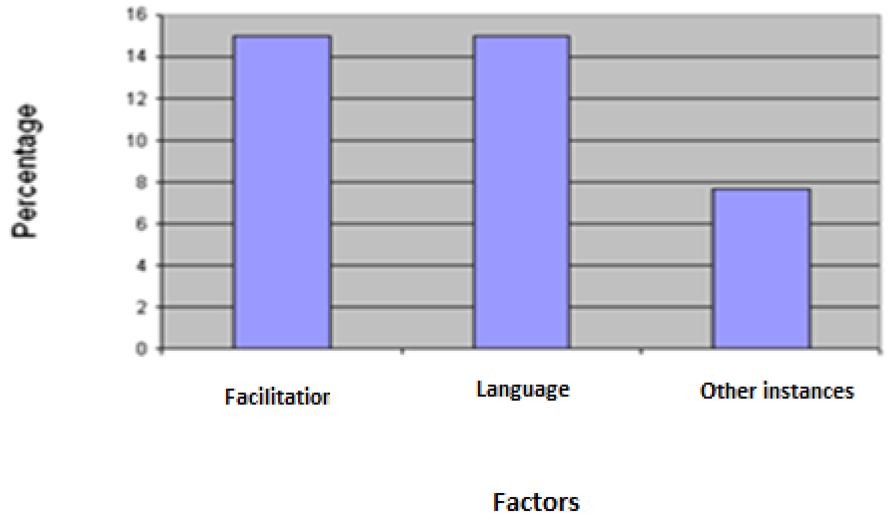

Figure 4.2: A chart to show the factors that do not make a successful learning experience in general

Topic 2 - Factors that do not make a successful learning experience in general (framework approach)

Delivering material via multimedia technology such as power point is not considered to be a successful learning mechanism.

Participant #1 stated: "*I don't like too much power point stuff*".

This could be interpreted as expressing a non-preference for structured, directed and dependent learning. This contradicts Finden's (2006) study which found that learning in later adulthood is best achieved in relaxed arrangements with self-directed senior groups. While it reiterates Goodman et al's (2003) most popular method of participating in a course, it contradicts the Digital Lifestyles Ofcom (2009) report which found informal learning to be the most popular.

The same can also be re-iterated with large group learning in which not having a trainer or facilitator present is ineffective. Small groups on the other hand are effective (as indicated in Topic 1).

Participant #1 stated: "*Trainer contribution in small groups, perhaps so*"

Bean's (2004) study reiterated this notion in that classes were most effective when there is a 3:1 student: trainer ratio (e.g. with 6 learners). It also stated that training should be tailored towards older adult's capabilities rather than needs and requirements.

The optimised group number is 6. Contrary to this, a trainer is important for successful learning with small groups (such as in 'real' or virtual environments), which again re-iterates the same proposition identified in Topic 1. The learning process itself should not be unstructured, nor should it go on for 'too long' (this however is a subjective term). Although books and instruction manuals are effective for referencing, they are not considered effective learning mechanisms individually.

Participant #2 stated: "*I think trying to read from books and certainly from instruction manuals are good for referencing but not for learning*"

The Digital Lifestyles (2009) report found key learning methods included reading the manual which to an extent contradicts this statement (good for referencing but not learning). However, the strategies proposed detail the improvements required for instruction documents to be effective mechanisms.

It is important not to create a group that differs in both age and experience of the particular technology (or other technologies). It is therefore important to maintain distinguishable groups based upon age and experience of technology. The pace of learning material delivered by the facilitator should be on par to that of the learners, and ineffective learning occurs when the language incorporates too much jargon, therefore rendering it ‘unnecessary’. An aspect of ineffective learning and support is when the learner cannot learn at their own pace.

Participant #2 stated: “*One of the problems I found is that the tutors tend to go at their own pace and talk in the language they understand but not at the pace of the student*”

In an ‘older adults’ and lifelong learning’ paper by Findsen (2006) it tends to question the use of facilitation by inferring a preference for self-directed senior groups as well as the use for unstructured learning (which may not be associated with tutor directed learning).

Learning that is unsynchronised is considered ineffective. Such ineffective learning and support is related to not fully understanding the technology, which is based upon the naming acronyms. Unless the benefits of learning are ascertained by the learner, then learning progression can be inhibited. This is coupled with learning that is considered a requirement rather than for self-improvement or interest.

Topic 3 – Learning and support mechanisms used to further engage with ICTs (coding approach)

1) Courses (31.5%)

2) Receiving help from others e.g. colleagues (21%)

3) Trial and error (15.8%)

3) Self-taught (15.8%)

4) The other instances (5.3% each)

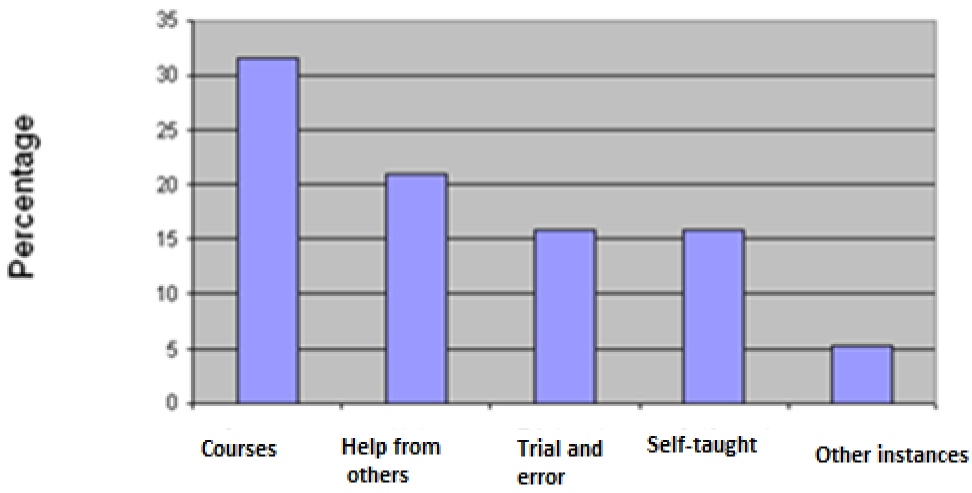

Figure 4.3: A chart to show the learning and support mechanisms used to further engagement with ICTs

Topic 3 – Learning and support mechanisms used to further engage with ICTs (framework approach)

The successful learning of technology is using a technology to learn other technologies (e.g. virtual learning). This reflects an independent and activist style to learning. It was found that 1 to 1 learning, trial and error, courses and dialogue discussion, seeking help from others and observations were all prominent methods to learn ICTs.

Participant #3 stated: "*I've been on lots of courses trying to teach me Excel and Microsoft Project and all those sorts of things so they're learning methods I suppose, but I think I've learned a lot by doing it myself like a trial and error thing*"

This independent and self-directed learning approach emphasises the findings found by Findsen (2006) in that generic forms of learning such as expressive and self-directed were designed to meet their requirements.

Both structure and direction (guidance) were used to further engagement with ICTs. Established and traditional courses were considered successful learning and support mechanisms, although they did not cater efficiently for the needs of older adults. The organisation and design of courses should take such needs and requirements into consideration. The traditional taught classroom based methods in the evening were considered effective, due to being hosted, outside of traditional daytime work. This should encompass standardised courses such as the CLAIT course within established awarding organisations should be used. Learning courses should be application specific e.g. word processing or desktop publishing applications.

Participant #5 stated: "*I'm self-taught but there have been occasions when I've gone and taken courses to assist and try to expand on my personal experience. These are all through educational colleges and evening classes"*

The interaction achieved via evening classes reiterates Trentin's (2004) proposition that older adults prefer direct personal interaction compared to younger people, especially when there was uncertainty and unfamiliarity with the technology.

A conceptual understanding element is important to complement a taught element, and this can be achieved through books, manuals, magazines and pamphlets. Help and assistance from children and colleagues have been considered effective learning and support mechanisms of using ICTs. From a government intervention and social policy perspective, funding should be provided to expand learning opportunities of ICTs, as well as to provide free courses or ones where fees are subsidised.

Participant #4 stated: "*We've been trying to get a system where we can get funding to create our own little suite or project so we can deal with the if you like the learning that established organisations don't seem to deal with or cater for*"

This notion is similar to Gray's (2004) study which set up an informal adult learning online community of practice environment, in which participants were engaged with the practice as well as expressing their perspectives of their own work.

Government or local council accredited courses are considered effective ways of attractive older adult learners, and the endorsement can further such learning of ICTs. The demographic learning style is also considered effective in furthering learning engagement with ICTs, as it is 'directed based', and collaborative, exploring dialogue with other members of the group.

Topic 4 – Effective learning and support provision of ICTs (coding approach)

1) Obtaining help from others (22%)

2) Simple approaches (18%)

3) Active approaches (18%)

4) The other instances = (5.5% each)

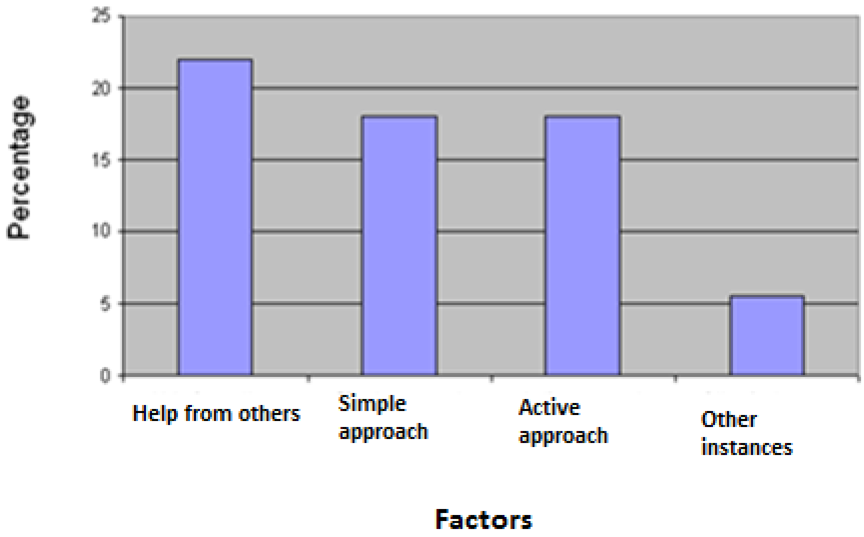

Figure 4.4: A chart to show effective learning and support provision of ICTs

Topic 4 – Effective learning and support provision of ICTs (framework approach)

Aspects of learning and support that are effective include maintaining dialogue with others, as well as helpdesks (e.g. whether virtual or 'telehelp').

Participant #1 stated: "*In the times that I've struggled to grasp something with ICT, I've found helpdesks, company helpdesks that you ring in to find solutions very useful*"

This reiterates a research report found by the Learning and Skills Research Centre (2004) that found establishing dialogue between the learner and facilitator is important for effective learning. There needs to be some sort of interactive ‘real time’ dialogue.

Professionally affiliated courses are effective ways to engage learners. The accessibility of online and virtual courses is imperative in minimising the complexity as well as issues with virtual learning. This can be achieved via a structured and simplistic layout. Appropriate and additional resources are considered necessary, with the instructors making sure the learners have gained sufficient comprehension of the material by assisting with the learning process.

Participant #2 stated: “*You’ve got to have the optimum resources”*

A key strategy proposed by Entwistle et al’s (2001) study on classroom environment and optimisation was that issuing realistic assignment requirements and workloads was imperative, as was offering opportunities with peer discussion in groups. This as such contributes to having optimum resources.

Effective learning and support provision is also based upon using the same platform, for learner and teacher. The instruction manuals should be concise, logical, and simplistic and in a number style step by step format.

Participant #3 stated: “*Good written instruction would be the best way forward in using a computer*”

This reiterates Entwistle et al's (2001) curriculum design strategy in delivering materials to help overcome gaps and common misunderstandings.

Potential mistakes should be minimalized by evaluating at least one trial and error method when learning how to use ICTs, while also building confidence during the learning process. It is very important to start with the absolute basics, and not base assumptions on previously acquired knowledge of using at least one technological device. The 'starting with basics' approach should be uniform across the entire digital technology spectrum. Setting a goal and sub goals within the learning programme is important in providing effective learning and support. In particular, it is important to understand the nature of the goal and the approximate time it takes to complete it. Material should be repeated, to enable the learner to rehearse it, therefore allowing easier recall. This can then be applied to the successful learning of a particular technology. The learning environment itself should consist predominantly of 'older adults' who are considered at the same 'stage or level' as one another, in terms of knowledge and experience of ICTs or a particular digital technology or application.

Participant #7 stated: "*Learning in an environment where all older people or the majority of older people who are at the same stage as yourself*"

This was reiterated by Mederios's (2008) study which found that both 'young' and 'old' older adults have different needs and expectations in terms of learning, so assigning groups would be an effective strategy for furthering learning progress. Such groups are also related to previous levels of experience.

It should be collaborative and involve those who are known to the learner e.g. family, friends or colleagues. Learning in such an environment should be sequential and structured. Written notes (e.g. post it notes) are important to enhance memory and recalling instructions on learning how to use a particular application or technology. This should take place in an active form (e.g. displaying and prompting when necessary), without the need for a third party to provide instructions. On the contrary, ineffective learning and support is when the training is delivered ‘short and quickly’ and the expectation levels are considered high. The facilitator or instructor, whether virtual or ‘real’ should provide support and encouragement in maintaining effective learning. It is important that a pastoral element is incorporated into a training programme to help those learning.

<u>Topic 5 – Ineffective learning and support provision of ICTs (coding approach)</u>

1) Non coherent instructions (21%)
2) Acronyms (10.5%)
3) Knowledge assumption (10.5%)
4) The other instances (5.2%)

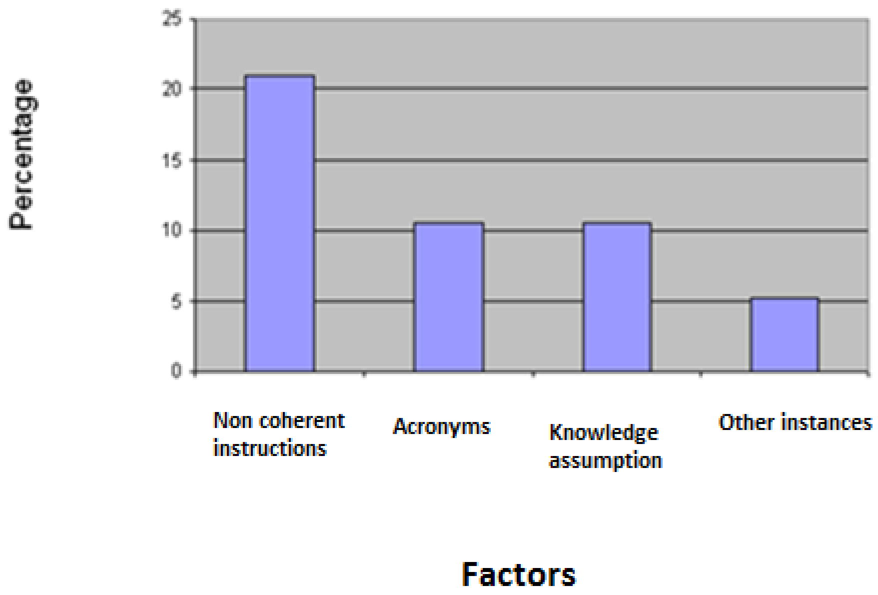

Figure 4.5: A chart to show ineffective learning and support provision of ICTs

Topic 5 – Ineffective learning and support provision of ICTs (framework approach)

If the pace of other learners is not on par with the learner, when learning how to use a digital technology, this can impede the learning progression.

Participant #1 stated: *"When other people are moving forward faster in a programme of learning than I am and playing catch up. Then you become more conscious about trying to keep up and not holding up other people actually learning"*

This reflects class resources and numbers in particular as emphasised by Bean's (2004) study. It found that the optimum number of learners in any group setting should be about 6 or a 3: 1 trainer: learner ratio.

In order to maintain pace for all learners, it is suggested to utilise defined sub goals and therefore structure, with a facilitator in place to moderate the pace of learning (e.g. increase or decrease). A surplus of resources can make ineffective learning and support provision of ICTs. Accessibility is a key issue in that the device (e.g. TV remote control) should be simplified, with larger, fewer and relevant buttons. It has been suggested to design a simplified version which does not incorporate the extra and unnecessary functionality. Mass marketed mobile devices for example are commonly small which results in accessibility issues. Any instructions which are not defined, that incorporate jargon, are not presented in a logical and step by step manner are considered 'ineffective'.

Participant #8 stated: "*Acronyms, abbreviated nonsense jargon, in house language and just some things that don't seem to be common sense really*"

A key barrier regarding the disengagement with ICTs included the applications and accompanying documents being too complicated, as well as too much jargon and inadequate support (Goodman et al 2003).

Further, learning in a non-linear format can be attributed to an unstructured approach. They should be minimised or adjusted according to experience level. The communication and delivery of material is imperative in gaining appropriate understanding. It should not incorporate jargon and instead use an informal and friendly approach. The learner should be given autonomy or independence. There should also be an active engagement with all learners during the learning process, in terms of interacting with and experiencing a technology system, and not merely learning via a passive and cognitive approach. A theoretical approach should complement the practical learning.

This mixed theory and practice based approach should involve the rehearsal of material and the actual use of the digital technology to enhance the learning process. When learning progression is in the wrong sequence of events (e.g. in a non-linear format), it can deter an individual from learning. This non-linear format can be attributed to an unstructured learning approach. This is attributed to inadequate interpersonal dialogue which influences the quality of the teaching and learning.

<u>Topic 6 – Main reasons for not wanting to learn to use ICTs (coding approach)</u>

1) Complexity issues (18.75%)
2) No needs identified for them (12.5%)
3) Mobile phone learning ineffective (12.5%)
4) The other instances (6.25% each)

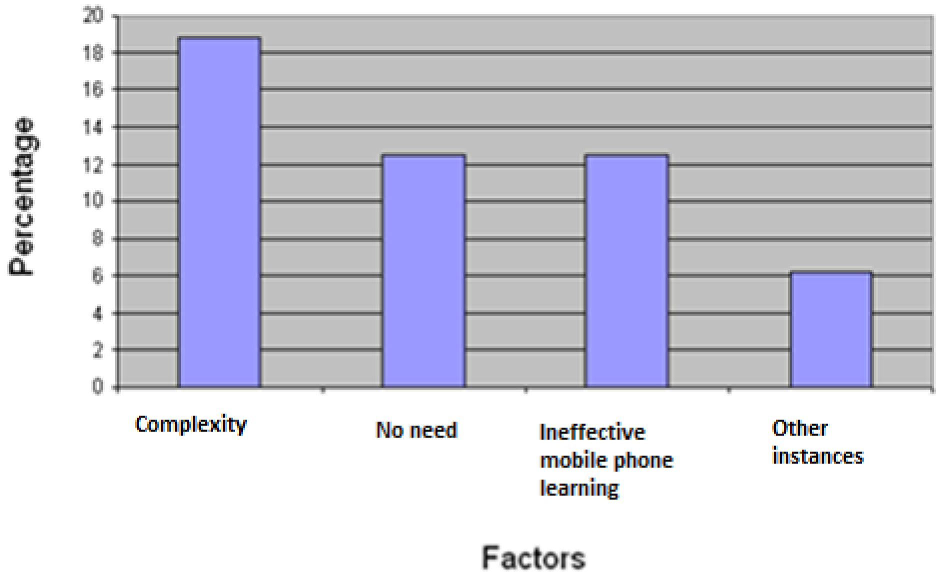

Figure 4.6: A chart to show the main reasons for not wanting to learn to use ICTs

Topic 6 – Main reasons for not wanting to learn to use ICTs (framework approach)

Digital technologies which were considered 'too complicated' and 'irrelevant' to the needs of older adults and those that take too much time to use to deter interest. Simplicity is therefore imperative to achieving successful learning.

Participant #1 stated: "*If the application is too complicated or relevant to the amount of time that I've got to learn how to use the application, I can find that off putting*"

The is on a similar par to Taylor et al's (2004) study which found that older adults who used application training preferred an informal structure instead of a formalised and linear structure. However, Findsen (2006) found that there is a preference for unstructured learning as opposed to structured and linear learning.

The technology should appeal to the needs and requirements the older adult, in terms of the learning component and actual usage of them (e.g. the benefits).

Participant #2 stated: "*I might give them up because they're not applicable or much use*"

Selwyn et al's (2003) study found on the extent and nature of ICT access by older adults that such technologies are considered to be of little relevance, and was a minority activity by older adults.

There are, unfortunately, age related perceptions about using ICTs, so such stereotypes should be minimised, and efforts made to improve older adults' confidence in learning how to use them. Such preconceived notions could be countered by using analogies and simplification of the naming conventions shown on the displays.

A device that is not connected to the internet in some way or another can deter an individual from engaging in the learning uptake of technologies. A commonly held perception is that there is simply 'no use' for ICTs by the older adult population. Mobile technology devices such as the iPad and iPhone are not considered good learning tools due to their cost and accessibility features. Further, mobile phone usage is actually considered 'anti-social', especially when being used in public places. The texting feature can also inhibit and reduce social interaction. Information flow and its subsequent management (or mismanagement) is usually associated with ICTs, and this is a key reason for not wanting to engage with them. Such an issue is associated with spam in e-mail applications.

<u>Topic 7 – Learning and support methods which could improve engagement with ICTs (coding approach)</u>

1) Effective group learning 16.6%
2) Other instances 5.56% each

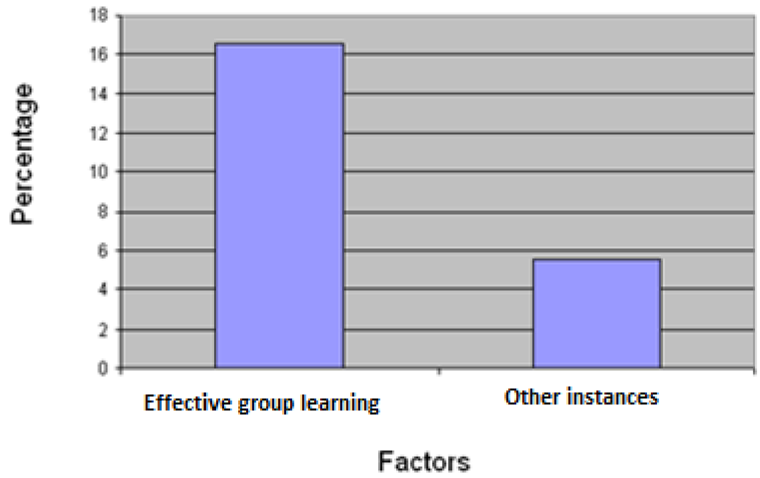

Figure 4.7: A chart to show the learning and support methods that could improve engagement with ICTs

<u>Topic 7 – Learning and support methods which could improve engagement with ICTs (framework approach)</u>

The use of simplistic manuals (e.g. jargon free) is important.

The manuals should be standardised in terms of the format, with guidance provided for the ‘basic needs’. Other strategies include designing the mobile phone design and menu layouts to be simplified and accessible. Workplace based learning can be used in which colleagues provide support to one another.

Participant #3 stated: “*Courses in the workplace, also your colleagues helping use the facilities*”

Interestingly with Swindell’s (2002) study, it was found that older adults who did not take part in traditional courses, including those in the workplace showed excitement and purpose from virtual communities and learning.

Government initiatives should reduce the cost of traditional classroom based courses, as well as increasing the awareness of them. The training itself should be modified and tailored towards the dynamics of the group and the preferred style of learning. The training effectiveness among own group peers can be increased.

Participant #4 stated: "*We got to think more about teaching these people with their own peers basically*"

This notion was reiterated again by Swindell's (2002) study which found fulfilment was achieved by being part of a community, and communicating with other members as part of a group, as well as there being a "discuss and share" element to it. This also reinforces the proposition by the Digital Lifestyle's (2009) in that collaborative learning should take place with those who are known to the learner.

The very basics should be incorporated into the curriculum, and then be built upon in a linear, sequential and logical manner, all inter-related with one another. A mixture of both informal and formal learning is then utilised. Learning via the laptop has proved to be an effective technology, due to its portability and relative ease of use. On the other hand, desktop and tower systems have presented difficulties. The laptops are also considered 'easier' to use and accessible. Applications on the same platform are still considered different in terms of learning how to use them and should be standardised and simplified. The technical language within instruction manuals and guides, on both software and hardware systems should be informal and colloquial, to enhance understanding and interpretation. An A4 type card system with instruction corresponding to a device should be provided with the technology, without the need for superfluous and unnecessary learning information. Key motivators for learning engagement include social networking applications such as Facebook on PC and laptop platforms. It allows the older adults to keep in contact with one another, and social networking platforms can be used as a means to learn with. Interestingly, learning collaboratively in a group setting is not considered effective as it is patronising. The most effective learning is said to occur with a 1 to 1 method. 1 to 1 learning is however considered resource intensive. This 1 to 1 method can also be combined with independent learning.

Participant #10 stated: "*There's a 1 to 1 and I get the same symbiotic approach with the person helping me, I learn very quickly. It was tailored to the basics of computing, that pushes me in the right direction, and I could find my route easier, on my own*"

This is similar to a finding from Bean's (2004) study in that the training should be tailored to the needs and requirements of the older adult learner, as opposed to the basics of using computers.

A 1 to 2 or 1 to 3 method may be achieved, making it less resource intensive, and reduces the perception of group learning.

<u>Topic 8 – Potentially entertaining learning and support methods (coding approach)</u>

1) Animated virtual character (21%)

2) Learning and working as a group (15.8%)

3) The other instances = (5.2% each)

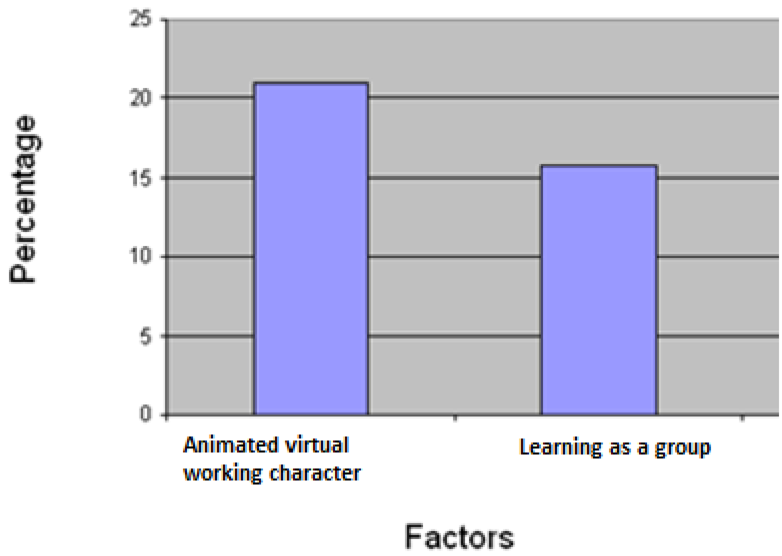

Figure 4.8: A chart to show potentially entertaining learning and support methods

Topic 8 – Potentially entertaining learning and support methods (framework approach)

Potentially entertaining learning and support includes the incorporation of interactive and animated characters outputting brief and non-jargon information. The virtual interaction between the learner and the virtual character is considered a fun and interactive way to learn with.

Participant #1 stated: *"Any interactive method is good. I remember, I mean years ago when Microsoft word would pop up with a balloon and give you information"*

This reiterates Trentin's (2004) study on e-learning activities in that short, interactive, online learning modules were considered a success. This was particularly important when there was unfamiliarity and uncertainty with the device.

Another effective learning mechanism can encompass a quiz, perhaps using at least two groups to compete (therefore establishing team working, dialogue and discussion) with a desire to reach the end goal and subsequently learn. The incorporation of hardware component analogies are important for making technology user friendly, as well as minimising perception complexities. A social environment should be created as well as working in a group structured and systematically (e.g. setting defined sub goals and working democratically).

Participant #4 stated: "*It's a bit like a ladies coffee morning whereby they come together and learn a technology; you've got to develop what I call a social atmosphere to start with*"

Swindell's (2002) study emphasises this point in which learning occurs effectively within community groups and conversing informally. It also reiterates that the social aspects of learning is a key motivator or the uptake of learning activities.

A user friendly guide or instruction manual should also be accessible. Further, a combination of an independent yet active approach to learning underpins a potentially entertaining approach to learning. Effective facilitation in an informal atmosphere and environment is also important. It should be a relaxing and uplifting environment with a friendly and approachable tutor, possibly a ‘virtual avatar’ in addition. The perceived effectiveness of the facilitator is integral to creating a supportive atmosphere in which to work and learn in. However, it should be noted that a successful learning experience is not necessarily synonymous with an entertaining one.

An entertaining way to learn is via virtual instruction in a collaborative setting with a ‘known’ virtual facilitator. The overall task should be sub divided into a number of smaller goals or sub tasks, in which approximate durations to complete them are assigned. With regards to ‘real’ based learning environments, incentives such as drinks (e.g. tea) should be offered, as well as any other refreshments. These should be made available during the breaks with such technology sessions. A first introductory session should also be used so that the learners can informally get to know one another which are important for collaborative group learning. However, another key finding was that being ‘entertained’ was not necessarily synonymous with a successful learning experience.

Topic 9 – Specific learning and support needs and requirements when learning how to use ICTs (framework approach)

As the coding approach illustrated a wide variety of responses, a framework approach was primarily used to analyse and interpret the data. An active approach is required in which effective learning is a result of engaging with the experience. This can also be combined with an independent approach using a, trial and error method.

Participant #1 stated: "*I learn more practically with ICT by doing rather than reading about doing. So I need to go hands on, on the keyboard and find my way through*"

Learning ICTs via interactive and trial and error was a key method identified in the Digital Lifestyle's (2009) report. This infers a practical element to learning ICTs rather than not engaging with them.

A friend is required, or a store directly related to the product (e.g. the Apple Store for the iPad). This re-iterates the notion that dialogue in 'real time' is a specific need and requirement for successful learning. There is a significant differentiation between finding a solution and learning what is done, in terms of the learning process itself. There is no specific need and requirement for additional in-built utility features which are designed to enable efficient use of digital technology systems. Such utilities can actually hinder learning progression. There should be specific learning and support needs that minimise the disparity between 'what the application is supposed to do' with input from the user. In other words, it is important to minimise ambiguity about a given command. An older adult learner using and engaging with the technology should not, in effect, be misled. A network of other learners is an important need and requirement, with less emphasis placed on written manuals and instruction guides.

Participant #4 stated: "*Whereby you could have a network and there'd be help at hand*"

A study on virtual community learning found that achievement was achieved by being part of an online community, communicating with other members of the group as well as being part of the group, and forming relationships with others (Swindell 2002).

A specific need and requirement in terms of manuals is that they should include all the relevant, yet not superfluous material, as well as incorporating structure e.g. step by step instructions.

Participant #5 stated: "*It used to be helpful when manuals were available with various programs*"

This reiterated the technical problems that arose with programs such as the U3A in which technical support guides should be provided. It was Githen's (2007) study which found that some methods of virtual communication may be suitable for older adults.

There are also keyboard accessibility issues. The keys should, in some cases, be larger in size with fewer 'additional functionality' keys that might not be necessary. This could be achieved by using two keyboards; one a 'basic' keyboard containing letters and numbers, and another, separate device containing additional functionality. Another solution to meet this particular need and requirement could be to partition one keyboard with the 'essential' functionality housed within one section, and 'extra' functionality housed within the other. Such functionality can also apply to other devices such as mobile telephones and TV remotes. Interactivity is required in the form of 'interactive whiteboard's' in which the learner can also demonstrate learning to other learners. Here the learners can learn from the colleague (or learner) carrying out the instruction. This can also be referred to as 'problem based learning' in which solutions are reached as part of a group following the democratic style. The workstation and environment itself should be free from noise and other distractions, as well as being considered comfortable.

In terms of the learning, it should be focused directly on the application or technology, without using a scenario based approach.

Topic 10 – Additional needs and requirements when first starting to learn to use ICTs (coding approach)

1) Discussing the problem (11%)

2) The other instances (5.5% each)

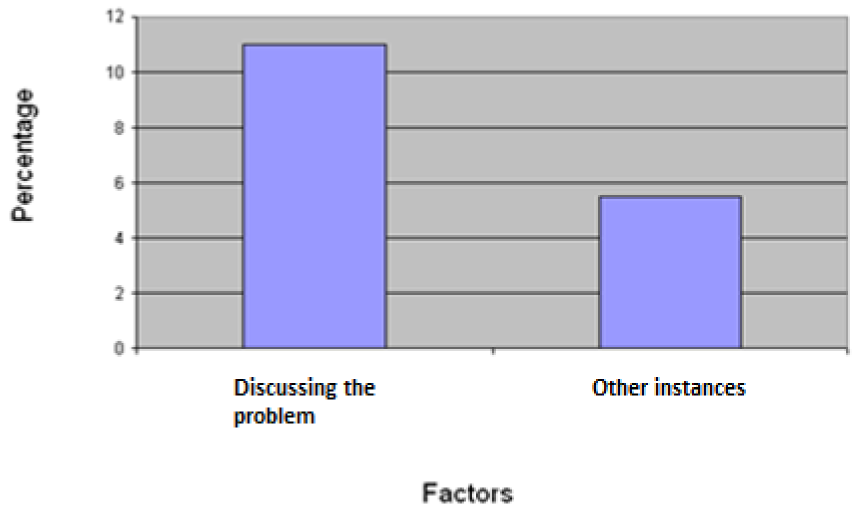

Figure 4.9: A chart to show additional needs and requirements when first starting to learn to use ICTs

Topic 10 – Additional needs and requirements when first starting to learn to use ICTs (framework approach)

The learning approach would usually be with minimal collaboration and dialogue, but additional needs and requirements suggest a preference for group dialogue with those that are known to the learner e.g. friends, peers and colleagues. Collaborative learning with those already 'known' to the learner are said to be more effective than those who are 'unknown' to them.

Participant #1 stated: "*I really did get a lot of assistance by talking to friends about how it resolved a problem, so having being networked with other users who I could ring up and get advice*"

This to an extent refers to application training which found that older adults preferred an informal structure instead of formal (Taylor et al 2004). Githens (2007) found that workforce development programmes offered community colleges and workforce development centres in which learning programmes were offered. This allowed for learning in community based work settings with those known to the learner.

Moving on from 'traditional' methods, the solutions could be reached in a group (underpinned by a democratic learning style) while exploring any other aspects of the topic further in virtual communities. The learning method has transformed from a trial and error and independent approach to consulting with the appropriate staff members that are familiar or are accustomed with the technology.

Participant #2 stated: "*I learned from the computer staff and computer technicians. I feel my transition from paper tape to using the iPad has been quite smooth*". Githen's (2007) study reiterated this in that an effective method was found to provide a combination of online learning and interpersonal interaction and dialogue, both in person and virtually to be effective.

This suggests that independence is likely to be used earlier on than later on reflecting the two age generations. Additional needs and requirements have arisen as a result of specific applications such as email, which is attributed to their navigational and non-simplistic structure. A key finding was that additional needs and requirements were present due to the advancement of computer systems (including periodic updates), including new products being mass marketed. To cater for such complexities, additional documentation containing necessary information is required. Such information could be produced for different groups of older adult learners (e.g. those with 'little experience' of a particular technology or application and those with 'some experience). Information within such documentation should be made available about the fundamental aspects of many widely used ICTs. Other additional needs and requirements are attributed to changes in the work that has been carried out (e.g. when studying a subject or within a work environment). There are external influencing factors, which are not necessarily the choice of the learner. Due to the ICTs being present in such an environment, colleague assistance and support is sought after. Pastoral support from an expert or professional in the field is also an additional requirement, as this can enhance the understanding and learning process as well as help build confidence. Help should be made available when the learner requires it, otherwise it could prove frustrating. The availability can be increased via a virtual instructor or 'avatar' or simplified virtual communication mediums. Undertaking a course such as the European Computers Driving License Course allows for the articulation of further needs and requirements. Needs and requirements can also be articulated by considering the goal achievement of a task via traditional methods, when digital technology learning methods can be used in place of them.

Topic 11 – Anything that furthers engagement with ICTs (coding approach)

1) The internet and computers as interest (19%)

2) Social contact (12.5%)

2) Information retrieval (12.5%)

4) The other instances (5.6%)

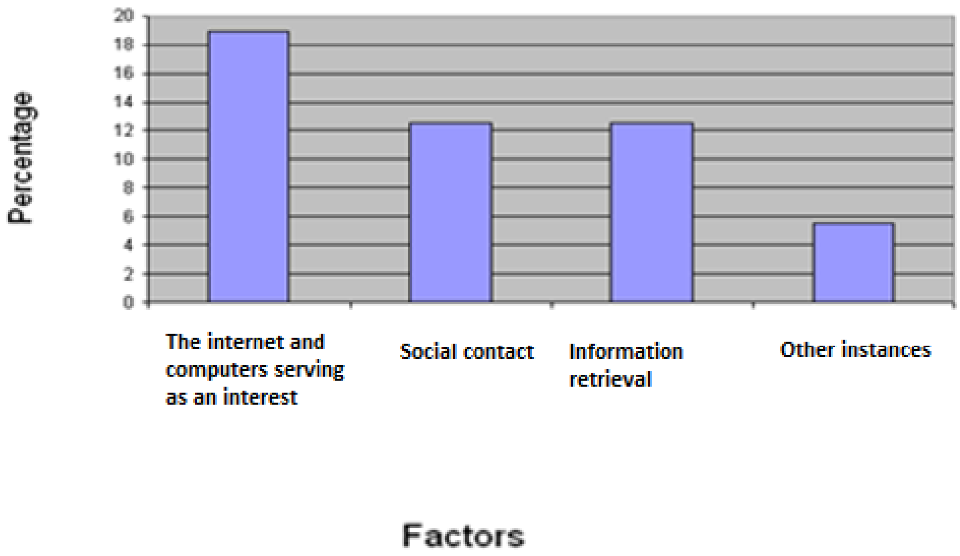

Figure 4.10: A chart to show factors that further engagement with ICTs

Topic 11 – Anything that furthers engagement with ICTs (framework approach)

Main motivational influences include using the internet, personal admin and carrying out work related activities. CD rom based learning (a form of multimedia learning such as with the Encarta series) is still considered an effective learning and support mechanism. It can be both entertaining and satisfying to use.

Participant #1 stated: "*I would say the internet has engaged me in ICT. Everything else I've done with ICT has been work related, preparing documents, domestic admin, writing letters and keeping accounts*"

The study by Gray (2004) in which informal work based learning took place found that learning new work practices was a key finding. This was online based so allowed the older adult to engage with the technology, as part of the learning process. This experiential engagement helps with familiarity surrounding the technology device.

It is argued that some information on the internet (from 'unofficial' sources) is not considered accurate, yet sources such as encyclopaedias are. The use of multimedia combined with collaborating in virtual communities can be a potential solution. ICTs (and their applications) can also be used as a hobby. Motivations include personal interests such as writing for a newspaper. Another key motivator is the communication that is afforded, as this can result in efficient transactions and processes, in addition to information retrieval and management (e.g. information research relating to personal interests).

Participant #3 stated: "*It's a very quick and easy way to make contact if you need to, obviously email is much quicker than sending a letter, also to Google and look up information very quickly and social networking*"

In Swindell's (2002) study, it found that some participants wanted to engage and participate in online interaction and others did not, which suggests there are barriers to such an online communication medium (e.g. attributed to the complexity or preconceived notions). Swindell's (2002) study found that participants preferred to utilise simpler technologies such as an electronic mailing list.

However, website accessibility can influence this. The role of the internet and the computer in reducing isolation by maintaining contact with others are also key motivational factors. Government initiatives can play a key role in increasing the access to ICTs. From such initiatives, schemes could be established to enable better access to ICTs for the older generation. In addition, ICTs themselves can be key motivators in order to want to learn how to use and get the best from technology in terms of fulfilling achievements. Other motivations include utilising digital photography and connecting technology devices to the TV to playback multimedia such as audio and video.

<u>Topic 12 - Anything that inhibits engagement with ICTs (coding approach)</u>

1) Cost (16.5%)

2) The other instances (8.35% each)

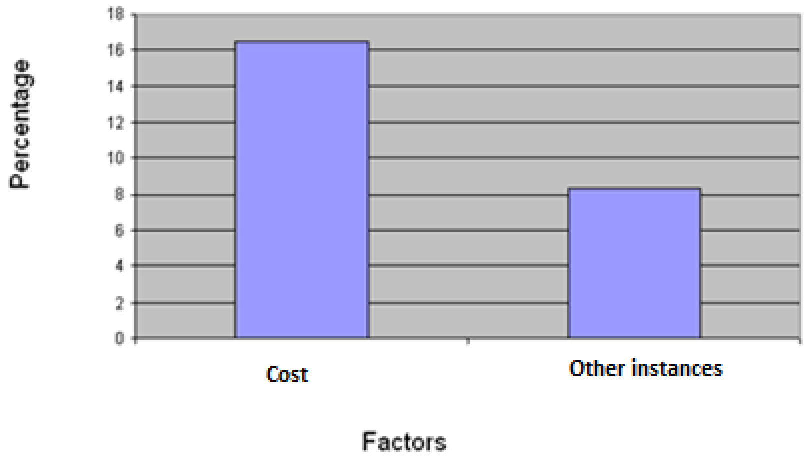

Figure 4.11: A chart to show potential factors that inhibit engagement with ICTs

Topic 12 - Anything that inhibits engagement with ICTs (framework approach)

A lack of understanding of the device can deter an older adult from engaging with them. The technical jargon can also act as a deterrent. To reduce such disengagement, simplification and a change in terminology suited to the needs of older adults is required.

Participant #1 stated: *"A lack of knowledge generally inhibits your engagement because you won't explore things that you don't really understand"*

A key strategy proposed by Entwistle et al's (2001) study was that of designing a course which takes into account he student's current knowledge base, so that the transition into the learning programme is smooth for those with little familiarity with the technology or application. The study also suggests considering a relative approach which relates the subject matter to other topics or real life experiences.

Advertisements targeting specific consumers (e.g. the over 50s) play a key role in reducing inhibitions with regards to learning such technology. The cost of the technology equipment is again a factor that restricts engagement with ICTs. There is a widely held assumption that older adults have access to what may be considered commonly used ICTs. Other uses such as information retrieval can be achieved via traditional, yet dated methods such as books, libraries and archives. Information retrieval and management is a key reason why older adults learn to use ICTs. The amount of available time for an older adult to learn is also a factor that inhibits the learning uptake of ICTs. This is an external factor and is not directly related to older adults' personal needs and requirements. The successful learning of ICTs is not on par with being entertained, however, it is important to generate awareness of the entertainment opportunities that such ICTs have to offer. A key factor of this is commercialism whereby products are geared towards the younger generation, rather than the older generation. Emphasis should be put on accessibility features such as using a structured and simple design layout with appropriate fonts etc. These are considered of relatively high importance to the older generation whose eyesight may have deteriorated. Also, additional functionality features are not necessary as these can cause extra complications and as such are not required.

<u>Topic 13 – Learning virtually (coding approach)</u>

1) Issues such as privacy and usability with social networking platforms (10. 5%)

2) The other instances (5.2% each)

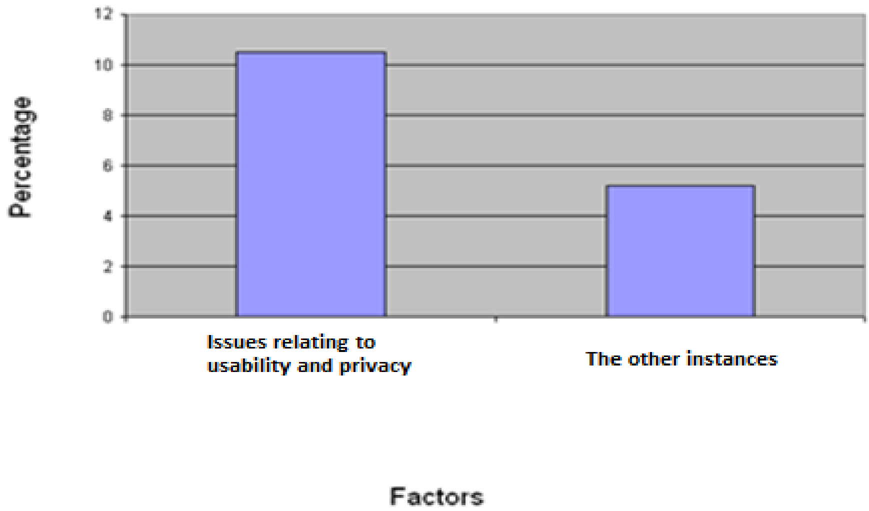

Figure 4.12: A chart to show factors that can inhibit virtual learning engagement

<u>Topic 13 – Learning virtually e.g. Facebook and YouTube for learning (framework approach)</u>

A form of virtual learning is considered effective in reaching solutions to problems, as well as learning how to use (other) technologies. These can comprise the utilisation of Google, message boards and chat rooms deliver solutions, although not practically deliver them. The use of virtual technologies to learn with also depends on preferred learning styles e.g. as it involves engaging with a technology, this generally reflects those with an experiential learning style. There is minimal structure with social networking platforms and Web 2.0 technologies such as Facebook.

Participant #2 stated: "*Tutorials on YouTube are not structured in a group*"

Findsen (2006) found a preference for unstructured learning, as opposed to structured and linear learning, structure was a specified requirement when learning in virtual settings. Yet if any collaborative learning is to take place, it should take place with those known to the learner (Digital Lifestyles 2009).

As such, structure is required with a non-randomised approach to learning. Such Web 2.0 technologies are considered very effective ways of keeping in contact with others, as well as being used for multimedia purposes such as listening to music. Learning could therefore occur in a structured and methodological manner in a collaborative setting. A key deterrent from learning with virtual technologies is potential access gained by others to financial records and accounts. As well as security issues, there are also privacy issues with such technologies that can deter learning in this manner. Virtual learning brings together peers in a collaborative manner, and this could be considered key to successful and fulfilling learning. With such learning, error alerts are considered far and few between, if an older adult is presented with difficulties on the computer. The error messages themselves however may require modifying as these can contain jargon. A key principle is for the older adult to firstly understand the message that is being delivered, as well as to understand and act accordingly upon this. Access to such virtual technologies is required and many older adults are put at a disadvantage regarding this. To sum up, there were mixed views with regards to social networking applications to learn with. Key motivators included communicating with friends, colleagues or peers and key deterrents included security, privacy and 'complexity' factors associated with the structure and layout. A study by Glover and Miller (2001) found that interactive whiteboards in pedagogical classroom based settings were used for efficiency, as extension and transformative devices. There were also 'fear' factors related to learning with such virtual technologies.

4.3 The coding and framework analyses of the focus groups

A total of 3 focus groups were carried out, and analysed and interpreted the same way as semi-structured in-depth interviews. It was decided to present the findings for each focus group separately, rather than as a group. This was because there were only three focus groups in total and one out of the three focus groups was based upon virtual learning (which was of a different nature compared to the other two). As with the interviews, the framework approaches carried out have been used to analyse and explore the findings in detail.

4.3.1 Focus group 1

Topic 1 – General opinions about ICTs (coding approach)

1) That it is good technology 4/30 = 13%
2) Getting via children is effective 4/30 = 13%
3) There are individual perceptions about the complexities of ICTs 4/30 = 13%
4) That it is not good technology 3/30 = 10%
5) Using an instruction manual is important 2/30 = 7%
6) Learning via a traditional course is effective 2/30 = 7%

7) The other instances 11 / 30 = 3% each

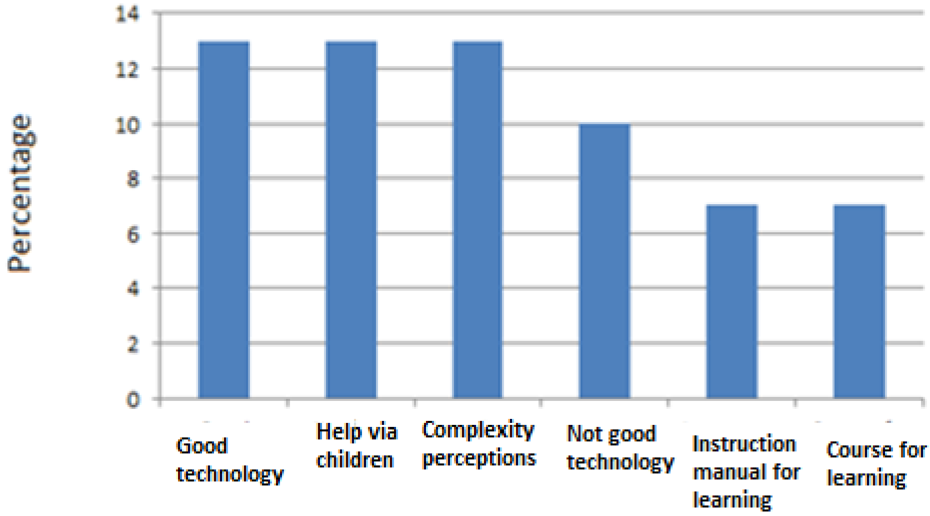

Figure 4.13: A chart to show general opinions about ICTs

Topic 1 – General opinions about ICTs (framework approach)

A key motivational influence is utilising ICTs for authoring purposes, with Web 2.0 technologies. It is important to be able to take advantage of the channel diversity digital TVs have to offer. Key features such as playback and on-demand are of particular importance. The remote controls which are integral to such devices are imperative, as is their simplicity and accessibility. The instruction manuals should be simple, jargon free, using sequential step by step approaches, or alternatively an accessible help book not containing unnecessary and excessive information. A help guide should accompany a course to enhance recall.

Participant #3 stated: "*I went on a course some years ago but unfortunately they didn't give us anything to take home, you need to reinforce what you've learned*"

It was important to provide learners with appropriate materials to help overcome gaps and common misunderstandings as proposed by Entwistle et al (2001). This contradicts Findsen's (2006) finding about a preference for unstructured learning (as opposed to structured and linear which is assumed to be with a course). Support guides should as such be provided as they offer flexibility (Githens 2007).

Again, 1 to 1 personal instruction is considered effective, although it is also considered resource intensive. To counter this, e-learning can be used with the incorporation of a virtual avatar. Here the virtual tutor can assist many learners. An accessible, simple e-learning platform could therefore be utilised. Key reasons for using ICTs are for communication purposes, such as with email and the mobile phone. Other branches of learning can stem from this e.g. utilising social networking platform on mobile phones to learn with. There are also geographical constraints with regards to ICTs. These include a lack of transport to travel to computer stores, limited broadband being made available in the area, and non-awareness of what such technologies can offer for the older adult consumer.

<u>Topic 2 – Specific things that make older adults want to learn to use ICTs (coding approach)</u>

1) Maintaining social contact: 2 / 13 = 15%

2) The internet being a key motivator: 2 / 13 = 15%

3) The other instances = 13% each

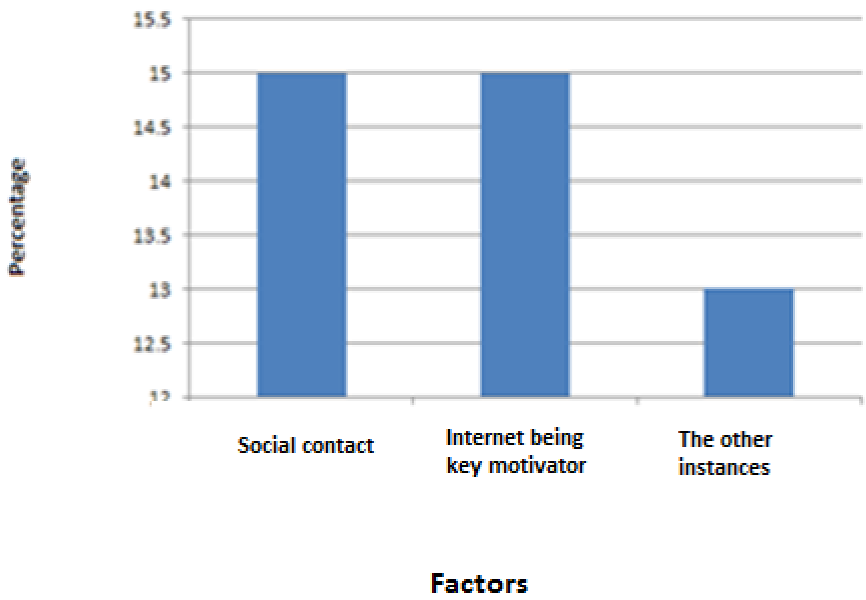

Figure 4.14: A chart to show factors that make older adults want to learn to use ICTs

Topic 2 – Specific things that make older adults want to learn to use ICTs (framework approach)

Ineffective facilitation is based directly upon the facilitator. The facilitator should have a good knowledge and understanding of the subject, as well as maintaining appropriate pace and not be initially known to the learner. The courses should adapt to the needs and requirements of older adults in the context of the learning material. As such, material issues may need to be revised throughout the course and focus on the essential and important learning outcomes that the cohort wishes to achieve on a uniform level. The learning styles prior to attending a course should be noted e.g. cognitive or experiential or both.

Participant #3 stated: "*Maybe we're different to younger people, it's a different type of learning really, and that's why it's probably harder for older people*"

This draws on similar comparisons to a key finding from the Digital Lifestyles (2009) report. It found that older adults are less likely to want to learn about digital technologies than younger age generations. Regarding age group differences, it was found an interest to learn is limited to those in their 60s rather than those who are 70. However, no gender differences were established.

The availability of DVD media directly related to the course material is also important for learning, as it offers a flexible approach so an older adult can access it and skip to key features when they prefer. However, there is a certain amount of inflexibility with DVDs if the older adult learner wishes to explore in detail the understanding of a particular subject. It is therefore a structured way to learn. Any assumptions on prerequisite knowledge about ICTs should be minimised. The media is integral in promoting the benefits of ICTs such as via TV advert broadcasts, leaflets, websites and community centres. Local councils and the government can also play a significant part in this, in specifically targeting the interests of the older adult community. Applications in particular should be simplified e.g. the layout of email clients. Communication mediums e.g. simplified chat rooms and user groups incorporating avatars should be set up and made available for a specific learning purpose. A key to such simplified virtual versions is to incorporate a basic layout with appropriate fonts, with instructions and a dialogue box for virtual communication. Such dialogue could also combine multimedia applications e.g. chat rooms which incorporate video and audio avatars and are designed purely for learning a particular technology or application.

Topic 3 – How older adults would best like to learn to use ICTs (coding approach)

1) Being taught by another person = 4/23 = 17%
2) Writing it down = 3/23 = 13%
3) Learning via a course = 3/23 = 13%
4) Not learning by books and other documentation = 2/23 = 9%
5) Appropriate rehearsal of material =2/23 = 9%
6) Not learning via relatives = 2/23 = 9%
7) Learning via relatives = 2/23 = 9%
8) The other instances = 4% each

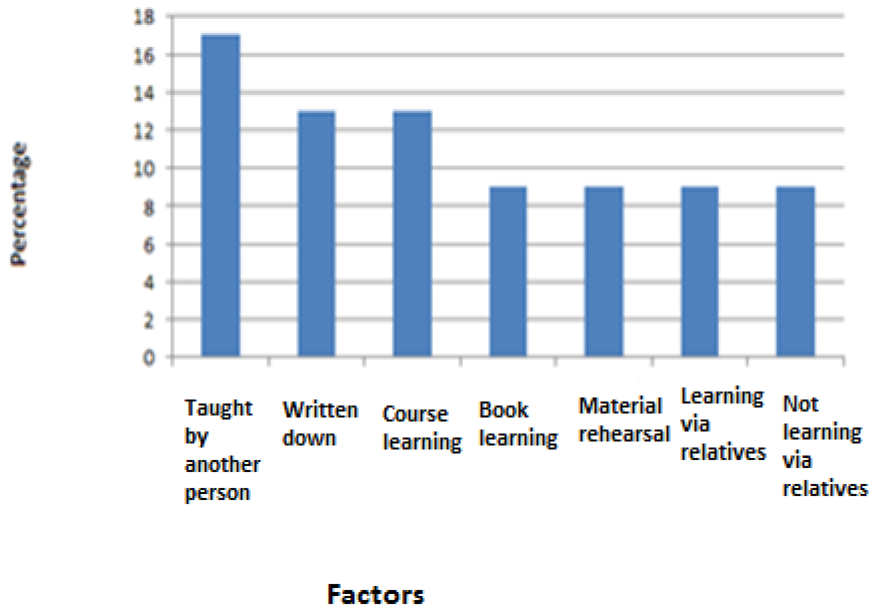

Figure 4.15: A chart to show how older adults' best like to learn to use ICTs

<u>Topic 3 – How older adults would best like to learn to use ICTs (framework approach)</u>

An active engagement approach with another learner or facilitator is considered best, rather than a conceptual approach by reading over the instruction manual or guide.

Participant #1 stated: "*I'm better if someone is showing me, give me a book, no, I've got no interest in reading how to do something, I need to be shown*"

The e-learning and third age study by Trentin (2004) found that older adult's preferred direct personal interaction compared to younger people. However, a blended solution would seem appropriate in which individual and group learning can be carried out in a virtual environment over the internet.

An audio option with books could complement a conceptual approach to learning. Writing down the instructions reflects an active engagement approach to learning and helps to reinforce the material.This could include incorporating notepads beside the technology or technologies in addition to virtual notepads. Any tasks undertaken should be repeated and practiced, with others if available to maintain this reinforcement. Such companionship can either be ‘real’ or virtual. When utilising a learner-teacher approach, encouragement of participation is important, as well as the feedback provided by the tutor or instructor. The feedback should expand on good points, as well as topics to be worked on. Courses of the same type incorporating different generational groups could be used effectively by providing peer support where necessary. Effective learning can be achieved by appreciating the way another learner goes about learning something and considering it. Learning and support mechanisms should make use of reinforcement e.g. an application which incorporates a practical element to reinforce good progress. A combination of an independent approach, while also learning via a course is effective. This can be offered by older adult community centres that incorporate an IT training programme element into their curriculum. The courses should be free of charge, or at a reduced rate, to increase accessibility as cost is a major barrier to course uptake.

Participant #1 stated: “*You know the council run courses in the winter for free*”

The survey carried out by Goodman et al (2003) found that courses were the most popular learning preferences in using ICTs. This could be furthered by subsidising fees for the courses thus making them for accessible for older adults.

Topic 4 – How changing motivations, attitudes, preferences and 'learning capacities' have influenced use and learning of ICTs (coding approach)

1) Learning about the use of the internet for a specific purpose x 5 = 5/24 = 21%

2) Increase awareness of security issues x 4 = 4/24 = 17%

3) Not making purchases online x 4 = 4/24 = 17%

4) Establishing communication x 3 = 3/24 = 12.5%

5) Learning independently x 2 = 2 / 24 = 8%

6) Informational issues x 2 = 2 / 24 = 8%

7) No interest in using ICTs for social networking x 1 = 1/24 = 4%

8) Previous experience of using technology influencing use x 1 = 1/24 = 4%

9) A lack of confidence being present x 1 = 1/24 = 4%

10) Using an instruction manual or books for learning x 1 = 1/24 = 4%

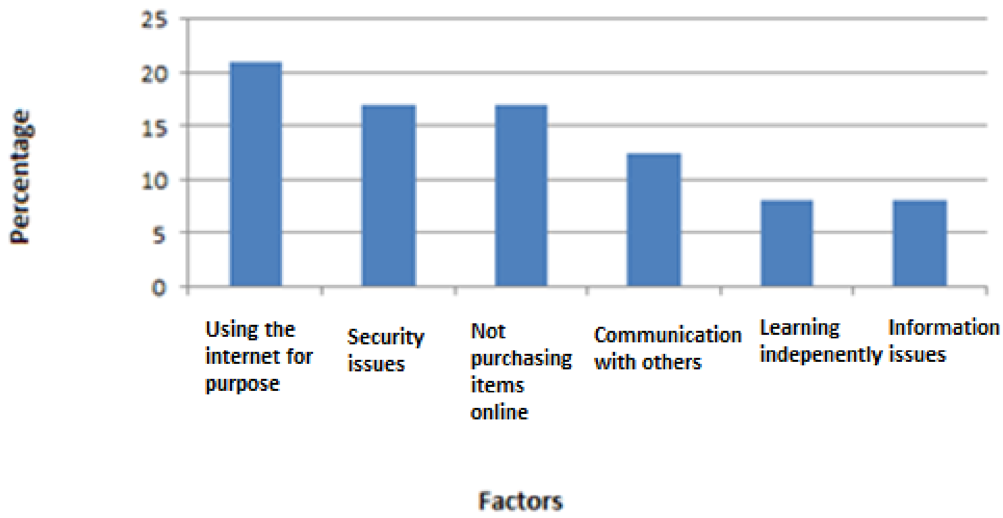

Figure 4.16: A chart to show how changing motivations, preferences, and 'learning capacities' have influenced use of learning of ICTs

<u>Topic 4 – How changing motivations, attitudes, preferences and 'learning capacities' have influenced use and learning of ICTs (framework approach)</u>

The use of email is a key motivator which enables fast communications between people. It is a key motivational influence for furthering the uptake of a computer or mobile device. Awareness should be made about security issues, as this can deter an older adult from engaging with many consumer technology products. This is particularly in reference to online mediums for transactions. As such, security about purchasing commodities online is an issue; however money can be saved by online purchases, rather than at the store. Booking travel online is again advantageous although the systems are considered too complex. This is because of the complex interfaces of such systems, as well as advertisements.

Participant #1 stated: "*I will not buy anything on the computer*"

Interestingly throughout all the literature, e-commerce was not considered a main reason for engaging with ICTs. While financial reasons was a choice identified in Trentin's (2004) study on e-learning and the third age, other reasons included: checking for news updates, engaging with local authorities and government associations. This may be attributed to little learning and support on financial uses which uses direct personal interaction.

Informational issues have presented complexities, especially through social networking applications. Web 2.0 applications such as Skype are considered effective mechanisms to communicate with others, and learn, due to its focused and simplistic approach. Additional icons and buttons that do not cater for basic functionality are not required. There should also be an increasing prevalence of technology exhibitions and conferences, as well as trade stands to sell technologies at a discounted rate, and to provide guidance.

<u>Topic 5 – Any specific challenges using ICTs (coding approach)</u>

1) Not being sure about buying online x 3 = 3/6 = 50%

2) Not being sure on how to use ICTs x 2 =2/6 = 33%

3) Security issues x 1 =1/6 = 16%

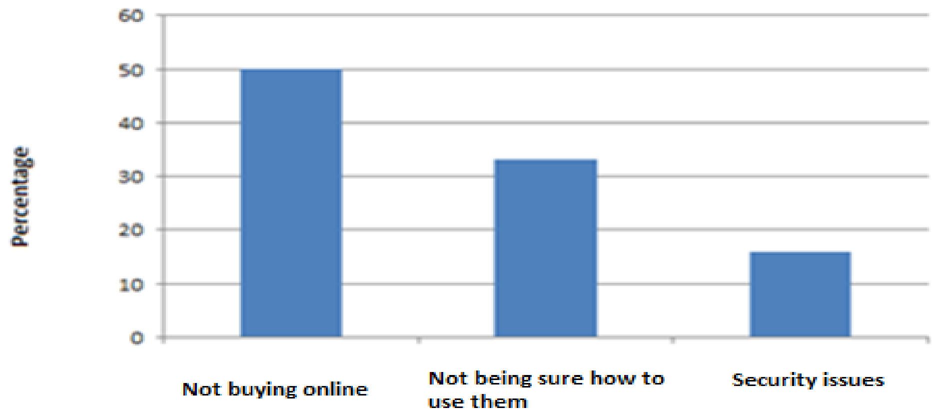

Figure 4.17: A chart to show any specific challenges in using ICTs

Topic 5 – Any specific challenges using ICTs (framework approach)

The interfaces within such computer systems and especially for purchasing online are not considered intuitive, although a trial and error method was used to overcome it. The layout should be simplified. Security issues are a major concern with e-commerce Web 2.0 systems such as online banking and product ordering. This is unfortunate due to cheaper products and services being made available online. In addition there are integrity issues (e.g. with the use of eBay, the seller not sending the item). The use of credit card transactions is also a deterrent. To counter this, media such as newspapers could incorporate free guides to help users become familiar and learn to use such technologies, as costs can be reduced and familiarity with the application gained. Any error messages should be communicated on an 'understandable' level to the target audience, and help guide the user effectively without causing complications.

Participant #3 stated: "*I paid for the TV license like that and the telephone bill on the internet, it's like when you use your mobile phone and they say 'this number's unavailable' and you phone again and it's fine*"

With the U3A study by Swindell (2002), it was found that 68% of participants preferred to have some contact or support with the course instructor and colleagues. Just 12% preferred not to have contact with them. This support could be transferred to a virtual format to help or reassure the learning in the form of a virtual avatar.

<u>Topic 6 - Any specific aspects that of ICTs that older adults have difficulty in using previously – (coding approach)</u>

1) Intermittent connectivity issues with the internet x 6 = 6/8 = 75%
2) Rectifying technology faults x 1 = 1/8 = 12.5%
3) Cost implications x 1 = 1/8 = 12.5%

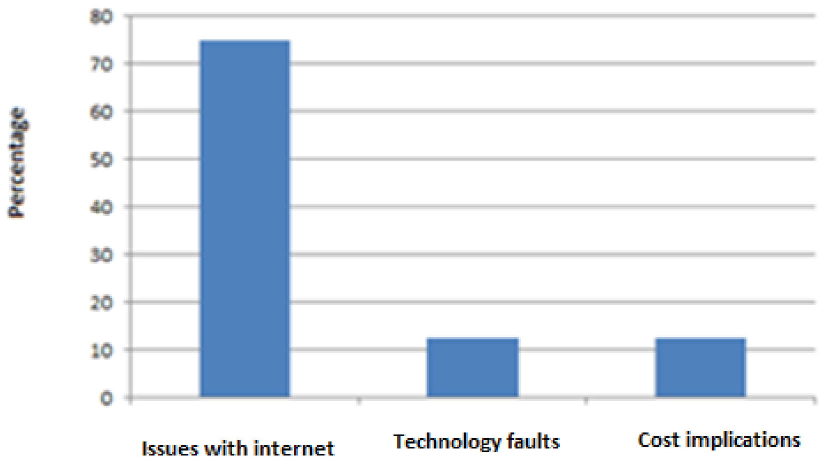

Figure 4.18: A chart to show specific aspects of ICTs that older adults have had difficulty in using previously

Topic 6 - Any specific aspects that of ICTs that older adults have difficulty in using previously – (framework approach)

While internet access can be intermittent, other technologies can be utilised to resolve practical issues that may arise e.g. mobile phones. Any potential solutions to reaching intermittent downtime issues related to the internet are not readily available.

Participant #1 stated: "*They were unable to connect me at this time, try later*"

Participant #2 stated: "*Technology has its glitches*"

Much of the literature surveyed did not consider faults with the technology, rather than the older adult learner. However, while Trentin's (2004) study on ATM usage found hardware issues to be prominent, trial and error methods of overcoming difficulties were identified in the Digital Lifestyle's (2009) report. This follows the pragmatist learning approach as identified in Honey and Mumford's (1989) learning framework.

Simplified and accessible trouble manuals should be available in hard copy format for common technological problems. The troubleshoot guides should be simplified, minimising the use of technical jargon. In built systems could also be used to resolve potential and common difficulties. The common difficulties should be identified with solutions prepared for them. Cost reduction strategies proposed by the government should also be implemented, as the costs of services delivering a phone line, internet connection and other TV packages is cheaper in other countries.

<u>Topic 7 – Any alternative learning methods to further engagement with ICTs – (coding approach)</u>

1) 1 to 1 tuition x 5 = 5/9 = 56%
2) Not independently x 2 = 2/9 = 22%
3) A course x 1 1/9 = 11%
4) Group learning with a facilitator x 1 = 1/9 = 11%

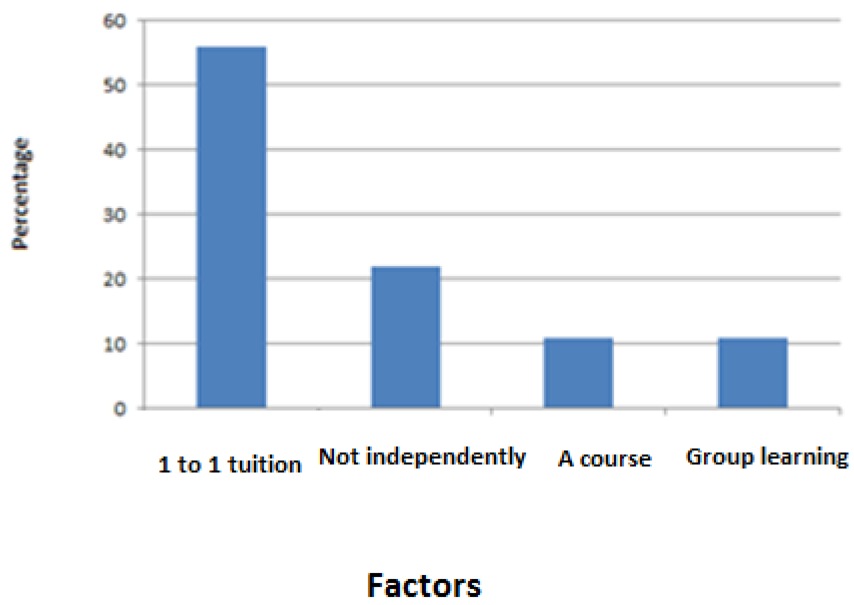

Figure 4.19: A chart to show any alternative learning methods to further engagement with ICTs

<u>Topic 7 – Any alternative learning methods to further engagement with ICTs – (framework approach)</u>

Any course should be accompanied by a teacher or instructor with basic knowledge of the subject, and commence the course with this basic knowledge. The 1 to 1 tuition carried out in a virtual or 'real' setting should be optimised in a structured and collaborative manner. Support is required rather than utilising an independent approach with help and assistance.

Participant #2 stated: "*It's very difficult to try to teach yourself*"

This self-teaching may assume an informal structure for application training instead of a formalised and linear class structure (Entwistle et al 2001). This was also reinforced by Findsen's (2006) study which found a preference for unstructured learning as opposed to structured and linear learning (which may be less associated with an independent and self-taught approach to learning).

The younger generation can actually be used to teach older adults effectively, even when a mismatching is present with different learning styles between learner and teacher. Such help should be used in a personal manner. The group size is again very important (e.g. with an optimum number of 6), as is building rapport and trust with the learners further. An intervention approach by the facilitator is important where necessary.

<u>Topic 8 –The virtual learning of ICTs – (coding approach)</u>

1) Not being interested x 1 = ¼ = 25%

2) Not understanding the technology thoroughly x 1 = ¼ = 25%

3) A different language being used x 1 = ¼ = 25%

4) Use of certain technologies being required that have been influenced by others x 1 = ¼ = 25%

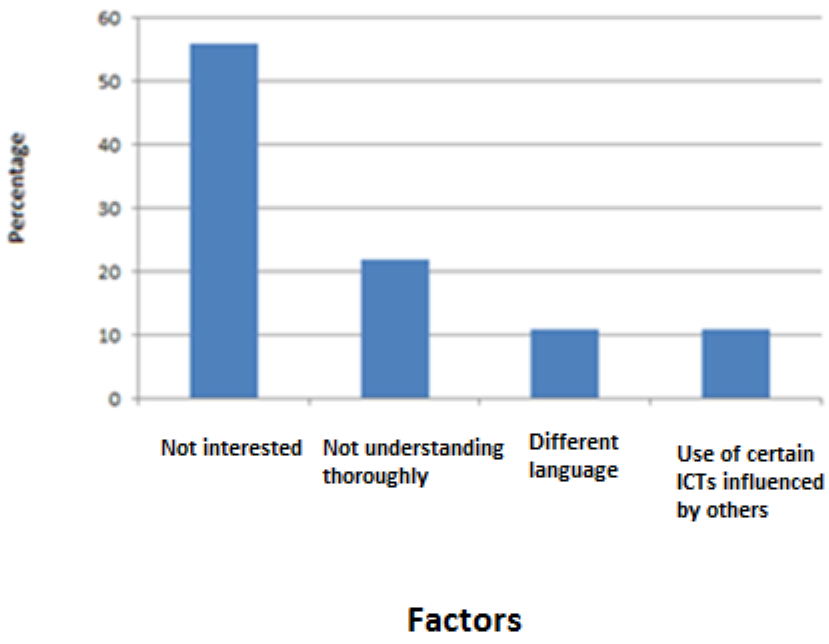

Figure 4.20: A chart to show factors that influence the learning of certain technologies virtually

Topic 8 –The virtual learning of ICTs – (framework approach)

With virtual learning, and in particular social networking platforms, there is not a sufficient level of understanding, as well as a lack of interest in using it. Motivations for using such technologies should be identified.

Participant #3 stated: "*Because I don't need them, I don't bother with them, at the moment it's not a necessity*"

This could be rectified by Entwistle et al's (2001) strategy of providing a statement about the purposes of the course. It was SeniorNet (2012) which provides older adults access and education to computer technologies found a key reason for the engagement with ICTs, which was for communication purposes. So it is about identifying key motivators for finding ICTs necessary. This also reiterates Mederios's (2008) proposition in that older adults are less likely to want to learn to use products and technology as a result of ageing.

As a result, 'basic' social networking platforms should be designed, as common ones incorporate a lot of unnecessary features make them cumbersome to learn with and use. A social networking platform targeted for 'older adults' could be designed, as a solution for this.

Topic 9 –Any other comments – (coding approach)

1) A book or manual is not necessarily effective x 2 = 2/20 = 10%
2) Writing it down to rehearse the material x 2 = 2/20 = 10%
3) Engaging with the experience several times x 2 = 2/20 = 10%
4) There are language issues x 2 = 2/20 = 10%
5) There are different ways of learning x 1 =1/20 = 5%
6) Taught by a teacher is preferred x 1 =1/20 = 5%
7) That there is a fear factor with ICTs x 1 =1/20 = 5%
8) That interest in a particular technology or application is required initially x 1 =1/20 = 5%
9) That effective lessons are important x 1 =1/20 = 5%
10) That there is limited awareness and availability of technology applications x 1 =1/20 = 5%

11) That the government has too much influence on educational courses x 1 =1/20 = 5%

12) Learning via rote is effective x 1 =1/20 = 5%

13) That other learning styles may require considering to make the learning of ICTs effective x 1 =1/20 = 5%

14) That phonics should be used x 1 =1/20 = 5%

15) That too many changes is not effective e.g. to the nature of the learning course x 1 =1/20 = 5%

16) It is about how the learning is taught and delivered which determines its effectiveness x 1 =1/20 = 5%

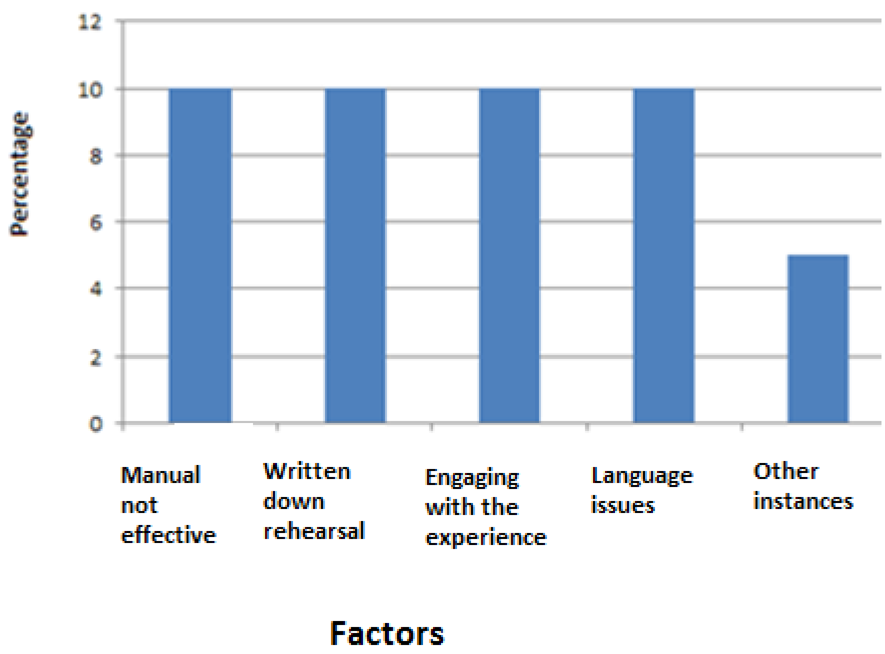

Figure 4.21: A chart to show any other comments that were mentioned in relation to learning and ICTs

Topic 9 –Any other comments – (framework approach)

That teaching is considered effective, rather than independent study with a book or other documentation. This is a form of personal support being required. An active and engaging approach from the teacher is considered effective. Written instructions accompanying the technology product are important for recall. However, on their own they are not considered effective. These can also include pre-prepared notes also accompanying the learning programme rather than traditional and book texts. Traditional course based lessons are considered interesting, although they should be complemented by an independent approach with a book. Obtaining help via family members is also a good way to learn, in addition to the government's influence on learning, training and curriculum development. The system should remain consistent, yet the material delivered adapt according to technology changes and the specified needs of older adults. The learning course itself should not be intensive, and appropriate feedback should be sought after regarding the nature of such courses.

Participant #3 stated: "*It's not what you know; it's how you teach it*"

This draws on the principles of curriculum design outlined by Entwistle et al (2001) which includes a statement of the purposes of the course, designing a course to take into account the student's current knowledge base, issuing feedback, materials and realistic assignments, a relative approach, peer discussion and making use of factual knowledge with problem based criteria.

The facilitator should note down and consider any needs or requirements related to the learner.

The language should be easy to follow and compatible for all learners. The use of phonics can also be successful for older adults whose first language is not English. A phonic based system could therefore be used next to the original system to help such learners, with analogies used to describe computer terms. There are also cultural differences within such systems, which may be related to the way material is presented. As such, awareness of cultural norms should be incorporated into the curriculum, to enable the effective communication of material and help all learners.

4.3.2 Focus group 2

Topic 1 – Opinions about ICTs in general – (coding approach)

That they are frustrating x 2 = 2/13 = 15%

The sending of documents via email is effective x 2 = 2/13 = 15%

Quick information retrieval via the internet x 1 = 1 / 13 = 7%

That ICTs are considered confusing x 1/13 = 7%

That ICTs have changed over time x 1/13 = 7%

That ICTs should be integrated into life x 1/13 = 7%

That ICTs are used in the workforce for quicker and automated transactions x 1/13 = 7%

Such technologies should be used otherwise older people will be missing out on things x 1/13 = 7%

There are no reasons for not learning how to use ICTs x 1/13 = 7%

That learning courses are not effective, this being attributed to too much non-sense jargon, icons, breaks in the delivery e.g. absence of tutor, different facilitators being used instead of one x 1/13 = 7%

Physical accessibility limitations being present x 1/13 = 7%

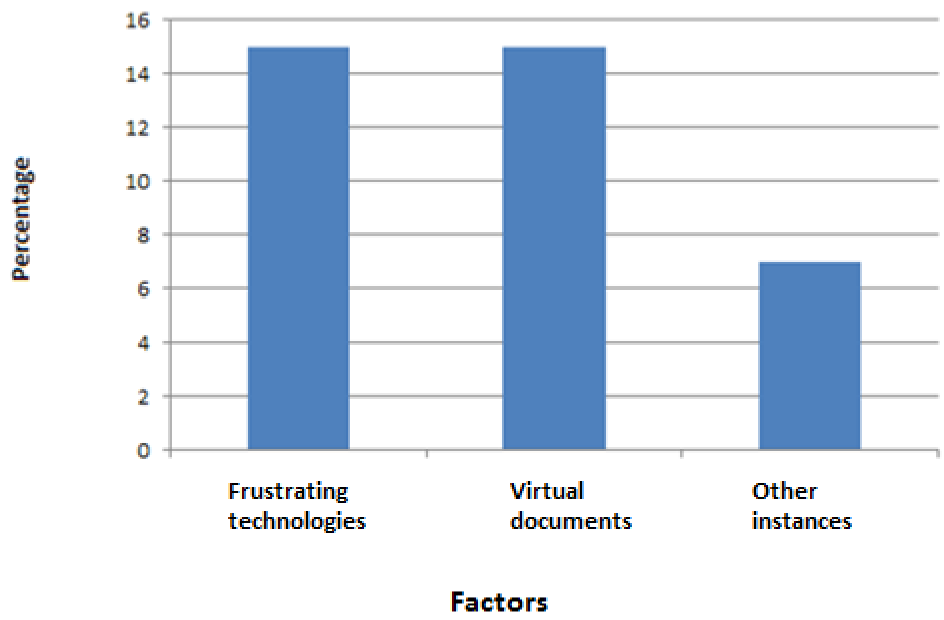

Figure 4.22: A chart to show some general opinions about ICTs

<u>Topic 1 – Opinions about ICTs in general – (framework approach)</u>

ICTs can be frustrating to use, yet report writing is considered useful, as are email facilities and information retrieval. Such automated processes can be carried out faster than traditional, manual based methods. There are general perceptions about ICTs such as complexity issues, yet to counter this standardisation would be necessary. The ‘real world’ and personal benefits should be explored and identified via a reflection and evaluation process. The prevalence of ICTs in the workforce has a distinct influence on older adults’ experience levels, and may increase learning progression. This is dependent upon different age generations. There is also a common perception about not knowing where to start. It is essential to teach the basics first, and then build on this knowledge and understanding. Many taught courses do not consider the needs and requirements of the older adult population. This can be a major deterrent from undertaking courses to learn ICTs and their applications. It was found that a linear and randomised structure was also considered successful in addition to a linear structure. The course itself should be continuous with no breaks, with the same tutor building rapport and trust with the learners. Personal help and feedback should be provided where necessary. Personal attention is also important in identifying areas that need improving for learners.

Participant #6 stated: "*College kind of course and they seemed to put everything in your way, they give you the course, the first 7 weeks there's a bank holiday in the middle there were two weeks when a tutor didn't come, we had 5 weeks where we had 4 different tutors so there's no continuity*"

This reiterates the proposition from the U3A study which found that the majority of participants preferred to have some contact with the instructor (Swindell 2002). The facilitator is a key component of the successful learning of ICTs. This continuity was not however identified in Entwistle et al's (2001) study which proposed strategies to curriculum design.

New products should be geared towards being accessible, without having to incorporate accessibility functions for particular demographics. An option to enable specific accessibility functions should be made available for such groups.

Topic 2 – Things that make older adults want to learn to use ICTs – (coding approach)

Information gathering x 4 = 4/21 = 19%

Courses tailored towards practical applications x 3 = 3/21 =14%

Online communication x 3 = 3/21 = 14%

Photo applications x 2 = 2/21 = 10%

Accessibility requirements not being an issue e.g. icons decreasing accessibility x 2 = 2/21 = 10%

Browsing websites x 1 = 1/21 = 5%

Social media applications such as Facebook and YouTube x 1 = 1/21 = 5%

Effective teachers x 1 = 1/21 = 5%

Searching family history x 1 = 1/21 = 5%

Shopping online x 1 = 1/21 = 5%

Basic skills e.g. English and Maths are not being maintained due to the use of computers x 1 = 1/21 = 5%

That general learning is not associated with ICTs x 1 = 1/21 = 5%

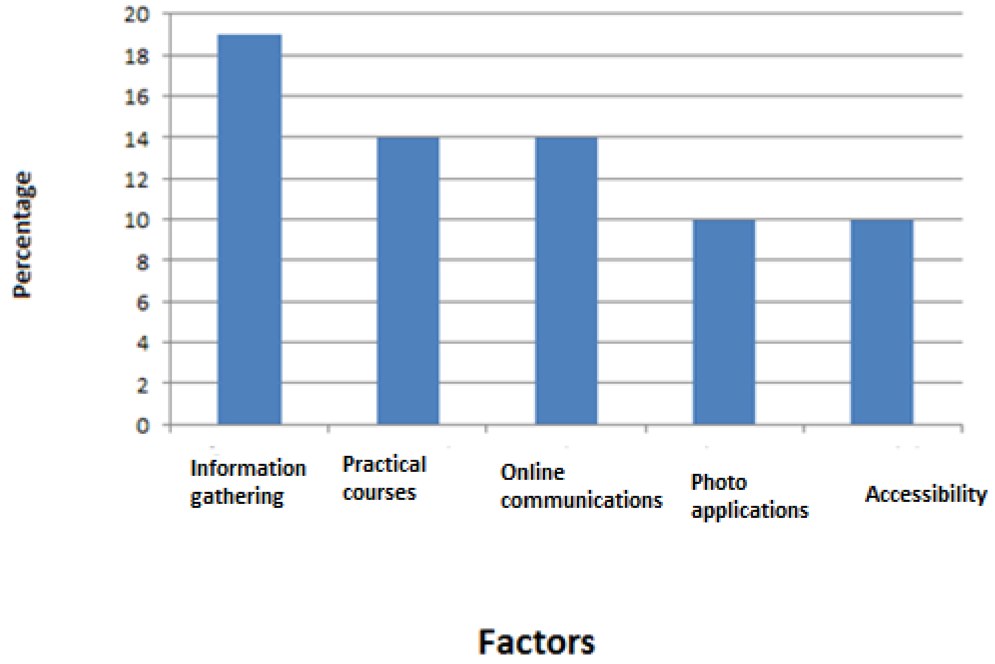

Figure 4.23: A chart to show things that make older adults want to learn to use ICTs

<u>Topic 2 – Things that make older adults want to learn to use ICTs – (framework approach)</u>

Key motivations include information gathering and multimedia applications (e.g. photos and audio recordings). The Skype application is another motivator although an increase of usability and accessibility would make learning easier. The courses delivered by unions are considered effective, and this is attributed to the organisation of them.

Participant #1 stated: "*One of the interesting things was unison put on courses for retired members and it was very good and I learned quite a bit*"

This suggests that community courses and collaborative learning with those known to the older adult are a preferred method of learning. This emphasises the point proposed by Entwistle et al (2001) in that opportunities for peer discussion should be provided. It refers to the Andragogy approach as put forward by Knowles (1980). Further, this reiterates Swindell's (2002) proposition that enjoyment is achieved by being part of and communicating with other members of the group.

Information retrieval as well as maintaining contact with others was again important. The Web 2.0 technologies are considered interesting yet perceived as difficult to use, and this could remain a barrier to their uptake. The icons can impede learning and the layout should be re-redesigned to be simpler, with larger icons, less jargon and less optionality within the menus. While information retrieval was a key motivator, help and assistance was lacking with regards to this. Information retrieval and management is a substantial topic and assistance in this area lacks. While mobile technologies were a key motivator in engaging with ICTs, they were said to reduce 'basic' everyday skills. Although such technology corrects certain mistakes, it does not replace learning in traditional, non-computational methods. A learning programme could be designed to amend aspects of the learning process as the learner learns. The availability of freebies when purchasing items online is another motivator for using e-commerce technology to order goods with. However, many online systems are considered complicated to use, with much added options and functionality. A basic design layout is required, with a different, accessible version. Such systems should consider ‘like’ variants.

Topic 3 – How older adults would best like to learn to use ICTs – (coding approach)

1 to 1 learning x 3 = 3/16 = 19%

With an appropriate tutor who provides attention x 3 = 3/16 = 19%

With small classes of less than 10 learners x 1 = 1/16 = 6%

Technologies related to jobs and job prospects x 1 = 1/16 = 6%

For writing and authoring purposes x 1 = 1/16 = 6%

Using mobile technologies to learn x 1 = 1/16 = 6%

For internet banking x 1 = 1/16 = 6%

For telehealth x 1 = 1/16 = 6%

Learning ICTs via company x 1 = 1/16 = 6%

Invalid error messages need to be coherent x 2 = 2/16 =12 %

Enthusiasm is important for the learning uptake of ICTs x 1 = 1/16 = 6%

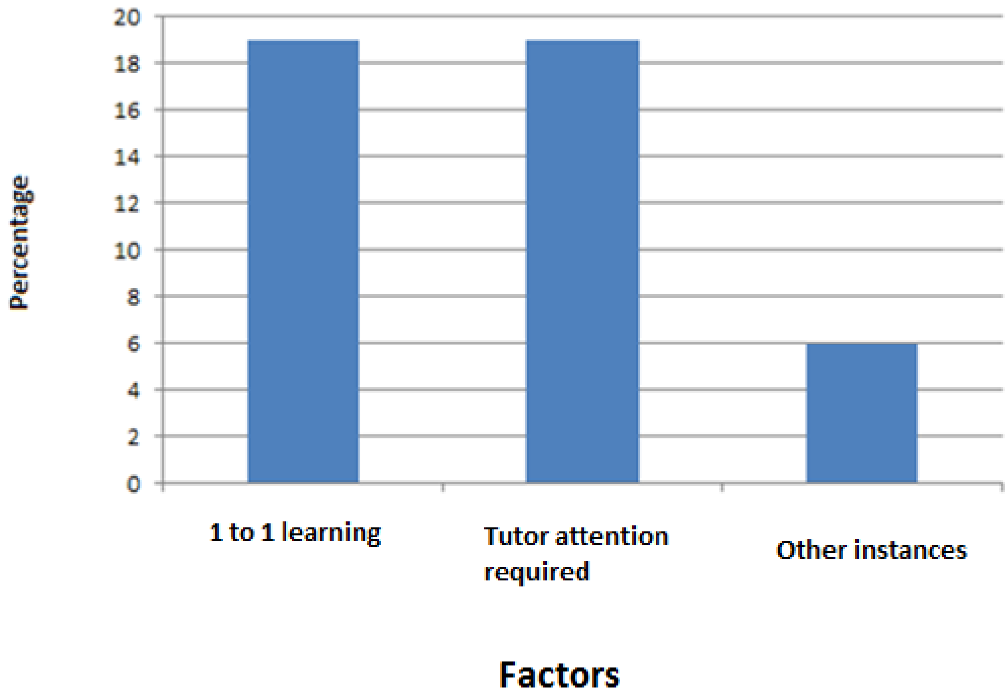

Figure 4.24: A chart to show how older adults would best like to use ICTs

<u>Topic 3 – How older adults would best like to learn to use ICTs – (framework approach)</u>

Older adults would best like to learn to use ICTs via 1 to 1 tuition e.g. in 'real' or virtual environments. The techniques should be optimised by allowing for virtual instruction with an artificial intelligence based avatar. A technique could be used in which a mechanism is utilised for detecting their responses and adapting the help and assistance where necessary. The attention of the learners should be maximised, and a solution to this is to evaluate common problems based upon previous trials and issue feedback to increase attention within the learning process. Learning in a collaborative, group setting with about 10 peers, colleagues or friends was considered optimum.

Participant #2 stated: “*I’ve used it in small classes that was no more than 10 so that was easy to pick up*”

This number is slightly more than the optimum group learning number of 6 as proposed by Bean (2004). If possible, two facilitators could be provided to achieve the 3: 1 learner: teacher ratio, although this may be considered resource intensive. Such classes also allow the opportunity for peer discussion as proposed by Entwistle et al (2001).

Enthusiasm is synonymous with identifying key motivators for using the technology e.g. word processing and searching for jobs. This can also motivate older adults to learn to use other areas of ICTs. Standardisation should be prevalent among technologies, as it has become increasingly common for knowledge transfer. However, such standardisation has been reduced by different products within the market. There is an intergenerational divide between the ‘older’ older adult generation (who were less likely to be brought up with ICTs) and the younger older adult generation (in which access is considered readily available). It is important to consider and discard various learning methods via the process of self-reflection and evaluation in which both generations collaborate together.

<u>Topic 4 - How changing motivations, attitudes, preferences and ‘learning capacities’ have influenced use and learning of ICTs (coding approach)</u>

The notion that technology can reduce knowledge x 6 = 6/28 = 21%

That ICTs can impede education and learning (e.g. especially with the younger generation who use calculators) x 5 = 5/28 = 18%

That banking issues can arise as a result of such technology x 4 = 4/28 = 14%

That ICTs can be used to maintain skills x 2 = 2/28 = 7%

That learning can be achieved in general x 2= 2/28 = 7%

That age does not necessarily influence ‘capabilities’ of learning x 2 = 2/28 = 7%

Knowledge can be gained from greater uptake of ICTs x 1 = 1/28 = 3.5%

That there is a ‘big brother’ phenomenon x 1 = 1/28 = 3.5%

That the internet is beneficial x 1 = 1/28 = 3.5%

That courses should be offered by an organisation closely affiliated to its members e.g. Age UK computer clubs x 1 = 1/28 = 3.5%

The teaching methods and situation in which the learners are in are key issues x 1 = 1/28 = 3.5%

Enjoyment is an important component of learning ICTs x 1 = 1/28 = 3.5%

That ICTs are perceived as 'not easy' nor 'hard' in terms of learning and usage x 1 = 1/28 = 3.5%

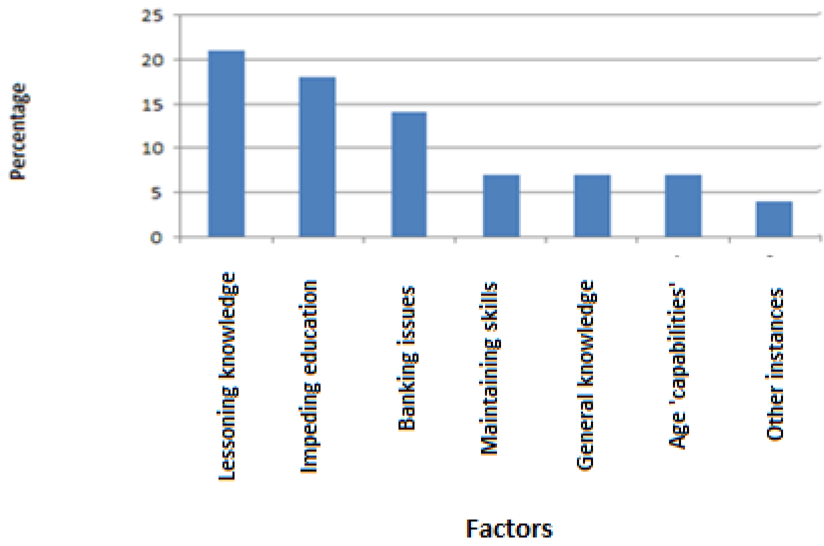

Figure 4.25: A chart to show how changing motivations, attitudes, preferences and 'learning capacities' have influenced use and learning of ICTs

Topic 4 - How changing motivations, attitudes, preferences and 'learning capacities' have influenced use and learning of ICTs (framework approach)

The use of computers can help older adults lead an active lifestyle. Many 'real life' applications can be transferred to the use of ICTs, as well as knowledge transfer from mobile to pervasive technologies.

Participant #7 stated: "*I want to know and there's a lot on there and I learn more by myself*"

This is an independent approach as proposed by Holec (1981). This indicates that it allows learners to make informed choices and take on responsibility for what they need to do in order to learn. The learners need to engage in learner centred decision making, reflect on own current learning mechanisms and consider whether the learning has been effective or to take another approach (The Quality Improvement Agency for Lifelong Learning 2008).

Attitudes have changed towards Web 2.0 technologies, in terms of their limiting accessibility. There is also a 'big brother' phenomenon involved with such technologies which can instil a fear factor for older adults wanting to use them. In addition, courses offered by organisations affiliated with its members (in this respect the Nottingham Elders Forum) are likely to recruit learners. This affiliation may be due to other members of the group being known. The environment in which learning takes place should be considered. The use of learning via e-methods in a classroom based environment was considered effective. This includes combining real with virtual learning. As ageing increases, the basics (including the setting of defined goals) should be outlined and adhered to, as well as maintaining confidence. Such basic skills are being influenced via the use of ICTs in various practical applications. Learning via games and entertainment platforms is considered effective in engaging enthusiasm. As ageing increases, confidence is said to decrease in terms of engaging in a learning method and therefore ICTs.

<u>Topic 5 – Any specific challenges of using ICTs (coding approach)</u>

Books for dummies e.g. accessible books x 4 = 4/19 = 21%

Index problems with searches x 3 = 3/19 = 16%

Key words are required x 3 = 3/19 = 16%

Encyclopaedias being out of date x 2 = 2/19 = 11%

Information retrieval is quicker via internet x 2 = 2/19 = 11%

Familiarisation with the book required x 1 = 1/19 = 5%

The radio is a potential learning solution x 1 = 1/19 = 5%

Superfluous information impeded the learning process x 1 = 1/19 = 5%

Sympathetic approval is required to provide confidence to the learners x 1 = 1/19 = 5%

Starting slowly is important x 1 = 1/19 = 5%

The total number of occurrences = 19 = 1/19 = 5%

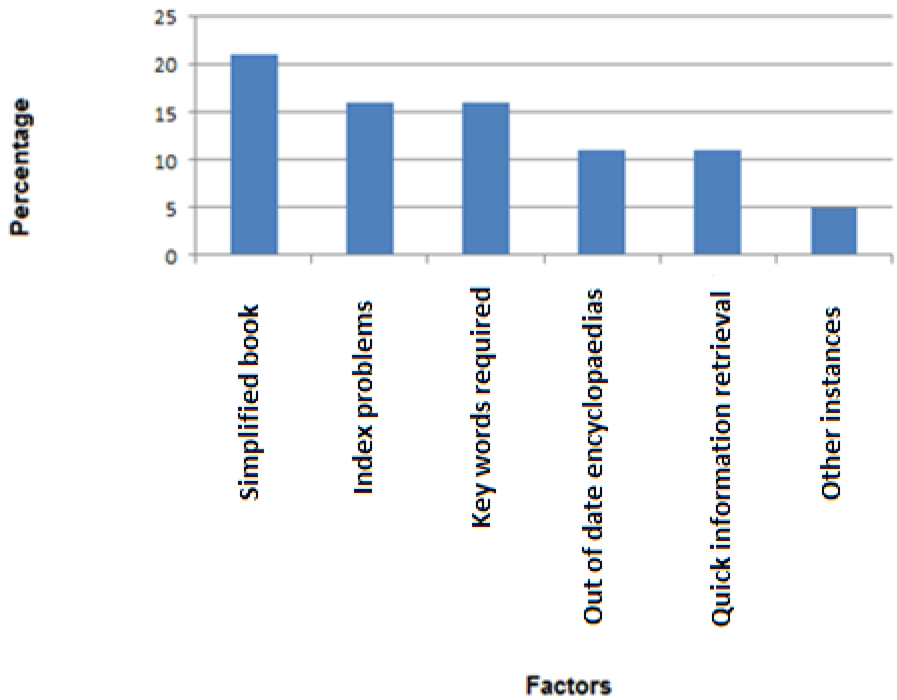

Figure 4.26: A chart to show specific challenges in using ICTs

Topic 5 – Any specific challenges of using ICTs (framework approach)

There are language and terminology issues when using the index in an instruction manual to find a solution for a particular problem e.g. it is not under what some older adults may consider the appropriate place. The indexing system could be re-designed with alternative key words considered. A possible solution would be to survey the key words older adults use to refer to particular computer phrases. There is a disparity between key words the author and publisher considers relevant when compared to the older adult technology user.

Participant #1 stated: "*You have these books and you look up something that you want to know about and you can go through the index because it's not under what you think it is, it's under something they think it is*"

This suggests that instruction document is not an effective mechanism, and this was reiterated in Morell's (2002) study which found that any accompanying documents were considered too complicated, with too much jargon and inadequate support. Learning via a manual or other documentation was not however identified in Goodman et al's (2003) study in learning methods and preferences for using ICTs.

Encyclopaedias were once a very useful resource for searching information about a topic. Security risks are associated with online retrieval, and a revolutionised encyclopaedia with increased multimedia usage could attract learners. This could take the form of a Web 2.0 format, with an accessible 'Wikipedia' style Web 2.0 technology for overcoming the challenges associated with widely accessible technologies. Becoming accustomed to the help manual as well as becoming acquainted with it are potential solutions. A sympathetic and supportive tutor is required using analogies in language terminology. Another common problem is that the pace of material delivery is considered too fast, so a slower pace is necessary.

Topic 6 – Any aspects of ICTs that the older adult has difficulty in using previously (coding approach)

Effective tuition is required to resolve such difficulties x 3 = 3/17 = 18%

The location of the 'on' switch x 2 = 2/17 = 12%

Starting from the beginning is required x 2 = 2/17 = 12%

Practice based learning x 2 = 2/17 = 12%

Independent learning is required x 1 = 1/17 = 6%

Trial and error x 1 = 1/17 = 6%

Facilitation or help from someone required x 1 = 1/17 = 6%

Internet shopping not being secure x 1 = 1/17 = 6%

Security issues x 1 = 1/17 = 6%

Spam x 1 = 1/17 = 6%

Issues with lots of paper being printed – conserving the environment x 1 = 1/17 = 6%

Hardware experience being important x 1 = 1/17 = 6%

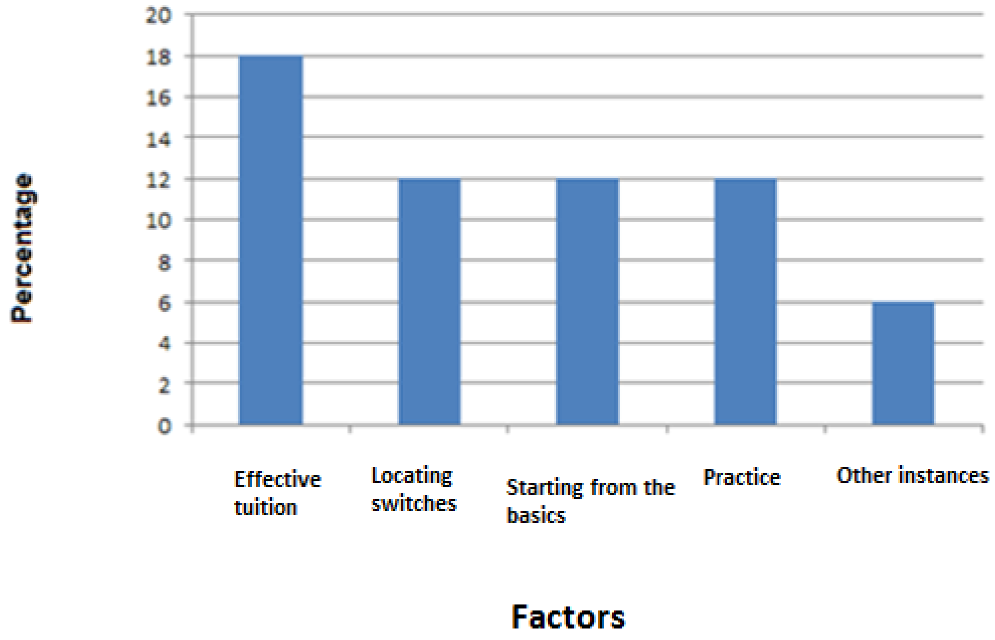

Figure 4.27: A chart to show aspects of ICTs that older adults have had difficulty in using previously

<u>Topic 6 – Any aspects of ICTs that the older adult has difficulty in using previously (framework approach)</u>

The basic features of a computer such as the ‘on’ switch can cause problems for older adults. As a result, basic instruction guides or courses should provide familiarity with the technology.

Participant #6 stated: *“If I was giving a class you wouldn’t want to leave that room until you learned and showed everybody how to switch it on”*

This suggests an informal approach by showing, encouraging, supporting and helping older adult learners in actually using the technology as identified by Taylor et al (2004). However a key drawback with Entwistle et al’s (2001) strategies for curriculum design do not mention a “show how” method of teaching, thus not incorporating practical elements into the course. This is important to enhance theoretical understanding.

In a classroom or virtual learning environment, the very basics should be addressed to the entire learning cohort. The basics should be thorough, especially if they are important and fundamental to the piece of technology. Overcoming mobile technology difficulties can be achieved via trial and error methods. This is due to a limited number of courses and training offered for mobile technologies because of the vast amount of products on the market. Products should be standardised. For example, if an older adult learner learned to use an iPad successfully, the chances of learning to use the iPhone effectively and efficiently are substantially increased due to the standardisation (e.g. they both belong to the Apple company and so familiar features are incorporated into the product). Errors should be expected, but it is very important to maintain support and redirect the older adult user where necessary. There were security issues surrounding Web 2.0 technologies and in particular e-commerce. In addition, spam and viruses have caused concerns. The gap between standard English language and technology language should be minimised. Hardware accessibility is an issue, especially with the commonly used keyboard in terms of letter positioning. The dimensions of the keys also influence accessibility, and with mobile devices this is prevalent.

<u>Topic 7 –Any alternative methods to further engagement with ICTs (coding approach)</u>

Learning to shop online x 4 = 4/23 = 17%

Learning with laptop is ineffective as their power consumption is limited x 3 =

3/23 = 13 %

Online purchasing which is affecting retail shops x 3 = 3/23 = 13%

Laptops portability x 3 = 3/23 = 13%

Products on the market are overwhelming for such consumers x 2 = 2/23 = 9%

DVD on computer learning – tailoring own pace x 2 = 2/23 = 9%

Identity theft x 2 = 2/23 = 9%

Laptop learning being convenient x 1 = 1/23 = 4%

Cost being involved with internet learning x 1 = 1/23 = 4%

Security issues x 1 = 1/23 = 4%

That exercise is limited x 1 = 1/23 = 4%

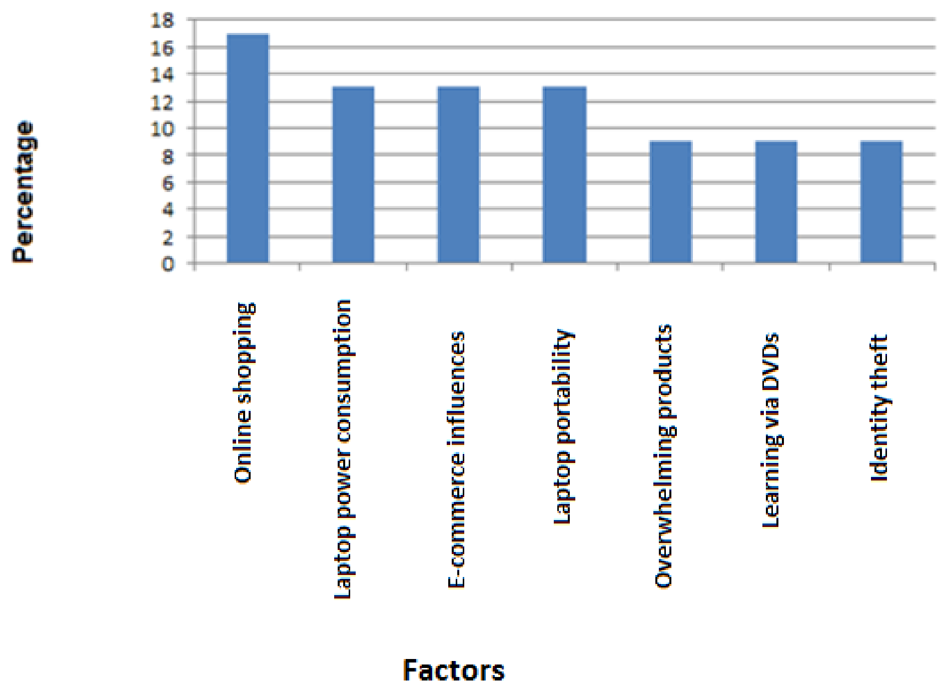

Figure 4.28: A chart to show any alternative learning methods to further engagement with ICTs

Topic 7 –Any alternative methods to further engagement with ICTs (framework approach)

A DVD centred on learning particular ICT applications was considered effective, so was a multimedia application. Such a learning mechanism is considered flexible as the learner can learn at their own pace and time. It can also be offered in alternative formats e.g. audio playback on cassettes to cater for 'traditional' and dated technologies. Laptops themselves are considered effective devices for learning on due to their portability, but may lack power.

Participant #6 stated: "*You can go out in the garden wherever you're comfortable*"

This comfort was omitted throughout much of the empirical based literature, and this was considered key to successful learning. Comfort can generally be achieved in environments in which the older adult learner is familiar too. Such comfort can be attributed to community based courses as identified in Goodman et al's (2003) study.

Other portable devices such as notebooks may have additional advantages compared to say laptops. Learning technologies that have mobility are considered successful. Learning via the internet was another alternative mechanism, although there are cost implications (in addition to the technology) involved with this. There should be trial packages and shorter term contracts. Increasing use of tutorial based learning methods that incorporate pictorial representations with qualitative descriptors should be made available.

‘Internet starter packs’ containing playback media to set up, install and use the system should be incorporated into such packages.

<u>Topic 8 –The virtual learning of ICTs (coding approach)</u>

Online purchasing is not the same as going to the shop or store x 5 = 5/12 = 42%

That virtual learning is not an effective way of learning how to use ICTs x 2 = 2/12 = 17%

That ‘virtual friends’ should not be considered in the same group as ‘real friends’ x 1 = 1/12 = 8%

Mobile devices being used to resolve ‘basic’ tasks x 1 = 1/12 = 8%

That grandchildren are effective in teaching older adults to use virtual technology x 1 = 1/12 = 8%

That virtual learning can be achieved via instructions x 1 = 1/12 = 8%

The font for instructions is too small x 1 = 1/12 = 8%

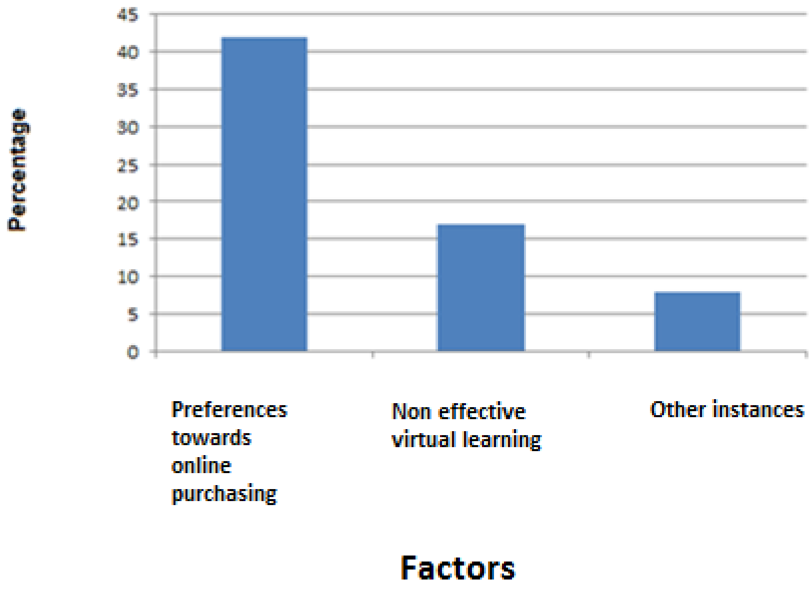

Figure 4.29: A chart to show virtual learning for learning how to use ICTs

<u>Topic 8 –The virtual learning of ICTs (framework approach)</u>

Social networking platforms are not necessarily effective ways to learn, and that learning collaboratively is not necessarily effective over such a medium. Social networking such as Facebook has gone global and there are nearly a billion users worldwide. Learning opportunities can be taken advantage with this in that learning is carried out in a collaborative manner, also incorporating optimisation techniques. In terms of e-commerce, the facilities do not necessarily replace real life consumer shopping as the product is made available before the actual purpose. Mobile devices are only used for basic functionality and not advanced functionality such as Web 2.0 applications, music and social networking etc.

Participant #4 stated: “*I only use my mobile to call for a taxi when I go anywhere or anything like that*”

There were less pervasive technology uses from the literature, apart from ATM usage as identified by Trentin (2004). This contradicts Ofcom's (2010) proposition that older adults use mobile technologies less than any other age group. It does however emphasise the U3A's key finding in that mobile technologies were limited to communication purposes.

There are different mobile specifications available, and the older adult should choose one according to their needs and requirements. In particular, accessible devices with simpler layouts, fewer features and larger buttons should be utilised. Instructions are not provided with some virtual technologies such as the Apple iPad. An assumption is made that the technology is intuitive for learners. However, an instruction manual should be provided that incorporates a large font, as well as a numbered style system which is laid out logically and sequentially.

<u>Topic 9 –Any other comments (coding approach)</u>

There is a sociological assumption to own computers x 3 = 3/11 = 27%

A desire to increase knowledge about them without having to train x 1 = 1/11 = 9%

Lessons are required for learning but time is limited x 1 = 1/11 = 9%

Learning independently x 1 = 1/11 = 9%

Fresh information regarding learning and technology is important x 1 = 1/11 = 9%

That there is a need to learn different applications x 1 = 1/11 = 9%

That error messages require clarity x 1 = 1/11 = 9%

TV programmes are migrating to computers e.g. the BBC's iPlayer x 1 = 1/11 = 9%

There are privacy issues x 1 = 1/11 = 9%

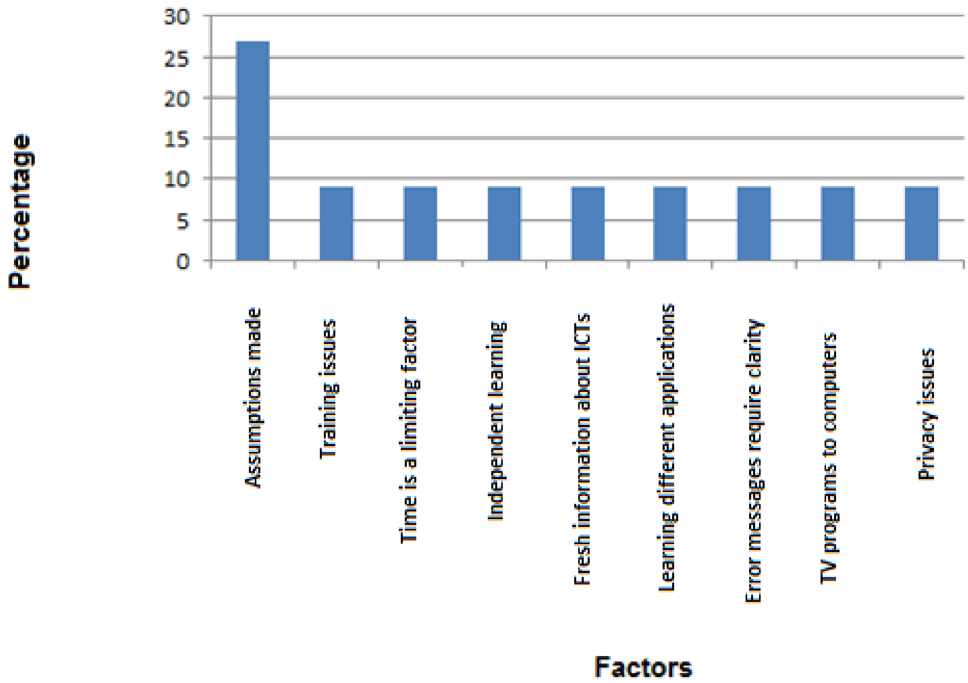

Figure 4.30: A chart to show any other comments with regards to ICTs

<u>Topic 9 –Any other comments (framework approach)</u>

There is a learning and training element involved in gaining familiarity with certain technologies. Computer games are considered a global interest and could be used in the learning process, perhaps by incorporating structured and modular learning e.g. with defined goals. An independent learning approach is still valued, and up to date information about the technology itself is important. The learning should be continued on par with the number of applications that are brought out. Due to standardisation, such learning may be easier e.g. the layout of the menus being in the same location for Microsoft Word and Excel. Standardisation is the key issue. Error messages require clarity, and should not be presented in the language of the developers, but what older adult users consider appropriate.

Participant #7 stated: "*You get all these things up, error and you can hardly read it and haven't got a clue what they're talking about anyway*"

This suggests that for an older adult to overcome a difficulty, the error message needs to be coherently understood, and with sufficient clarity. This suggests a pragmatist approach to learning (Honey and Mumford 1989). A trial and error method as identified by the Digital Lifestyles (2009) report.

Informational leaflets and the generation of awareness of various courses or technologies should also have more than just the web address to contact them with e.g. the inclusion of the telephone number. Finally, there were privacy issues with such technologies for older adults and in particular the internet can act as a deterrent. To counter this, safeguards and privacy and safety filters should be put in place to minimise or prevent it. The next sub section details the findings from focus group 3.

4.3.3 Focus group 3

As only two older adults participated in focus group 3, the graphical outputs were omitted.

Topic 1 – How virtual technologies have been learned before (coding approach)

Virtual technologies being learned in the workplace x 1 = 1/4 = 25%

Panicky emotions associated with the learning virtual technologies x 1 = 1/4 = 25%

Learning to use a mobile phone is challenging x 1 = 1/4 = 25%

The language of instructional manuals accompanying virtual technologies should be compatible x 1 = 1/4 = 25%

Topic 1 – How virtual technologies have been learned before (framework approach)

Such virtual technologies are off-putting, when an error is returned. Learning virtually via mobile phones is still considered complicated. A product should be made much simpler and be readily available, perhaps a 'lite' version. Older adults who prefer an accessible mobile phone may not know they exist, and they should be promoted. The instructions should be coherent and designed to meet the needs of the older adult user. There may be disparities between what a researcher or designer requires and the older adult considers who learns virtually.

Topic 2 – How easy or hard using virtual technologies was (coding approach)

There is a fear factor involved in not being able to resolve issues adequately x 2 = 2/5 = 40%

Preconceived notions of not being technology oriented can deter learning of virtual technologies x 1 = 1/5 = 20%

A fear factor involved in learning how to use them x 1 = 1/5 = 20%

It is difficult to adjust and adapt to the preferences of the older adult user to such technologies x 1 = 1/5 = 20%

Topic 2 – How easy or hard using virtual technologies was (framework approach)

There were unfortunately preconceived notions with virtual technologies which are linked to confidence levels. An adjustment is required for the transition of learning to use and understand virtual technologies. Accessible prompts should be made when error dialogues are triggered to guide the user in the right direction. With modern technologies there are aspects of it many of us take for granted. The complexity of learning with virtual mobile devices is attributed to the functionality.

Participant #1 stated: "*I found it very difficult to adjust*"

In Githens (2007) study it was found that some methods of virtual communication may be suitable for older adults than others. The displays and keyboards with mobile devices were considered too small to use.

Standard software packages such as Microsoft Word incorporates various facilities that may not be required by many older adult technology users.

Topic 3 – What aspects made particular virtual technologies easy to use (coding approach)

Growing up with such technologies is said to make them easier to use x 2 = 2/6 = 33%

Obtaining help from others is effective x 1 = 1/6 = 16%

On screen prompts are effective, in a numerical sequence and structured x 1 = 1/6 = 16%

A trial and error approach is effective x 1 = 1/6 = 16%

That enjoyment is synonymous with success x 1 = 1/6 = 16%

<u>Topic 3 – What aspects made particular virtual technologies easy to use (framework approach)</u>

Although there was complexity issues associated with learning via mobile technologies, ‘big button’ mobile phones are available although they do not seem to be marketed effectively, nor made available in many stores. Information kiosks are considered relatively easy to use, and this is attributed to their big touch screen buttons and on screen logical instructions and prompts.

Participant #1 stated: “*When you become ok with it, it is enjoyable isn’t it, it’s just understanding it*”

In Swindell's (2002) study it was found that an informal approach to learning

was considered an entertaining way to learn. The use of games based learning can also be considered an entertaining and effective way to learn (Githens 2007). However, the needs and requirements of the older adult are to be considered for the design and development of such a games based platform.

On screen, logical, sequential and step by step instructions are important, with limited jargon. Standardisation also makes learning easier, especially if the older adult learners would like to learn with one another. This also refers to grouping like features in the same place in an uncluttered manner.

Topic 4 – What aspects in particular made virtual technologies hard to use (coding approach)

Language x 1 = 1/1 = 50%

Topic 4 – What aspects in particular made virtual technologies hard to use (framework approach)

The language used too much technical jargon, either on screen, menus or within the instruction manuals and this made virtual learning challenging. There was also limited awareness of such virtual technologies that could be used to learn. There is a lack of courses that focus purely on 'main' technologies e.g. mobile phones. Introductory courses could be offered by community centres and ageing organisations. Any fees should be subsidized by government intervention to allow appropriate accessibility. The courses should be made readily available so that members are aware of such opportunities.

Topic 5 – How virtual technologies could be improved (coding approach)

The instructions or on screen prompts should be sequential, logical and numerical (e.g. structured in stages) x 2 = 2/6 = 33%

Numerical automated voice responses are not effective (e.g. seeking telephone help) x 1 = 1/6= 16%

Using understandable language is important x 2 = 2/6 = 33%

Topic 5 – How virtual technologies could be improved (framework approach)

The numerical and sequential sequencing of instructions is important. The descriptors within virtual technologies should be accompanied by a number e.g. press 1 to display sub menu. This numerical sequencing does not necessarily work with telephone help and automated responses when seeking assistance with a particular technology. The language should be kept simple, understandable and consistent to enhance the interpretation of it. This includes the spoken word, written instructions as well as on screen dialogue prompts perhaps with a virtual character to contribute to its user friendliness.

Topic 6 – Common problems associated with accessibility (coding approach)

Readability issues x 2 = 2/4 = 50%

Hardware accessibility - there is difficulty after using the buttons x 2 = 2/4 = 50%

Topic 6 – Common problems associated with accessibility (framework approach)

Mobile phone button accessibility should be increased. Larger mobile phones with larger buttons are considered accessible technologies to utilise. The text itself should be an appropriate size which may require adjusting the display screen dimensions. A main hardware function could include text modification.

The same approach may include amending the text size on digital TVs or when accessing it via a computer monitor.

Topic 7 – At least one way of learning how to use virtual technologies (coding approach)

A trial and error approach x 2 = 2/6 = 33%

The other learners providing tuition and constructing written instructions x 1 = 1/6 = 17%

Confidence being associated with such learning x 2 = 2/6 = 33%

Testing helps with the learning process x 1 = 1/6 = 17%

Topic 7 – At least one way of learning how to use virtual technologies (framework approach)

A trial and error approach, which incorporates structure, is considered effective. In the event of an error, a ‘friendly’ way of prompting the user and offering alternative solutions is required.The lessons should make use of the tutor to write notes and produce instructions. The instructions should be made readily available and are considered a very important part of the virtual technology.

Participant #1 stated: “*We had a person who really knew what they were doing, and they wrote instructions for us, because that was a great help*”

It is important for the instructor to issue feedback including instructions to help the learner progress, as well as materials to help overcome gaps and common misunderstandings as proposed by Entwiste et al (2001). This can help increase the extent of their use and access of ICTs to help overcome barriers and seek to find solutions as a result of such direct interpersonal dialogue and support (Selwyn et al 2003).

Emphasis should be made on referring the learner to the instructions. A testing system could be helpful in producing successful learning outcomes.

<u>Topic 8 – What makes effective feedback (coding approach)</u>

Good, positive feedback is important x 2 = 2/4 = 50%
A balance between negative and positive feedback is important for
constructive criticism x 2 = 2/4= 50%

<u>Topic 8 – What makes effective feedback (framework approach)</u>

That positive feedback is important, especially if progress was not as the learner expected. This can help improve confidence.

Participant #2 stated: "*If it was good feedback, I'd be ok*"

This again reiterates Entwistle et al's (2001) on curriculum design, teaching and assessment in that the feedback needs to be centred on what learners need to do to make progress. This feedback could also include reflecting on their own current learning mechanisms (The Quality Improvement Agency for Lifelong Learning 2008).

Advice should be provided to help older adults improve the use of learning provision and technology. However, a balance of both positive and negative feedback should also be used to provide constructive reasoning. This encourages and motivates the learner, as well as to help them improve.

Topic 9 – Any other comments (coding approach)

Games are not necessary for learning – although they would help some people x 1 = 1/ 7 = 14%

Children learn effectively from playing games, and this can be learned x 1 = 1/ 7 = 14%

Obtaining family members to help is effective x 2 = 2/ 7 = 28%

A trial and error method via onscreen instructions can result in a successful

learning outcome x 1 = 1/ 7 = 14%

Instructions are important x 2 = 2/ 7 = 28%

Topic 9 – Any other comments (framework approach)

The use of games could be an effective way to learn but is not considered as such. The way children learn with games could apply to older adult learning, but in a different context e.g. games that appeal to such an older age generation. Games based learning should be appropriate to the context.

Participant #2 stated: "*I couldn't start doing those games and that; it would for some people but I don't think it would be for me*"

Githens (2007) proposed that new technologies such as games based learning have been incorporated into e-learning programmes. It could therefore be considered an entertaining and effective way to learn.

Compiling a list of things to do or overcome with virtual technologies systematically organises the learning process. The learning does not necessarily occur if someone else is asked to do it. On screen instructions that are logical and sequential are considered effective ways to learn and make progress. They are considered imperative for effective learning and support. Such virtual technologies should be intuitive and often when the same button performs multiple tasks complexities can arise. Effective instructions can help with the learning process.

4.4 Conclusion

Both framework and coding approaches have been combined and related to the research objectives and their subsequent questions. Both the qualitative and quantitative findings were combined to fully answer the research questions, as well as relating to the literature. As previously mentioned, such synthesis, triangulation and linkage are presented in Chapter 6 where the results are discussed. The discussion from this is also provided. The next chapter presents the quantitative findings in relation to the research objectives and questions. To reiterate it consists of two surveys: one designed for those who use ICTs and another for those who do not, as well as a secondary source learning questions within a 'digital engagement' themed survey.

5. The quantitative analyses and interpretations from the primary source IT and Non IT users' survey and secondary source learning questions from the 'digital engagement' themed questionnaire

This chapter presents findings from the SPSS analyses carried out on both the IT and Non IT users questionnaire surveys. These included generating frequency tables of the variable responses, including learning mechanisms, aspects of learning methods, virtual methods and aspects of virtual methods. The analysis also compared age and gender groups to the learning variables, as well as non-parametric testing of the variables (the Mann-Whitney and Kruskall-Wallis tests). Non parametric testing has been carried out due to the data not being normally distributed. The tests do not assume normality of variance and are therefore distribution free. There is however a lack of power and disadvantages with the non-parametric test. This is of particular concern if the sample size is small or if the assumptions for the corresponding parametric method (e.g. normality of the data) hold. In addition, non-parametric methods are geared towards hypothesis testing rather than estimation of effects. It is also not necessarily straight forward in obtaining non parametric estimates and associated confidence intervals. Tied values may also be problematic and adjustment to the test statistic may be necessary. Also, how SPSS deals with tied values and how it obtains appropriate p values may not always be obvious (Whitley and Ball 2002). Non parametric methods are less sensitive than parametric methods when the assumptions of the latter are met. As such, larger differences are needed before the null hypothesis can be rejected. They use less information than the parametric tests. Finally, they are less efficient than parametric methods when the assumptions of parametric methods are met. As such, larger samples are required (Bluman 2006). As the data was non parametric in nature, non-parametric tests which took the median into consideration were utilised. In addition case summaries are provided which summarised age groups and gender, as well as any 'reservations perceived' about a particular learning mechanism. The learning needs and requirements are compared to particular variables (e.g. as in the case of the Non IT survey). This synthesis and formulation of learning strategies (provided in the next two chapters) depends on the findings from this chapter, which is linked to the research objectives and subsequent research questions. The summary of the results is presented at the end of the chapter.

5.1 The presentation of the findings

The findings are presented in the following order:

a) Findings and analyses from IT Users survey
   - Learning methods
   - Aspects of learning methods
   - Virtual methods
   - Aspects of virtual methods

b) Findings and analyses from Non IT Users survey
   - Non-use of ICTs
   - External and environmental influences
   - Personal aims and aspirations

c) Findings and analyses from ‘digital engagement’ themed questionnaire

- How older adults learned to use ICTs via specific methods
- Preferred learning mechanisms for using ICTs via specific methods

For the primary IT and Non IT users’ surveys, the descriptor and hypothesis will firstly be introduced for a particular variable. For each hypothesis, any supporting evidence will be considered via a table illustrating the findings from the data. For the secondary source learning questions, the descriptions will be initially provided, which is then justified via the statistic. Similarly, the hypotheses from the non-parametric testing will be collated together and presented in tabular form, with their corresponding comments.

The next section presents the findings and analyses from the IT user’s survey.

5.2 IT Users Survey Findings and Analyses

The IT users findings will be presented in the following order: *Learning methods, aspects of learning methods, virtual methods and aspects of virtual methods.* Each variable is commented upon, which is related to the other variables. A case summary of the participants aged 50 and over is described next.

5.2.1 Case summary of age and gender groups

Although the target group in this work is people aged 50 or over, it could be hypothesised that this covers a very diverse population and that differences may exist in groups within this population. Accordingly, participants have been classified by age and gender, so that investigations of potential differences between groups can be carried out. To begin, a case summary is provided of the participants in relation to three age groups (50 to 59 to 60 to 69 and 70 +) as well as the gender groups (male or female). While the target population for this research was those aged 50 and over, the population was sub divided into further categories (the age and gender groups). Each age group was approximately evenly distributed, with a higher female to male ratio.

Agegroup	Gendergroup	N	Mean	Median	% of Total N	% of Total Sum
50 to 59		1	2.0000	2.0000	3.4%	3.9%
	Female	7	1.7143	2.0000	24.1%	23.5%
	Male	4	2.0000	2.0000	13.8%	15.7%
	Total	12	1.8333	2.0000	41.4%	43.1%
60 to 69	Female	6	1.8333	2.0000	20.7%	21.6%
	Male	2	2.0000	2.0000	6.9%	7.8%
	Total	8	1.8750	2.0000	27.6%	29.4%
70 +	Female	7	1.4286	1.0000	24.1%	19.6%
	Male	2	2.0000	2.0000	6.9%	7.8%
	Total	9	1.5556	2.0000	31.0%	27.5%
Total		1	2.0000	2.0000	3.4%	3.9%
	Female	20	1.6500	2.0000	69.0%	64.7%
	Male	8	2.0000	2.0000	27.6%	31.4%
	Total	29	1.7586	2.0000	100.0%	100.0%

Table 5.1: A table to show the age groups and genders in relation to having any needs and requirements when using ICTs

The next section describes the responses in terms of the effectiveness of different individual learning mechanism variables.

5.2.2 Learning mechanisms analyses

The learning mechanisms that older adults used to learn or enhance their usage of ICTs are described in terms of their effectiveness. This was achieved by a 3 point rating scale of 'very effective', 'somewhat effective' and 'didn't find it effective'. This was supplemented by an additional 'never used it' response, for those who have never learned via a particular method before. This is illustrated via the table:

	Very effective		Somewhat effective		Didn't find it very effective		Never used it	
	Count	Row N %	Count	Row N %	Count	Row N %	Count	Row N %
Learning via a course at an institution	11	37.9%	5	17.2%	1	3.4%	12	41.4%
Learning via one to one tuition	8	28.6%	4	14.3%	0	.0%	16	57.1%
Learning via video tutorials	2	6.9%	9	31.0%	3	10.3%	15	51.7%
Learning via instruction manuals	4	13.8%	15	51.7%	5	17.2%	5	17.2%
Learning in groups	4	14.3%	12	42.9%	6	21.4%	6	21.4%
Learning over the internet	9	32.1%	11	39.3%	1	3.6%	7	25.0%
Learning via the telephone	3	10.7%	9	32.1%	5	17.9%	11	39.3%
Self teaching	10	35.7%	12	42.9%	3	10.7%	3	10.7%
Learning via the TV and radio	3	10.3%	3	10.3%	0	.0%	23	79.3%
Learning via audio books	0	.0%	0	.0%	2	6.9%	27	93.1%
Learning via a software feature	1	3.4%	14	48.3%	6	20.7%	8	27.6%

Table 5.2: A frequency table to show each individual 'learning mechanisms used' variable in relation to the 'effectiveness' scale

It was found that **learning via a course at an institution, one to one tuition, internet learning** and being **self-taught** were popular ways to learn and were considered in general "very effective" learning methods.

In terms of comparisons with the empirical literature, the learning via a course and self-teaching reflect the most preferred learning methods as identified by Goodman et al (2003). One to one tuition could be considered within “informally by asking friends, family or work colleagues” which was the most preferred leaning method as identified in Ofcom’s Digital Lifestyle’s (2009) report. The use of encouragement, vocational and expressive forms of learning should be incorporated into these learning methods to enhance them even further as proposed by Findsen (2006).

The learning methods which were considered “somewhat effective” based upon the frequency response rate percentage proportions included learning via **video tutorials, instruction manuals, group learning, telephone learning** and **learning via software programs**. Some learning methods were preferred than others e.g. there was a relatively high proportion of learners who did not use audio books and the TV and radio to learn. This may be attributed to the availability of such learning afforded by these platforms, or a lack of availability of these learning mechanisms in general. This is reiterated in Mederios (2008) study that found both ‘young’ and ‘old’ older adults had different needs and expectations in terms of learning. Such mechanisms that were considered “somewhat effective” could be attributed to too much argon and inadequate support (e.g. in the instruction manuals), as well as complexity issues e.g. with software programs (Morell 2000). Learning via software programs should be accompanied via accessible support guides as proposed by Githens (2007) as this could improve its effectiveness.

It was found that no methods were approximately evenly distributed (e.g. those having an approximately same response rate for each “effective” variable). This indicated that some methods were preferred or not used very much compared with others. Further, the statistics indicated that each categorical variable (e.g. “very effective”, “somewhat effective” and “did not find it effective”) were unevenly distributed according to the response rate for each method.

The “never used it” option was considered a separate ‘entity’ or ‘paradigm’ to the effectiveness scale. The **‘1 to 1’ learning tuition, ‘video tutorial’ learning, TV and radio learning and ‘audio book’ learning** were, in comparison to the others, mostly never used (based upon the 50% > proportion percentage). On the other **hand instruction manuals, group learning, internet learning, self-teaching, software learning** were used the most (based upon the < 50% proportion percentage). There were mixed views with **learning via a course at an institution** and **via the telephone** (with a percentage proportion rate of approximately 40%). To clarify, proportion percentage refers to the percentage of the population in the sample.

It is also worth noting the differences between two different learning methods by considering those who actually used a method (as opposed to ‘never used them’). For example when omitting ‘never used them’ it was found that 17 people actually used learning via a course at an institution, whereas 25 used self-teaching as a method which equates to 64.7% and 40% respectively as illustrated in the table:

	Very effective		Somewhat effective		Didn't find it very effective	
	Count	Row N %	Count	Row N %	Count	Row N %
Learning via a course at an institution	11	64.7%	5	29.4%	1	5.9%
Learning via one to one tuition	8	66.7%	4	33.3%	0	.0%
Learning via video tutorials	2	14.3%	9	64.3%	3	21.4%
Learning via instruction manuals	4	16.7%	15	62.5%	5	20.8%
Learning in groups	4	18.2%	12	54.5%	6	27.3%
Learning over the internet	9	42.9%	11	52.4%	1	4.8%
Learning via the telephone	3	17.6%	9	52.9%	5	29.4%
Self teaching	10	40.0%	12	48.0%	3	12.0%
Learning via the TV and radio	3	50.0%	3	50.0%	0	.0%
Learning via audio books	0	.0%	0	.0%	2	100.0%
Learning via a software feature	1	4.8%	14	66.7%	6	28.6%

Table 5.3: A table omitting the 'never used it' category to determine the differences between variables of those who actually used the learning method

From these statistics, **one to one tuition** and **a course at an institution** were considered very effective methods (over 60%) whereas **self-teaching, learning via the TV and radio** and **internet learning** were considered somewhat effective (approximately 50%). The **learning via video tutorials, via instruction manuals, in groups, over the telephone, audio books** and **via a software feature** were not considered very effective learning methods.

Such learning mechanisms also comprised aspects of learning methods, as these were identified in the qualitative stages of the research. An aspect of a particular learning method may mean, for example, that in order for effective learning to occur, the learning process should be divided into a number of sub goals (or stages), therefore incorporating structure in a linear and non-randomised fashion. As such, the next section presents and analyses findings from the 'aspects of learning methods' category.

5.2.3 Aspects of learning mechanisms analyses

Respondents were asked to rate, on a scale to 1 to 10, different variables (directed by the output from the semi-structured in-depth interviews and focus groups). To simplify the scale and facilitate analysis, these ratings were then collapsed to a three point scale, grouping respondents by the strength of their opinions. Three groups were then assigned based upon this scale rating. The scale 1 to 3 indicated 'not important', 4 to 7 indicated 'neither important nor unimportant (or indifferent) and 8 to 10 indicated a 'quite strong' preference towards a particular aspect of learning. The scales have been grouped so that easy comparisons can be made.

The analysis from the findings of each individual variable will be described, with reference to the statistical table.

Group structure (StrucGroup variable)

There were 'mixed feelings' with the group structure. Just over half of the respondents considered an appropriate structure to the learning programme to be 'strongly important'. However there were no 'not important' responses.

Appropriate non-jargon language (LanguageGroup variable)

Incorporating appropriate, easy to understand and non-technical jargon language in an 'easy to interpret' manner was considered imperative to ensuring a smooth, consistent and easy learning process. The vast majority of respondents held a strong preference for it (82%). As such it is considered to be very important in incorporating appropriate and non-jargon language into either the learning programme or platform. The language should not be that of the developers, but that which the user understands and comprehends. This was found to be informal and colloquial.

Teacher or facilitation (TeacherGroup variable)

There were minimal quite strong ‘not important’ views with the inclusion of a teacher or facilitator, and just under half held indifferent (neither important nor unimportant) views. A significant proportion of the respondents considered that having a teacher is ‘strongly important’. Facilitation in some way or another (also in a virtual setting) was therefore considered important. This indicates that facilitation should be included in the learning process.

Duration of the learning experience (DurationGroup variable)

The vast majority of respondents (69%) within the sample considered an appropriate course duration to be ‘strongly important’. Very few respondents (just 1 or 3.4% of the sample) considered an appropriate duration to be unimportant.

The pace of the learning experience (PaceGroup variable)

The majority of respondents considered the pace of learning to be important with approximately two thirds holding ‘quite strong’ views and one third holding ‘neither important nor unimportant’ views. The pace should consider the learning progression of all learners.

Incorporating dialogue into the learning experience (DialogueGroup variable)

Establishing dialogue (such as in group settings with other learners or informally with the facilitator), mixed views were held. Just under half of respondents were not concerned about incorporating dialogue into the learning process, with just over half considering it to be 'quite important'.

Learning to use ICTs via other technologies (TechGroup variable)

There were minimal 'quite strong not important' views with regards to learning via other technologies. Just over half of respondents held indifferent views while just under half of respondents held strong important views about it. As such, learning via this method was considered effective, although improvements could be made.

Formal learning (FormalGroup variable)

With formal learning there was a stronger set of opposing views. In other words, the population did not favour formal learning. Most of such views were considered neither important nor unimportant, with approximately a quarter of respondents considering formal learning to be 'quite strong important' and the other quarter 'quite strong not important'.

Informal Learning (InformalGroup variable)

Interestingly, informal learning held approximately the same response rate as formal learning. Overall the sample did not prefer it. The variable distribution was therefore approximately the same. This suggests that there are mixed views with regards to formal and informal learning, and that the two approaches could be combined to make learning effective. To find out if people that preferred formal learning disliked informal learning and vice versa, a Spearman's correlation could be carried out, which was also complemented by a Pearson's correlation to determine if there was a statistical significance. However, as the data was considered non-parametric (and not parametric) this was not really considered appropriate.

To conclude, the following learning mechanism variables were considered to be held with 'quite strong' views in terms of importance (relative to the overall response rate): **Appropriate non-jargon language, appropriate course duration** and an **appropriate pace of learning**.

Other aspects of learning which were considered relatively effective, although with reservations still held included: **incorporating structure in the learning (e.g. stage by stage), having a teacher to provide instruction and guidance, establishing group dialogue, learning with technologies** and **formal and informal learning**.

Interestingly no aspects of learning were held with relatively unimportant views, in terms of response rates.

To illustrate and with reference to the statistics above, the individual variables and their response rates are indicated in Table 5.4 below:

	Quite strong not important		Neither important nor unimportant		Quite strong important	
	Count	Row N%	Count	Row N%	Count	Row N%
StrucGroup	0	0.0%	13	44.8%	16	55.2%
TeacherGroup	4	13.8%	12	41.4%	13	44.8%
LanguageGroup	2	6.9%	3	10.3%	24	82.8%
DurationGroup	1	3.4%	8	27.6%	20	69.0%
PaceGroup	0	0.0%	10	34.5%	19	65.5%
DialogueGroup	3	11.1%	10	37.0%	14	51.9%
TechGroup	2	6.9%	15	51.7%	12	41.4%
FormalGroup	6	22.2%	14	51.9%	7	25.9%
InformalGroup	9	31.0%	13	44.8%	7	24.1%

Table 5.4: A table to show aspects of learning methods variables in relation to the 'importance' scale.

The next section considers virtual methods to learn with, as these are widely used and popular ways to learn. A key approach is to enable the older adult to exploit and take advantage of platforms already available (such as virtual mediums) to enhance the learning experience with other technologies or particular applications.

5.2.4 Virtual learning mechanism analyses

For virtual learning mechanisms, the descriptors and analyses are provided, which is followed by a collated table of the different variables and their scale.

Using online discussion boards to learn

A set of mixed views as held with regards to using discussion boards to learn with. The majority of respondents were indifferent (neither agreeing nor disagreeing). This infers that improvements are required with such virtual learning mechanisms. The same percentage of participants both agreed and disagreed that discussion boards were effective ways to learn (22.2%). A slightly higher proportion strongly disagreed (7.4%) compared to strongly agreeing (3.7%).

Using chat rooms to learn

The results showed that the respondents were in disagreement with using virtual chat rooms to learn with. The majority therefore opposed the notion that learning via chat rooms was considered effective.

Using voice enabled chat rooms to learn

As with using chat rooms to learn, the vast majority of respondents either disagreed or strongly disagreed that voice enabled chat rooms were effective ways to learn. Just under half agreed or strongly agreed. This is shown by the cumulative percentage of 64.3% which reflects both the 'disagreed' and 'strongly disagreed' categories.

Learning via web based instructions

A relatively higher proportion of respondents were in favour of learning via web based courses and found them effective learning and support mechanisms. The same proportion of respondents was both in agreement and held indifferent (e.g. neither agreed nor disagreed) views about finding web based (e.g. onscreen) instructions effective (both at 41.4%).

Using social networks to learn

With using virtual social networking platforms to learn, there were generally mixed views across the spectrum. However, a slightly higher proportion of respondents disagreed with finding social network learning effective.

Using online help to learn

Receiving help online was considered a very effective way to learn, in which the vast majority of respondents agreed with it.

Using voice chat rooms to learn

With voice enabled chat rooms, it was found that respondents were inclined to disagree or strongly disagree with finding such a mechanism an effective way to learn.

Using mobile technologies to learn

Generally mixed views were held with regards to using mobile technologies to learn with. A slightly higher proportion of respondents did not agree that mobile technologies were effective mechanisms to learn with.

Using online manuals to learn

There was a strong favour of agreeing to learn via online manuals. They were considered relatively effective learning mechanisms e.g. Adobe Acrobat.

To summarise, the following virtual learning mechanisms were considered very effective mechanisms to learn with based upon the response rates of the samples: **Seeking help online** and **online manuals**.

The following virtual learning methods were considered relatively effective to learn with: **web based instructions, mobile technologies, social networking platforms and online discussion boards.**

The following virtual learning methods were considered not very effective, and respondents (in terms of the population sample respondents) had reservations about them: **online chat rooms** and **voice enabled chat rooms**.

A detailed tabulation of the statistics justifying the above analyses is shown below:

	Strongly agree		Agree		Neither agree nor disagree		Disagree		Strongly disagree	
	Count	Row N %	Count	Row N %	Count	Row N %	Count	Row N %	Count	Row N %
Using discussion boards to learn	1	3.7%	6	22.2%	12	44.4%	6	22.2%	2	7.4%
Using chat rooms to learn	1	3.6%	2	7.1%	7	25.0%	10	35.7%	8	28.6%
Learning via web based instructions	2	6.9%	12	41.4%	12	41.4%	3	10.3%	0	.0%
Using social networks to learn	3	10.7%	7	25.0%	5	17.9%	6	21.4%	7	25.0%
Using online help to learn	15	53.6%	12	42.9%	1	3.6%	0	.0%	0	.0%
Using voice chat rooms to learn	0	.0%	1	3.7%	8	29.6%	10	37.0%	8	29.6%
Using mobile technologies to learn	4	14.8%	6	22.2%	4	14.8%	8	29.6%	5	18.5%
Using online manuals to learn	2	6.9%	17	58.6%	6	20.7%	3	10.3%	1	3.4%

Table 5.5: A table to show virtual methods attitudes

The next sub section considers particular components or aspects of virtual methods which may or may not contribute to their effectiveness. These are then evaluated.

5.2.5 Aspects of virtual learning mechanisms analyses

This section follows the same pattern as the previous sections in analysing each learning variable individually then uses the statistics table to summarise the analyses.

Virtual learning as being complicated

Most of the respondents were indifferent (just over half), whereas about a third were in agreement with virtual learning being complicated. There were no ‘strongly disagree’ and minimal ‘disagree’ responses.

Not being sure where to start

In terms of not being sure where to start when learning how to use a virtual technology to learn with, a higher proportion of respondents agreed that it was considered a complicated way to go about learning with.

Having limited access to virtual technologies

There was an approximately even distribution in terms of having limited access with virtual technologies such as a PC and mobile phone. However, a slightly higher proportion of the sample agreed that they had limited access to these virtual technologies.

Lacking confidence in learning with virtual technologies

There was an approximately even distribution amongst the respondents in terms of lacking confidence when using such ICTs. This was therefore considered an issue.

Not having much awareness about them

A significantly higher proportion of the sample did not perceive much awareness of the benefits that virtual technologies can bring. They were therefore unaware of the benefits and advantages of such virtual technologies.

Content concerns

A slightly higher proportion of the respondents disagreed with having concerns with inappropriate content (e.g. the material) when learning with virtual technologies. Such virtual technologies can be synonymous with this factor.

Lacking interest in using virtual technologies to learn with

A higher proportion of respondents disagreed with lacking an interest in using virtual technologies to learn with. In other words, there was an interest to learn with them which suggests such a mechanism would be considered effective to utilise.

Security concerns

A slightly higher proportion of respondents had concerns with security issues.

To summarise, just one aspect of virtual learning was considered a significant issue which was having **limited awareness about learning opportunities** with such technologies. The remaining aspects of virtual learning had approximately even variable distribution response rates, although some were inclined to agree or disagree.

This limitation of learning opportunities can be attributed to the extent and nature of ICT access by older adults (Selwyn et al 2003). It found that using a computer was a minority activity. However, this was attributed to them being of little relevance, rather than a lack of awareness of learning opportunities. It could therefore be argued that an increase in learning opportunities would increase the access with ICTs.

A slightly higher proportion of participants were in agreement with **virtual learning being complicated to use** and learn with as well as there being a case of **not being sure where to start**. There was also a slight bias in agreement of having **limited access to virtual technologies**, **lacking confidence in learning with virtual technologies** and having **concerns over security**. On the other hand, the respondents were inclined to slightly disagree that they **lacked an interest in virtual learning** as well as there being **content concerns**.

These factors are again attributed to the training (e.g. in course or self-taught form) to accessibility issues with the technologies, to make learning easier. A key finding from Bean's (2004) study was to provide an accessible and free e-mail provider. Any instructional document should start with the basics so the older adults know where to start, and perhaps give a brief explanation of all related components of the technology. It was Goodman et al (2003) that found simplicity was good, as well as addressing an application of a technology's perceived usefulness to the older adult learner.

The table below summarises the statistics is shown:

	Strongly agree		Agree		Neither agree nor disagree		Disagree		Strongly disagree	
	Count	Row N %	Count	Row N %	Count	Row N %	Count	Row N %	Count	Row N %
Virtual learning as being complicated	1	3.6%	10	35.7%	15	53.6%	2	7.1%	0	.0%
Not being sure where to start	3	10.7%	9	32.1%	11	39.3%	5	17.9%	0	.0%
Having limited access with virtual technologies	3	10.7%	10	35.7%	4	14.3%	10	35.7%	1	3.6%
Lacking confidence in learning with them	3	10.7%	8	28.6%	7	25.0%	8	28.6%	2	7.1%
Not having much awareness about them	5	18.5%	13	48.1%	6	22.2%	2	7.4%	1	3.7%
Lacking interest in virtual learning	3	10.7%	7	25.0%	4	14.3%	13	46.4%	1	3.6%
Having concerns over content	1	3.7%	4	14.8%	11	40.7%	8	29.6%	3	11.1%
Having concerns over security	3	11.5%	6	23.1%	10	38.5%	4	15.4%	3	11.5%

Table 5.6: A table to show aspects of virtual methods attitudes

The next section considers three different age groups within the over 50 population (the 50 to 59, 60 to 69 and 70 and over groups) with respect to the individual learning variables.

5.2.6 Age group comparisons with respect to the learning variables

The three age groups have been compared to each individual variable within the four themes (learning mechanisms, aspects of learning mechanisms, virtual learning and aspects of learning mechanisms). The age groups have been categorised into three main groups:

- 50 to 59 years (the 1st group)
- 60 to 69 years (the 2nd group)
- 70 + years (the 3rd group)

Each group has been compared with one another in terms of the learning variables and whether each learning method was effective or not e.g. it may be that one age group has a preference for a particular learning method than the other. The over 50s age group is very diverse and has therefore been stratified into the three categories (50 to 59, 60 to 69 and 70 +).

The following assumptions and rationalisation has been made: Sample proportions are going to be considered. The “never used it” variable is going to be considered as a separate entity, and is independent from the three variables: “Very effective”, “somewhat effective” and “did not find it effective” who used this learning method.

The analysis from the findings of each individual variable which has been initially described, with reference to the table. The table has been used to summarise the statistical analyses.

<u>Course at an institution</u>

Overall, for most who learned to use ICTs via a course at an institution, learning this way was at least "somewhat effective", with a significant proportion of the sample finding it "very effective". The entire sample in the 60 to 69 age category that learned via a course at an institution found it to be a very effective way to learn. The sample in the 50 to 59 age group found it less effective, and as such it was approximately evenly spread. A significant proportion still however found learning this way to be very effective. A smaller proportion of over 70s sample have never used this method. There could however still be improvements as a significant proportion (33%) found learning via courses to be somewhat effective.

			Learning via a course at an institution				
			Very effective	Somewhat effective	Didn't find it very effective	Never used it	Total
Agegroup	50 to 59	Count	4	2	1	5	12
		% within Agegroup	33.3%	16.7%	8.3%	41.7%	100.0%
	60 to 69	Count	3	0	0	5	8
		% within Agegroup	37.5%	.0%	.0%	62.5%	100.0%
	70 +	Count	4	3	0	2	9
		% within Agegroup	44.4%	33.3%	.0%	22.2%	100.0%
Total		Count	11	5	1	12	29
		% within Agegroup	37.9%	17.2%	3.4%	41.4%	100.0%

Table 5.7: A cross tabulation illustrating the age groups with respect to learning via a course

One to one tuition

As each age group increases, the proportion of those who have never learned via one to one tuition decreases. In other words, the older the participant, the less likely they have been to have used this learning and support method. The variable distributions for the 50 to 59 age group and the 60 to 69 age group were approximately the same. Of the over 70s who used this method, all of them found it to be a very effective learning and support method. This could indicate that the 'older' older adult age groups prefer personal facilitation and are increasingly dependent on such an approach than the younger age generation.

			Learning via one to one tuition			
			Very effective	Somewhat effective	Never used it	Total
Agegroup	50 to 59	Count	3	3	6	12
		% within Agegroup	25.0%	25.0%	50.0%	100.0%
	60 to 69	Count	2	1	4	7
		% within Agegroup	28.6%	14.3%	57.1%	100.0%
	70 +	Count	3	0	6	9
		% within Agegroup	33.3%	.0%	66.7%	100.0%
Total		Count	8	4	16	28
		% within Agegroup	28.6%	14.3%	57.1%	100.0%

Table 5.8: A cross tabulation illustrating the age groups with respect to learning via one to one tuition

Learning via video tutorials

With learning via video tutorials, again, as each age group increased, the proportion of those who have never used this method also increased. The majority of the sample in the 50 to 59 age group found that learning via video tutorials to be "somewhat effective". The 60 to 69 and 70 + age groups were approximately even distributed, although most of the sample had never actually used video tutorials to learn with.

			Learning via video tutorials				Total
			Very effective	Somewhat effective	Didn't find it very effective	Never used it	
Agegroup	50 to 59	Count	0	6	1	5	12
		% within Agegroup	.0%	50.0%	8.3%	41.7%	100.0%
	60 to 69	Count	1	2	1	4	8
		% within Agegroup	12.5%	25.0%	12.5%	50.0%	100.0%
	70 +	Count	1	1	1	6	9
		% within Agegroup	11.1%	11.1%	11.1%	66.7%	100.0%
Total		Count	2	9	3	15	29
		% within Agegroup	6.9%	31.0%	10.3%	51.7%	100.0%

Table 5.9: A cross tabulation illustrating age groups with respect to video tutorials

Learning via instruction manuals

The older the age group, the less likely the older adult learner is to have used instruction manuals to learn with. A significant proportion of the 50 and 59 age group found instruction manuals to be “somewhat effective”. This also applied with the over 70s as well as the 60 to 69 age group. A minimal proportion found them to be “very effective”. This suggests that instruction manuals could be improved.

			Learning via instruction manuals				Total
			Very effective	Somewhat effective	Didn't find it very effective	Never used it	
Agegroup	50 to 59	Count	2	9	1	0	12
		% within Agegroup	16.7%	75.0%	8.3%	.0%	100.0%
	60 to 69	Count	1	3	2	2	8
		% within Agegroup	12.5%	37.5%	25.0%	25.0%	100.0%
	70 +	Count	1	3	2	3	9
		% within Agegroup	11.1%	33.3%	22.2%	33.3%	100.0%
Total		Count	4	15	5	5	29
		% within Agegroup	13.8%	51.7%	17.2%	17.2%	100.0%

Table 5.10: A cross tabulation illustrating age groups with respect to instruction manuals

Learning in groups

With the 60 to 69 age group, the vast majority never used learning in groups as a method to learn, whereas the 50 to 59 age group found it to be a somewhat effective learning and support mechanism. The over 70s were approximately even distributed in each category, with approximately the same sample represented in each category, apart from the "very effective" which was slightly higher. Overall the 60 to 69 age group found it to be least effective.

			Learning in groups				Total
			Very effective	Somewhat effective	Didn't find it very effective	Never used it	
Agegroup	50 to 59	Count	1	8	2	1	12
		% within Agegroup	8.3%	66.7%	16.7%	8.3%	100.0%
	60 to 69	Count	0	2	2	3	7
		% within Agegroup	.0%	28.6%	28.6%	42.9%	100.0%
	70 +	Count	3	2	2	2	9
		% within Agegroup	33.3%	22.2%	22.2%	22.2%	100.0%
Total		Count	4	12	6	6	28
		% within Agegroup	14.3%	42.9%	21.4%	21.4%	100.0%

Table 5.11: A cross tabulation illustrating age group with respect to learning in groups

Learning over the internet

A higher proportion of the 60 to 69 and 70 + age groups have never used learning over the internet compared with the 50 to 59 age groups. However, of the over 70s who used this method, the majority found it useful. Interestingly, the vast majority of the 50 to 59 age group found it "somewhat effective".

			Learning over the internet				
			Very effective	Somewhat effective	Didn't find it very effective	Never used it	Total
Agegroup	50 to 59	Count	3	8	0	1	12
		% within Agegroup	25.0%	66.7%	.0%	8.3%	100.0%
	60 to 69	Count	2	2	0	3	7
		% within Agegroup	28.6%	28.6%	.0%	42.9%	100.0%
	70 +	Count	4	1	1	3	9
		% within Agegroup	44.4%	11.1%	11.1%	33.3%	100.0%
Total		Count	9	11	1	7	28
		% within Agegroup	32.1%	39.3%	3.6%	25.0%	100.0%

Table 5.12: A cross tabulation illustrating age groups with respect to learning over the internet

Telephone learning

A significant proportion of the over 70s have never used the telephone to learn to use ICTs with. It is therefore generally considered not an effective method. The 50 to 59 age group seem to have benefited from this learning method when compared to the other two age groups (even though the majority considered this mechanism to be "somewhat effective").

			Learning via the telephone				
			Very effective	Somewhat effective	Didn't find it very effective	Never used it	Total
Agegroup	50 to 59	Count	1	5	2	4	12
		% within Agegroup	8.3%	41.7%	16.7%	33.3%	100.0%
	60 to 69	Count	1	2	2	2	7
		% within Agegroup	14.3%	28.6%	28.6%	28.6%	100.0%
	70 +	Count	1	2	1	5	9
		% within Agegroup	11.1%	22.2%	11.1%	55.6%	100.0%
Total		Count	3	9	5	11	28
		% within Agegroup	10.7%	32.1%	17.9%	39.3%	100.0%

Table 5.13: A cross tabulation illustrating the age groups with respect to learning via the telephone

Self-teaching

The 70 + age group was approximately even distributed among all four responses. With the 60 to 69 age group, the majority found it to be very effective, with a significant proportion of the sample finding it somewhat effective. With the 50 to 69 age group, the majority found it “somewhat effective” with a significant representation of the sample finding it “very effective”. This suggests that overall this method is a popular learning mechanism, with all age groups surveyed.

			Self teaching				
			Very effective	Somewhat effective	Didn't find it very effective	Never used it	Total
Agegroup	50 to 59	Count	4	7	1	0	12
		% within Agegroup	33.3%	58.3%	8.3%	.0%	100.0%
	60 to 69	Count	4	3	0	0	7
		% within Agegroup	57.1%	42.9%	.0%	.0%	100.0%
	70 +	Count	2	2	2	3	9
		% within Agegroup	22.2%	22.2%	22.2%	33.3%	100.0%
Total		Count	10	12	3	3	28
		% within Agegroup	35.7%	42.9%	10.7%	10.7%	100.0%

Table 5.14: A cross tabulation illustrating age group with respect to being self-taught

The vast majority of all age groups have never used the TV and radio as a mechanism to learn with. A slightly higher proportion of the over 70s found this method to be very effective. It was approximately the same for all three age groups however.

			Learning via the TV and radio			
			Very effective	Somewhat effective	Never used it	Total
Agegroup	50 to 59	Count	0	2	10	12
		% within Agegroup	.0%	16.7%	83.3%	100.0%
	60 to 69	Count	1	0	7	8
		% within Agegroup	12.5%	.0%	87.5%	100.0%
	70 +	Count	2	1	6	9
		% within Agegroup	22.2%	11.1%	66.7%	100.0%
Total		Count	3	3	23	29
		% within Agegroup	10.3%	10.3%	79.3%	100.0%

Table 5.15: A cross tabulation illustrating age group with respect to learning via the TV and radio

Audiobooks

The vast majority of all groups never used learning via audio books and were approximately evenly distributed as a way to learn.

			Learning via audio books		
			Didn't find it very effective	Never used it	Total
Agegroup	50 to 59	Count	1	11	12
		% within Agegroup	8.3%	91.7%	100.0%
	60 to 69	Count	0	8	8
		% within Agegroup	.0%	100.0%	100.0%
	70 +	Count	1	8	9
		% within Agegroup	11.1%	88.9%	100.0%
Total		Count	2	27	29
		% within Agegroup	6.9%	93.1%	100.0%

Table 5.16: A cross tabulation illustrating age group with respect to learning via audio books

A software feature

The results suggest that as the age group increases, the proportion of those who have never learned via a software feature also increases. That a “very effective” rating was minimal across each of the age groups. The majority of the 50 to 59 age group found it to be a “somewhat effective” mechanism which decreased as the age group increased.

			Learning via a software feature				
			Very effective	Somewhat effective	Didn't find it very effective	Never used it	Total
Agegroup	50 to 59	Count	0	9	3	0	12
		% within Agegroup	.0%	75.0%	25.0%	.0%	100.0%
	60 to 69	Count	1	3	1	3	8
		% within Agegroup	12.5%	37.5%	12.5%	37.5%	100.0%
	70 +	Count	0	2	2	5	9
		% within Agegroup	.0%	22.2%	22.2%	55.6%	100.0%
Total		Count	1	14	6	8	29
		% within Agegroup	3.4%	48.3%	20.7%	27.6%	100.0%

Table 5.17: A cross tabulation illustrating age group with respect to learning via a software feature

From these tables, it indicates that certain groups find certain learning methods effective, ineffective or indifferent. Indeed, some age groups shared similar preferences, whereas disparities were present with others.

The 50 to 59 age group

With the 50 to 59 age group, the vast majority of learning methods were considered “somewhat effective”. These included: **learning via video tutorials, with instruction manuals, in groups, the internet, telephone help and finally via a software program.**

The following learning methods were considered, on the whole, somewhat or very effective for the 50 to 59 age group: **Learning ICTs via a course, self-teaching of ICTs and 1 to 1 tuition**.

The majority of the 50 to 59 age group had not learned to use ICTs via the **TV and radio and audiobooks**.

The 60 to 69 age group

This age group was different to the 50 to 59 age group as not as many learning methods were found to be "very effective". This age group found **learning via a course and being self-taught** to be very or somewhat effective learning and support mechanisms.

Approximately half of this age group have never **learned via a course, with 1 to 1 tuition, via video tutorials, TV and radio and audio books**.

Learning via instruction manuals, group learning, the internet, the telephone and via a software program demonstrated approximately even distributions in terms of preference for the 60 to 69 age group.

The 70 + age group

The majority of this age group found **learning via the internet and 1 to 1 tuition** to be very effective. A **course** to learn to use ICTs was considered to be between somewhat and very effective. Interestingly, the sample population in the over 70s age group did not find **learning via 1 to 1, video tutorials, the internet, TV and radio, audiobooks, software programs and the telephone** to be effective.

The following learning methods were evenly distributed in terms of variable preference: **Instruction manuals, group learning and being self-taught**. The sample therefore reflected a mixed opinion of using these learning methods to learn with.

It was found that both ‘younger’ and ‘older’ older adults had different needs and expectations in terms of learning. For example, with ‘younger’ older adults, Mederios (2008) study found that computers and mobile telephones were not just limited to communication purposes. Others included work, leisure and shopping online facilities.

The next sub section provides the analyses that compared the three age groups with aspects of learning. Aspects of earning refer to the components of the learning method which influences its effectiveness.

5.2.7 Age group comparisons with respect to aspects of learning

This section will be produced in the same format as the previous one. Prior to this, the key terms are elaborated upon to provide clarity on the next page:

Language *– appropriate, non-jargon, simplified, user friendly and colloquial language being used within the learning and teaching of ICTs, in instruction manuals and other documentation accompanying the product and system*

Learning duration *– Not having a course or learning programme that goes on for too long and is as such set at an appropriate length*

The pace of learning *– The rate at which learning is delivered to the cohort. This may be influenced by the group dynamics e.g. some members progressing faster than others, which influences the rate of instruction delivery*

Dialogue *– Learning by talking with others, either in an informal or formal setting. This could also mean establishing dialogue between the teacher or tutor and the learner, either in 'real' or virtual settings*

Learning via technology *– Using a virtual technology to learn how to use another technology or application with. This may consist of a multimedia approach to learning in the form of video and audio playback*

Teacher or tutor facilitation *– Having a teacher to facilitate, help, assist and provide feedback regarding the learning process*

Structure – *In which the training course or programme is divided into a number of stages so that learning can be achieved step by step.*

Structure

The majority of the 50 to 59 age group consider the structure of the training programme or course they are undertaking to be "quite strongly important". The structure is considered less important as the age group increases. Overall, the structure of a course programme or learning environment is at least considered "somewhat important" e.g. learning stage by stage. This may also involve treating the goal as a series of sub goals.

			StrucGroup		
			Neither important or unimportant	Quite strong important	Total
Agegroup	50 to 59	Count	4	8	12
		% within Agegroup	33.3%	66.7%	100.0%
	60 to 69	Count	4	4	8
		% within Agegroup	50.0%	50.0%	100.0%
	70 +	Count	5	4	9
		% within Agegroup	55.6%	44.4%	100.0%
Total		Count	13	16	29
		% within Agegroup	44.8%	55.2%	100.0%

Table 5.18: A cross tabulation illustrating age group with respect to structure

Teacher support

The majority of the 50 to 59 age group tended to consider requiring a teacher to help with the learning process as indifferent. In other words, they were not bothered about having a teacher to learn with. However, with the 60 to 69 age group, having a teacher to facilitate the learning process with was considered important. This also applied to the over 70s. It seems that the older the age group, reliance on a teacher is appropriate.

			TeacherGroup			
			Quite strong 'not important'	Neither important or unimportant	Quite strong important	Total
Agegroup	50 to 59	Count	2	7	3	12
		% within Agegroup	16.7%	58.3%	25.0%	100.0%
	60 to 69	Count	1	2	5	8
		% within Agegroup	12.5%	25.0%	62.5%	100.0%
	70 +	Count	1	3	5	9
		% within Agegroup	11.1%	33.3%	55.6%	100.0%
Total		Count	4	12	13	29
		% within Agegroup	13.8%	41.4%	44.8%	100.0%

Table 5.19: A cross tabulation illustrating age group with respect to learning with a teacher

<u>Non jargon language</u>

Appropriate non-jargon, simple and easy to understand language was of considerable importance across all three age groups with at least 75% of the participants agreeing language was "quite strong important".

			Quite strong not important	Neither important nor unimportant	Quite strong important	Total
Age group	50 to 59	Count	1	1	10	12
		% within Agegroup	8.3%	8.3%	83.3%	100%
	60 to 69	Count	1	1	6	12
		% within Agegroup	12.5	12.5	75.0%	100%
	70 +	Count	0	1	8	9
		% within Agegroup	0%	11.10%	88.9%	100%
Total		Count	2	3	9	29
		% within Agegroup	6.9%	10.3%	100%	100%

Table 5.20: A cross tabulation illustrating age group with respect to requiring appropriate, non-jargon language

Duration

The appropriate duration of a training course was considered quite strong important across all three age groups. It was considered the most important among the 70 + age group.

			Quite strong not important	Neither important nor unimportant	Quite strong important	Total
Age group	50 to 59	Count	0	4	8	12
		% within Agegroup	0.0%	33.3%	66.7%	100%
	60 to 69	Count	1	2	5	8
		% within Agegroup	12.5%	25.0%	62.5%	100%
	70 +	Count	0	2	7	9
		% within Agegroup	0%	22.2%	77.8%	100%
Total		Count	1	8	20	29
		% within Agegroup	3.4%	27.6%	69%	100%

Table 5.21: A cross tabulation illustrating age group with respect to requiring appropriate duration

Pace

The majority of the 50 to 59 age group considered the pace of the course or learning process to be “quite strong important” but less so than the 60 to 69 age group. The pace matters the least for the over 70 age group, with about half the respondents holding an indifferent attitude towards it. The 60 to 69 age group considered pace to be of considerable importance (with 87.5%) in the quite strongly important category.

			Neither important nor unimportant	Quite strong important	Total
Age group	50 to 59	Count	4	8	12
		% within Agegroup	33.3%	66.7%	100%
	60 to 69	Count	1	7	8
		% within Agegroup	12.5%	87.5%	100%
	70 +	Count	5	4	9
		% within Agegroup	55.5%	44.4%	100%
Total		Count	10	19	29
		% within Agegroup	34.5%	65.5%	100%

Table 5.22: A cross tabulation illustrating age group with respect to requiring appropriate pace

Dialogue

Requiring dialogue matters less than the other aspects of learning methods, but is still considered quite important for the 50 to 59 and 70 + age groups. The 60 to 69 age group is approximately evenly distributed with the majority holding indifferent views towards a dialogue method to learning.

			Quite strong not important	Neither important nor unimportant	Quite strong important	Total
Age group	50 to 59	Count	0	5	7	12
		% within Agegroup	0.0%	41.7%	58.3%	100%
	60 to 69	Count	1	4	3	8
		% within Agegroup	12.5%	50%	37.5%	100%
	70 +	Count	2	1	4	7
		% within Agegroup	28.6%	14.3%	57.1%	100%
Total		Count	3	10	14	27
		% within Agegroup	11.1%	37.0%	51.9%	100%

Table 5.23: A cross tabulation illustrating age group with respect to requiring dialogue

Group learning

Just over half of the 50 to 59 age group held indifferent attitudes towards learning with a technology in groups, although just under half considered it to be quite strong important. With the 60 to 69 age group, about half found it to be quite strong important whereas half were indifferent (neither important nor unimportant). The 70 + age group appeared to be evenly distributed, although it was geared towards both an "indifferent" and "quite strong important" view.

			Quite strong not important	Neither important nor unimportant	Quite strong important	Total
Age group	50 to 59	Count	0	7	5	12
		% within Agegroup	0.0%	58.3%	41.7%	100%
	60 to 69	Count	0	4	4	8
		% within Agegroup	0.0%	50%	50.0%	100%
	70 +	Count	2	4	3	9
		% within Agegroup	22.2%	44.4%	33.3%	100%
Total		Count	2	15	12	29
		% within Agegroup	6.9%	51.7%	41.4%	100%

Table 5.24: A cross tabulation illustrating age group with respect to learning with a technology

Formal learning

Learning formally was less important than then other factors. The majority of the sample within the 50 to 59 and 70 + age groups was indifferent, while a minority of the sample did not prefer this particular aspect of method. About half of the 60 to 69 group considered formal learning to be quite strongly important.

			Quite strong not important	Neither important nor unimportant	Quite strong important	Total
Age group	50 to 59	Count	3	7	2	12
		% within Agegroup	25.0%	58.3%	16.7%	100%
	60 to 69	Count	2	2	4	8
		% within Agegroup	25.0%	25%	50.0%	100%
	70 +	Count	1	5	1	7
		% within Agegroup	14.3%	71.4%	14.3%	100%
Total		Count	6	7	7	27
		% within Agegroup	22.2%	25.9%	25.9%	100%

Table 5.25: A cross tabulation illustrating age group with respect to learning formally

Informal learning

With the 50 to 59 and the 60 to 69 age groups, half were indifferent towards informal learning, with the same sample proportion (25% each) that considered it to be both quite strong important and quite strong not important. The majority of the over 70 age sample considered it to be unimportant. They either do not like learning informally, or consider it not important as an aspect of learning.

			Quite strong not important	Neither important nor unimportant	Quite strong important	Total
Age group	50 to 59	Count	3	6	3	12
		% within Agegroup	25.0%	50.0%	25.0%	100%
	60 to 69	Count	2	4	2	8
		% within Agegroup	25.0%	50%	25.0%	100%
	70 +	Count	4	3	2	9
		% within Agegroup	44.4%	33.3%	22.2%	100%
Total		Count	9	13	7	29
		% within Agegroup	31.0%	14.8%	24.1%	100%

Table 5.26: A cross tabulation illustrating age group with respect to informal learning

The 50 to 59 age group found the course structure, appropriate non jargon language, appropriate course duration, appropriate pace and dialogue to be quite strongly important. With the 60 to 69 age group, it was found that appropriate facilitation with a teacher, appropriate non jargon language, appropriate duration and appropriate pace was quite strongly important. The 70 and over age group considered having a teacher, appropriate non jargon language, appropriate course duration to be quite strongly important. The next sub section presents the age group comparisons with respect to virtual learning cross tabulations.

5.2.8 Age group comparisons with virtual learning

The descriptor for each variable is provided, followed by the table which justifies them following the same format as before. For the 50 to 59 age group half of the sample held indifferent views (neither agreeing nor disagreeing) towards using discussion boards to learn with. The majority of the sample within the 60 to 69 age group held indifferent views. With the 50 to 59 age group, the sample was however inclined to disagree. The 60 to 69 age group had an approximate even distribution among the responses, apart from the indifferent category. The 70 + age group were also approximately evenly distributed.

			Using discussion boards to learn					
			Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree	Total
Agegroup	50 to 59	Count	0	2	6	4	0	12
		% within Agegroup	.0%	16.7%	50.0%	33.3%	.0%	100.0%
	60 to 69	Count	1	1	4	1	0	7
		% within Agegroup	14.3%	14.3%	57.1%	14.3%	.0%	100.0%
	70 +	Count	0	3	2	1	2	8
		% within Agegroup	.0%	37.5%	25.0%	12.5%	25.0%	100.0%
Total		Count	1	6	12	6	2	27
		% within Agegroup	3.7%	22.2%	44.4%	22.2%	7.4%	100.0%

Table 5.27: A cross tabulation illustrating age group with respect to using discussion boards to learn with

<u>Chat room learning</u>

The majority of the sample in the 50 to 59 age group either disagreed or strongly disagreed about using chat rooms as a mechanism to learn with. This also applied with the 70 + group. With the 60 to 69 group, about half of the sample tended not to agree nor disagree towards using chat rooms as effective virtual learning methods.

			Using chat rooms to learn					
			Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree	Total
Agegroup	50 to 59	Count	0	2	2	5	3	12
		% within Agegroup	.0%	16.7%	16.7%	41.7%	25.0%	100.0%
	60 to 69	Count	1	0	4	0	3	8
		% within Agegroup	12.5%	.0%	50.0%	.0%	37.5%	100.0%
	70 +	Count	0	0	1	5	2	8
		% within Agegroup	.0%	.0%	12.5%	62.5%	25.0%	100.0%
Total		Count	1	2	7	10	8	28
		% within Agegroup	3.6%	7.1%	25.0%	35.7%	28.6%	100.0%

Table 5.28: A cross tabulation illustrating age group with respect to using chat rooms to learn with

Web based instructions

The majority of the 50 to 59 age group neither agreed nor disagreed towards learning via web based instructions. However, the rest of the sample either agreed or strongly agreed that learning via web based instructions was an effective way to learn.The 60 to 69 age group were evenly distributed, whereas the majority of the over 70s agreed that learning via web based instructions was effective. This indicated that the age group on the whole preferred web based learning.

			Learning via web based instructions				
			Strongly agree	Agree	Neither agree nor disagree	Disagree	Total
Agegroup	50 to 59	Count	1	4	7	0	12
		% within Agegroup	8.3%	33.3%	58.3%	.0%	100.0%
	60 to 69	Count	1	2	3	2	8
		% within Agegroup	12.5%	25.0%	37.5%	25.0%	100.0%
	70 +	Count	0	6	2	1	9
		% within Agegroup	.0%	66.7%	22.2%	11.1%	100.0%
Total		Count	2	12	12	3	29
		% within Agegroup	6.9%	41.4%	41.4%	10.3%	100.0%

Table 5.29: A cross tabulation illustrating age group with respect to learning via web based instructions

Social network learning

Both the 50 to 59 and 60 to 69 age group were approximately evenly distributed over each of the categories. In other words, each category (e.g. strongly agree, agree etc.) was approximately equally distributed. However, the 50 to 59 age group was slightly in favour of agreeing to use social networks to learn, while the 60 to 69 age group was in favour of disagreeing. The over 70s showed approximately the same distribution, with most of the sample neither agreeing nor disagreeing over the effectiveness of social networks to learn.

			Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree	Total
Age group	50 to 59	Count	1	4	2	2	3	12
		% within Agegroup	8.3%	33.3%	16.7%	16.7%	25.0%	100.0%
	60 to 69	Count	2	1	0	3	1	7
		% within Agegroup	28.6%	14%	0.0%	42.9%	14.3%	100.0%
	70 +	Count	0	2	3	1	3	9
		% within Agegroup	0.0%	22.2%	33.3%	11.1%	33.3%	100.0%
Total		Count	3	7	5	6	7	28
		% within Agegroup	10.7%	25.0%	17.9%	21.4%	25.0%	100.0%

Table 5.30: A cross tabulation illustrating age group with respect to using social networks to learn with

<u>Using online help</u>

The vast majority of the sample within the 50 to 59 age group either agreed or strongly agreed that they found using online help to be effective. The same also applied to the 60 to 69 and 70 + age groups. Learning online was therefore a popular choice among all three age groups.

			Using online help to learn			Total
			Strongly agree	Agree	Neither agree nor disagree	
Agegroup	50 to 59	Count	4	7	0	11
		% within Agegroup	36.4%	63.6%	.0%	100.0%
	60 to 69	Count	5	3	0	8
		% within Agegroup	62.5%	37.5%	.0%	100.0%
	70 +	Count	6	2	1	9
		% within Agegroup	66.7%	22.2%	11.1%	100.0%
Total		Count	15	12	1	28
		% within Agegroup	53.6%	42.9%	3.6%	100.0%

Table 5.31: A cross tabulation illustrating age group with respect to using online help

Voice enabled chat rooms

The majority of the 50 to 59 age group disagreed with using voice enabled chat rooms (e.g. Skype) to learn with. The 60 to 69 age group, either strongly disagreed or neither agreed nor disagreed about using voice enabled chat rooms to learn. The vast majority of the sample in the 70 + age group disagreed that voice enabled chat rooms were effective learning mechanisms to use.

			Using voice chat rooms to learn				
			Agree	Neither agree nor disagree	Disagree	Strongly disagree	Total
Agegroup	50 to 59	Count	0	3	4	5	12
		% within Agegroup	.0%	25.0%	33.3%	41.7%	100.0%
	60 to 69	Count	0	3	1	3	7
		% within Agegroup	.0%	42.9%	14.3%	42.9%	100.0%
	70 +	Count	1	2	5	0	8
		% within Agegroup	12.5%	25.0%	62.5%	.0%	100.0%
Total		Count	1	8	10	8	27
		% within Agegroup	3.7%	29.6%	37.0%	29.6%	100.0%

Table 5.32: A cross tabulation illustrating age group with respect to using voice chat rooms

Mobile technologies

With the 50 to 59 age group, a significant proportion of the sample agreed, strongly agreed or disagreed and strongly disagreed. The majority of the 60 to 69 age group were indifferent, while with the over 70s the sample was slightly in favour of a disagreement and strong disagreement of using mobile technologies to learn with.

			Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree	Total
Age group	50 to 59	Count	2	4	1	4	1	12
		% within Agegroup	16.7%	33.3%	8.3%	33.3%	8.3%	100.0%
	60 to 69	Count	1	0	3	1	2	7
		% within Agegroup	14.3%	0%	42.9%	14.3%	28.6%	100.0%
	70 +	Count	1	2	0	3	2	8
		% within Agegroup	12.5%	25.0%	0.0%	37.5%	25.0%	100.0%
Total		Count	4	6	4	8	5	27
		% within Agegroup	14.8%	22.2%	14.8%	29.6%	18.5%	100.0%

Table 5.33: A cross tabulation illustrating the age group with respect to using mobile technologies to learn with.

The majority of the 50 to 59 age groups agreed that learning via online manuals was effective, with a significant proportion neither agreeing nor disagreeing. With the 60 to 69 age group, the majority of the sample agreed or strongly agreed. Most of the over 70s agreed that learning via online manuals was considered effective. This method on the whole was a popular way to learn across all three age groups.

			Using online manuals to learn					
			Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree	Total
Agegroup	50 to 59	Count	0	8	4	0	0	12
		% within Agegroup	.0%	66.7%	33.3%	.0%	.0%	100.0%
	60 to 69	Count	2	3	1	1	1	8
		% within Agegroup	25.0%	37.5%	12.5%	12.5%	12.5%	100.0%
	70 +	Count	0	6	1	2	0	9
		% within Agegroup	.0%	66.7%	11.1%	22.2%	.0%	100.0%
Total		Count	2	17	6	3	1	29
		% within Agegroup	6.9%	58.6%	20.7%	10.3%	3.4%	100.0%

Table 5.34: A cross tabulation illustrating age group with respect to using online manuals to learn with.

Each of the age groups are presented, followed by the variables that were followed by a) agreed with b) neither agreed nor disagreed with and c) disagreed with.

50 to 59 age group

The following virtual learning methods were considered relatively important for this age group: **online help and learning with mobile technologies**.

This group neither agreed nor disagreed that **discussion boards** were effective methods to learn with.

This age group disagreed that using **chat rooms and voice enabled chat rooms** such as Skype were effective virtual learning methods.

There was a crossover between agreeing and neither agreeing nor disagreeing with: **web based instructions, social networks and online manuals**.

60 to 69 age group

Most of the sample in this age group agreed that **seeking help online and using online manuals** were effective methods to learn with.

The majority of the sample in this group neither agreed nor disagreed that using **discussion boards, chat rooms and mobile technologies** were effective virtual technologies to learn with.

The virtual learning methods **web based instructions** and **social networks** were evenly distributed. The majority considered **voice enabled chat rooms** not to be effective virtual learning methods.

70 + age group

The majority of the population sample in this group were in agreement that **web based instructions, online help and online manuals** were considered effective learning and support mechanisms. This group found **chat rooms** to not be effective.

For **learning with discussion boards and social networks**, the majority of the sample was in neither agreement nor neither agreed nor disagreed in terms of their effectiveness to learn with.

The group disagreed and neither agreed nor disagreed that **voice enabled chat rooms** were effective learning and support mechanisms. There was both agreement and disagreement in terms of learning with **mobile technologies** for this group.

5.2.9 Age group comparisons with respect to aspects of virtual learning

The descriptor for each variable is initially provided with reference to the cross tabulation.

<u>Virtual learning</u>

All age categories were, for the most part, in agreement that using virtual learning is a complicated process. However, a significant proportion of the sample neither agreed nor disagreed with this statement.

			Virtual learning as being complicated				
			Strongly agree	Agree	Neither agree nor disagree	Disagree	Total
Agegroup	50 to 59	Count	0	4	7	1	12
		% within Agegroup	.0%	33.3%	58.3%	8.3%	100.0%
	60 to 69	Count	1	3	4	0	8
		% within Agegroup	12.5%	37.5%	50.0%	.0%	100.0%
	70 +	Count	0	3	4	1	8
		% within Agegroup	.0%	37.5%	50.0%	12.5%	100.0%
Total		Count	1	10	15	2	28
		% within Agegroup	3.6%	35.7%	53.6%	7.1%	100.0%

Table 5.35: A cross tabulation illustrating age group with respect to using online manuals to learn with

Limited access to virtual technologies

There was an agreement and disagreement disparity with the 50 to 59 age group in terms of having limited access to such technologies. It was therefore approximately evenly distributed. This was also similar to the 60 to 69 year age group, yet the sample strongly agreed with this factor (as well as disagreeing and strongly disagreeing). The 70 + age group on the whole agreed that having limited access to virtual technologies applied to them.

			Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree	Total
Age group	50 to 59	Count	0	5	1	6	0	12
		% within Agegroup	0.0%	41.7%	8.3%	50.0%	0.0%	100.0%
	60 to 69	Count	2	0	1	3	1	7
		% within Agegroup	28.6%	0%	14.3%	42.9%	14.3%	100.0%
	70 +	Count	1	5	2	1	0	9
		% within Agegroup	11.1%	55.6%	22.2%	11.1%	0.0%	100.0%
Total		Count	3	10	4	10	1	28
		% within Agegroup	10.7%	35.7%	14.3%	35.7%	3.6%	100.0%

Table 5.36: A cross tabulation illustrating age group with respect to limited access to virtual technologies

Lacking confidence

The 50 to 59 age group agreed and neither agreed nor disagreed that lacking confidence was an issue. With the 60 to 69 age group there was an even distribution amongst the responses. The two majorities for the over 70s both resided within the “agree” and “disagree” categories with a small proportion responding neither agreed nor disagreed.

			Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree	Total
Age group	50 to 59	Count	1	4	3	3	1	12
		% within Agegroup	8.3%	33.3%	25.0%	25.0%	8.3%	100.0%
	60 to 69	Count	1	1	2	2	1	7
		% within Agegroup	14.3%	14%	28.6%	28.6%	14.3%	100.0%
	70 +	Count	1	3	2	3	0	9
		% within Agegroup	11.1%	33.3%	22.2%	33.3%	0.0%	100.0%
Total		Count	3	8	7	8	2	28
		% within Agegroup	10.7%	28.6%	25.0%	28.6%	7.1%	100.0%

Table 5.37: A cross tabulation illustrating age group with respect to lacking confidence in learning with virtual technologies

Not having much awareness

The 50 to 59 age group for the most part agreed about not having much awareness of such virtual technologies. With the 60 to 69 age group, there was both a strongly agree and neither agreed nor disagreed bias about not having much awareness of such technologies. The majority of the over 70s in the sample agreed that not having much awareness of such virtual technologies was an issue.

			Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree	Total
Age group	50 to 59	Count	1	7	2	1	0	11
		% within Agegroup	9.1%	63.6%	18.2%	9.1%	0.0%	100.0%
	60 to 69	Count	3	1	3	0	0	7
		% within Agegroup	42.9%	14.3%	42.9%	0.0%	0.0%	100.0%
	70 +	Count	1	5	1	1	1	9
		% within Agegroup	11.1%	55.6%	11.1%	11.1%	11.1%	100.0%
Total		Count	5	13	6	2	1	27
		% within Agegroup	18.5%	48.1%	22.2%	7.4%	3.7%	100.0%

Table 5.38: A cross tabulation illustrating age group with respect to not having much awareness about virtual technologies

Most of the sample in the 50 to 59 age group disagreed with lacking an interest in virtual learning. However, a slightly smaller proportion agreed or strongly agreed with just over a quarter neither agreeing nor disagreeing. For the 60 to 69 age group, there was an approximately even distribution. The over 70s disagreed that they lacked an interest in learning virtually.

			Lacking interest in virtual learning					Total
			Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree	
Agegroup	50 to 59	Count	1	3	2	5	0	11
		% within Agegroup	9.1%	27.3%	18.2%	45.5%	.0%	100.0%
	60 to 69	Count	1	2	2	3	0	8
		% within Agegroup	12.5%	25.0%	25.0%	37.5%	.0%	100.0%
	70 +	Count	1	2	0	5	1	9
		% within Agegroup	11.1%	22.2%	.0%	55.6%	11.1%	100.0%
Total		Count	3	7	4	13	1	28
		% within Agegroup	10.7%	25.0%	14.3%	46.4%	3.6%	100.0%

Table 5.39: A cross tabulation illustrating age group with respect to lacking an interest in virtual learning

The majority of the 50 to 59 age group neither agreed nor disagreed about having concerns over the content of material. With the 60 to 69 age group, a slightly higher proportion tended to disagree with having concerns with content. The 70 + group either agreed or neither agreed nor disagreed about having concerns over the content.

			Having concerns over content					
			Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree	Total
Agegroup	50 to 59	Count	0	0	5	4	2	11
		% within Agegroup	.0%	.0%	45.5%	36.4%	18.2%	100.0%
	60 to 69	Count	1	1	2	3	1	8
		% within Agegroup	12.5%	12.5%	25.0%	37.5%	12.5%	100.0%
	70 +	Count	0	3	4	1	0	8
		% within Agegroup	.0%	37.5%	50.0%	12.5%	.0%	100.0%
Total		Count	1	4	11	8	3	27
		% within Agegroup	3.7%	14.8%	40.7%	29.6%	11.1%	100.0%

Table 5.40: A cross tabulation illustrating age group with respect to having content concerns

For security concerns, the 50 to 59 age group neither disagreed nor agreed that it was an issue. The same also applied to the 60 to 69 age group. With the over 70s, the majority of respondents strongly agreed or agreed.

			Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree	Total
Age group	50 to 59	Count	1	2	5	1	2	11
		% within Agegroup	9.1%	18.2%	45.5%	9.1%	18.2%	100.0%
	60 to 69	Count	1	1	3	1	1	7
		% within Agegroup	14.3%	14.3%	42.9%	14.3%	14.3%	100.0%
	70 +	Count	1	3	2	2	0	8
		% within Agegroup	12.5%	37.5%	25.0%	25.0%	0.0%	100.0%
Total		Count	3	6	10	4	3	26
		% within Agegroup	11.5%	23.1%	38.5%	15.4%	11.5%	100.0%

Table 5.41: A cross tabulation illustrating age group with respect to having security concerns

The three age groups (50 to 59, 60 to 69 and 70 and over) are presented followed by the factors that were considered relatively, somewhat and ineffective.

To conclude all age groups in general found virtual learning as being complicated, as well as holding similarly mixed views towards lacking confidence and interest in learning to use ICTs. Interestingly both 50 to 59 and 60 to 69 age groups considered themselves not to have much awareness of the opportunities ICTs offered. The over 70s considered having limited access to ICTs was an issue than the other two age groups. The over 70s considered content and security to be of considerable importance.

The next sub section analyses the cross tabulations which compared gender to the four themed responses (learning methods, aspects of learning methods, virtual methods and aspects of virtual methods).

5.2.10 Gender comparisons with respect to learning methods

A higher proportion of females in the sample found that learning via a course at an institution was a better way to learn than males. A slightly higher proportion of males however have not used such a method.

		Learning via a course at an institution				Total
		Very effective	Somewhat effective	Didn't find it very effective	Never used it	
Gendergroup	Count	0	0	0	1	1
	% within Gendergroup	.0%	.0%	.0%	100.0%	100.0%
Female	Count	10	2	1	7	20
	% within Gendergroup	50.0%	10.0%	5.0%	35.0%	100.0%
Male	Count	1	3	0	4	8
	% within Gendergroup	12.5%	37.5%	.0%	50.0%	100.0%
Total	Count	11	5	1	12	29
	% within Gendergroup	37.9%	17.2%	3.4%	41.4%	100.0%

Table 5.42: A cross tabulation illustrating gender with respect to having content concerns

One to one tuition

With learning via one to one tuition, approximately the same representation of males and females shared the same views on it. However, a slightly higher proportion of males found it to be "very effective". This may suggest that females preferred to use independently emphasised methods.

		Learning via one to one tuition			Total
		Very effective	Somewhat effective	Never used it	
Gendergroup	Count	0	0	1	1
	% within Gendergroup	.0%	.0%	100.0%	100.0%
Female	Count	5	3	11	19
	% within Gendergroup	26.3%	15.8%	57.9%	100.0%
Male	Count	3	1	4	8
	% within Gendergroup	37.5%	12.5%	50.0%	100.0%
Total	Count	8	4	16	28
	% within Gendergroup	28.6%	14.3%	57.1%	100.0%

Table 5.43: A cross tabulation illustrating gender with respect to learning via one to one tuition

Video tutorial learning

From the sample population representations, both males and females shared similar views when it came to learning via video tutorials.

			Learning via video tutorials				
			Very effective	Somewhat effective	Didn't find it very effective	Never used it	Total
Gendergroup		Count	0	0	0	1	1
		% within Gendergroup	.0%	.0%	.0%	100.0%	100.0%
	Female	Count	1	7	2	10	20
		% within Gendergroup	5.0%	35.0%	10.0%	50.0%	100.0%
	Male	Count	1	2	1	4	8
		% within Gendergroup	12.5%	25.0%	12.5%	50.0%	100.0%
Total		Count	2	9	3	15	29
		% within Gendergroup	6.9%	31.0%	10.3%	51.7%	100.0%

Table 5.44: A cross tabulation illustrating gender with respect to learning via video tutorials

Instruction manuals

Approximately the same percentage proportion of males and females preferred to learn via instruction manuals. A higher proportion of females found it “very effective” yet also “did not find it very effective”. A disparity was thus present in that instruction manuals were either preferred or not preferred.

			Very effective	Somewhat effective	Didn't find it effective	Never used it	Total
Gender		Count	1	0	0	0	1
		% within Gendergroup	100.0%	0.0%	0.0%	0.0%	100.0%
	Female	Count	3	10	4	3	20
		% within Gendergroup	15.0%	50.0%	20.0%	15.0%	100.0%
	Male	Count	0	5	1	2	8
		% within Gendergroup	0.0%	62.5%	12.5%	25.0%	100.0%
Total		Count	4	15	5	5	29
		% within Gendergroup	13.8%	51.7%	17.2%	17.2%	100.0%

Table 5.45: A cross tabulation illustrating gender with respect to instruction manuals

Telephone learning

A higher proportion of females preferred to get help and learn via the telephone. This suggests females prefer voice dialogue in a 'real time' setting.

			Learning via the telephone				Total
			Very effective	Somewhat effective	Didn't find it very effective	Never used it	
Gendergroup		Count	0	0	0	1	1
		% within Gendergroup	.0%	.0%	.0%	100.0%	100.0%
	Female	Count	3	7	1	8	19
		% within Gendergroup	15.8%	36.8%	5.3%	42.1%	100.0%
	Male	Count	0	2	4	2	8
		% within Gendergroup	.0%	25.0%	50.0%	25.0%	100.0%
Total		Count	3	9	5	11	28
		% within Gendergroup	10.7%	32.1%	17.9%	39.3%	100.0%

Table 5.46: A cross tabulation illustrating gender with respect to telephone learning

Self-teaching

The proportion of males preferring to self-teach was higher than that of females. However, a significant proportion of females find it somewhat effective. It suggests that both genders hold a preference for independent learning.

			Very effective	Somewhat effective	Didn't find it effective	Never used it	Total
Gender		**Count**	1	0	0	0	1
		% within Gendergroup	100.0%	0.0%	0.0%	0.0%	100.0%
	Female	**Count**	2	11	3	3	19
		% within Gendergroup	10.5%	57.9%	15.8%	15.8%	100.0%
	Male	**Count**	7	1	0	0	8
		% within Gendergroup	87.5%	12.5%	0.0%	0.0%	100.0%
Total		**Count**	10	12	3	3	28
		% within Gendergroup	35.7%	42.9%	10.7%	10.7%	100.0%

Table 5.47: A cross tabulation illustrating gender with respect to being self-taught

TV and Radio

A higher proportion of females have never used TV and radio to learn with compared to males. Yet of those who did in the sample, a slightly higher proportion of males found this method to be effective.

			Learning via the TV and radio			Total
			Very effective	Somewhat effective	Never used it	
Gendergroup		Count	0	0	1	1
		% within Gendergroup	.0%	.0%	100.0%	100.0%
	Female	Count	1	2	17	20
		% within Gendergroup	5.0%	10.0%	85.0%	100.0%
	Male	Count	2	1	5	8
		% within Gendergroup	25.0%	12.5%	62.5%	100.0%
Total		Count	3	3	23	29
		% within Gendergroup	10.3%	10.3%	79.3%	100.0%

Table 5.48: A cross tabulation illustrating gender with respect to learning via the TV and radio

Audio books

The majority of both males and females have never used audio books as a way to learn to use ICTs.

			Learning via audio books		
			Didn't find it very effective	Never used it	Total
Gendergroup		Count	0	1	1
		% within Gendergroup	.0%	100.0%	100.0%
	Female	Count	1	19	20
		% within Gendergroup	5.0%	95.0%	100.0%
	Male	Count	1	7	8
		% within Gendergroup	12.5%	87.5%	100.0%
Total		Count	2	27	29
		% within Gendergroup	6.9%	93.1%	100.0%

Table 5.49: A cross tabulation illustrating gender with respect to learning via audio books

Software feature

Again, both males and females held similar views with regards to using software to learn with. The majority of both males and females found learning via software to be somewhat effective, with a smaller proportion not finding it very effective or having never used it.

			Learning via a software feature				Total
			Very effective	Somewhat effective	Didn't find it very effective	Never used it	
Gendergroup		Count	0	1	0	0	1
		% within Gendergroup	.0%	100.0%	.0%	.0%	100.0%
	Female	Count	1	9	4	6	20
		% within Gendergroup	5.0%	45.0%	20.0%	30.0%	100.0%
	Male	Count	0	4	2	2	8
		% within Gendergroup	.0%	50.0%	25.0%	25.0%	100.0%
Total		Count	1	14	6	8	29
		% within Gendergroup	3.4%	48.3%	20.7%	27.6%	100.0%

Table 5.50: A cross tabulation illustrating gender with respect to learning via a software feature

To conclude, a disparity was found with self-teaching, in which the sample indicated that males preferred it to females. From the sample representations, females preferred to increasingly learn via a course at an institution and over the telephone than males did. Learning methods which shared approximately similar views with both males and females included: one to one tuition, learning with video tutorials, learning via instruction manuals, learning with the TV and radio, learning with audio books and with software.

Similarly, the Digital Lifestyles (2009) report found that there was no gender difference between male and female older learners (those that were 60 and over) regarding the learning of ICTs.

The next sub section provides the cross tabulations of gender with respect to aspects of learning methods.

5.2.11 Gender comparisons with respect to aspects of learning methods

<u>Structure</u>

Both males and females held similar views regarding structure during the learning process, whether course based or independently. About half considered it to be "quite strong important" while the other half of the sample were indifferent.

			StrucGroup		Total
			Neither important or unimportant	Quite strong important	
Gendergroup		Count	0	1	1
		% within Gendergroup	.0%	100.0%	100.0%
	Female	Count	9	11	20
		% within Gendergroup	45.0%	55.0%	100.0%
	Male	Count	4	4	8
		% within Gendergroup	50.0%	50.0%	100.0%
Total		Count	13	16	29
		% within Gendergroup	44.8%	55.2%	100.0%

Table 5.51: A cross tabulation illustrating gender with respect to preferring structured learning

<u>Teacher facilitation</u>

A slightly higher proportion of females preferred a teacher to learn with. Also, a slightly higher proportion of females were indifferent, yet a slightly higher proportion of males considered learning with a teacher to be unimportant.

			TeacherGroup			Total
			Quite strong 'not important'	Neither important or unimportant	Quite strong important	
Gendergroup		Count	0	1	0	1
		% within Gendergroup	.0%	100.0%	.0%	100.0%
	Female	Count	1	9	10	20
		% within Gendergroup	5.0%	45.0%	50.0%	100.0%
	Male	Count	3	2	3	8
		% within Gendergroup	37.5%	25.0%	37.5%	100.0%
Total		Count	4	12	13	29
		% within Gendergroup	13.8%	41.4%	44.8%	100.0%

Table 5.52: A cross tabulation illustrating gender with respect to preferring to learn with a teacher

Appropriate, non-jargon language

Both genders again held similar views in considering language being appropriate to the context e.g. non jargon to be quite strongly important.

			LanguageGroup			Total
			Quite strong 'not important'	Neither important or unimportant	Quite strong important	
Gendergroup		Count	0	0	1	1
		% within Gendergroup	.0%	.0%	100.0%	100.0%
	Female	Count	2	2	16	20
		% within Gendergroup	10.0%	10.0%	80.0%	100.0%
	Male	Count	0	1	7	8
		% within Gendergroup	.0%	12.5%	87.5%	100.0%
Total		Count	2	3	24	29
		% within Gendergroup	6.9%	10.3%	82.8%	100.0%

Table 5.53: A cross tabulation illustrating gender with respect to preferring to learn with appropriate language

Duration

Approximately the same proportion of males and females held similar views with regards to the duration of the learning programme (which was the majority in the sample). A higher proportion of males considered the duration of the course or learning programme neither important nor unimportant.

			DurationGroup			Total
			Quite strong 'not important'	Neither important or unimportant	Quite strong important	
Gendergroup		Count	0	1	0	1
		% within Gendergroup	.0%	100.0%	.0%	100.0%
	Female	Count	1	4	15	20
		% within Gendergroup	5.0%	20.0%	75.0%	100.0%
	Male	Count	0	3	5	8
		% within Gendergroup	.0%	37.5%	62.5%	100.0%
Total		Count	1	8	20	29
		% within Gendergroup	3.4%	27.6%	69.0%	100.0%

Table 5.54: A cross tabulation illustrating gender with respect to preferring to learn with an appropriate duration

Pace

With the pace of learning, approximately the same proportion of the samples for both males and females considered it to be quite strongly important (with a slightly higher proportion of males compared to females considering it like this). A slightly higher proportion of females held indifferent views with regards to the pace of learning.

			Neither important nor unimportant	Quite strong important	Total
Gender		Count	1	0	1
		% within Gendergroup	100.0%	0.0%	100.0%
	Female	Count	7	13	20
		% within Gendergroup	35.0%	65.0%	100.0%
	Male	Count	2	6	8
		% within Gendergroup	25.0%	75.0%	100.0%
Total		Count	10	19	29
		% within Gendergroup	34.5%	65.5%	100.0%

Table 5.55: A cross tabulation illustrating gender with respect to preferring to learn with an appropriate pace

Dialogue

Approximately half of males and females considered dialogue in learning to be "quite strongly important" (with males at a slightly higher proportion). A slightly higher proportion of females are indifferent about the dialogue in terms of learning.

			DialogueGroup			
			Quite strong 'not important'	Neither important or unimportant	Quite strong important	Total
Gendergroup		Count	0	1	0	1
		% within Gendergroup	.0%	100.0%	.0%	100.0%
	Female	Count	2	7	9	18
		% within Gendergroup	11.1%	38.9%	50.0%	100.0%
	Male	Count	1	2	5	8
		% within Gendergroup	12.5%	25.0%	62.5%	100.0%
Total		Count	3	10	14	27
		% within Gendergroup	11.1%	37.0%	51.9%	100.0%

Table 5.56: A cross tabulation illustrating gender with respect to preferring to learn with an appropriate dialogue

On the whole, males much preferred technology to learn with than females. However, the majority of females held indifferent views about learning with technology.

			TechGroup			
			Quite strong 'not important'	Neither important or unimportant	Quite strong important	Total
Gendergroup		Count	0	1	0	1
		% within Gendergroup	.0%	100.0%	.0%	100.0%
	Female	Count	2	13	5	20
		% within Gendergroup	10.0%	65.0%	25.0%	100.0%
	Male	Count	0	1	7	8
		% within Gendergroup	.0%	12.5%	87.5%	100.0%
Total		Count	2	15	12	29
		% within Gendergroup	6.9%	51.7%	41.4%	100.0%

Table 5.57: A cross tabulation illustrating gender with respect to preferring to learn with an appropriate dialogue

A slightly higher proportion of females preferred informal learning, although the majority of both male and female groups held indifferent (neither important nor unimportant) views about it.

			FormalGroup			
			Quite strong 'not important'	Neither important or unimportant	Quite strong important	Total
Gendergroup		Count	1	0	0	1
		% within Gendergroup	100.0%	.0%	.0%	100.0%
	Female	Count	3	9	6	18
		% within Gendergroup	16.7%	50.0%	33.3%	100.0%
	Male	Count	2	5	1	8
		% within Gendergroup	25.0%	62.5%	12.5%	100.0%
Total		Count	6	14	7	27
		% within Gendergroup	22.2%	51.9%	25.9%	100.0%

Table 5.58: A cross tabulation illustrating gender with respect to preferring to learn formally

A higher proportion of males preferred informal learning compared to females. Contrary to this however females consider informal learning not to be important.

			InformalGroup			
			Quite strong 'not important'	Neither important or unimportant	Quite strong important	Total
Gendergroup		Count	0	1	0	1
		% within Gendergroup	.0%	100.0%	.0%	100.0%
	Female	Count	8	9	3	20
		% within Gendergroup	40.0%	45.0%	15.0%	100.0%
	Male	Count	1	3	4	8
		% within Gendergroup	12.5%	37.5%	50.0%	100.0%
Total		Count	9	13	7	29
		% within Gendergroup	31.0%	44.8%	24.1%	100.0%

Table 5.59: A cross tabulation illustrating gender with respect to preferring to learn informally

To conclude, males preferred to have a teacher to help with the learning process, as well as learning with technology. A higher proportion of males prefer to learn informally than females. Both genders shared similar preferences towards: structured learning, appropriate language, course duration, the pace of the learning, dialogue and formal learning.

The next sub section provides the cross tabulations for gender with respect do virtual learning methods.

5.2.12 Gender comparisons with respect to virtual learning

A higher proportion of females disagreed that using discussion boards was an effective way to learn in contrast to a higher proportion of males who agreed that this was an effective mechanism to learn with.

Discussion boards

			Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree	Total
Gender		Count	0	0	1	0	0	1
		% within Gendergroup	0.0%	0.0%	100.0%	0.0%	0.0%	100.0%
	Female	Count	0	2	10	4	2	18
		% within Gendergroup	0.0%	11.1%	55.6%	22.2%	11.1%	100.0%
	Male	Count	1	4	1	2	0	8
		% within Gendergroup	12.5%	50.0%	12.5%	25.0%	0.0%	100.0%
Total		Count	1	6	12	6	2	27
		% within Gendergroup	3.7%	22.2%	44.4%	22.2%	7.4%	100.0%

Table 5.60: A cross tabulation illustrating gender with respect to using discussion boards to learn

Chat rooms

A higher proportion of females disagreed that using chat rooms to learn with was effective, whereas the majority proportion of males either agreed or disagreed that learning to use chat rooms was an effective way to learn.

			Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree	Total
Gender		Count	0	0	0	0	1	1
		% within Gendergroup	0.0%	0.0%	0.0%	0.0%	100.0%	100.0%
	Female	Count	0	0	7	8	4	19
		% within Gendergroup	0.0%	0.0%	36.8%	42.1%	21.1%	100.0%
	Male	Count	1	2	0	2	3	8
		% within Gendergroup	12.5%	25.0%	0.0%	25.0%	37.5%	100.0%
Total		Count	1	2	7	10	8	28
		% within Gendergroup	3.6%	7.1%	25.0%	35.7%	28.6%	100.0%

Table 5.61: A cross tabulation illustrating gender with respect to using chat rooms to learn

Web based instructions

A slightly higher proportion of males preferred web based instructions compared to females.

			Strongly agree	Agree	Neither agree nor disagree	Disagree	Total
Gender		Count	0	0	1	0	1
		% within Gendergroup	0.0%	0.0%	100.0%	0.0%	100.0%
	Female	Count	1	7	9	3	20
		% within Gendergroup	5.0%	35.0%	45.0%	15.0%	100.0%
	Male	Count	1	5	2	0	8
		% within Gendergroup	12.5%	62.5%	25.0%	0.0%	100.0%
Total		Count	2	12	12	3	29
		% within Gendergroup	6.9%	41.4%	41.4%	10.3%	100.0%

Table 5.62: A cross tabulation illustrating gender with respect to learning via web based instructions

Social networking learning

For both genders the variable distribution frequencies were approximately the same. Both genders therefore had mixed views towards using social networks to learn with.

			Strongly agree	Agree	Neither agree nor disagree	Disagree	Total
Gender		Count	0	0	1	0	1
		% within Gendergroup	0.0%	0.0%	100.0%	0.0%	100.0%
	Female	Count	0	7	11	1	19
		% within Gendergroup	0.0%	36.8%	57.9%	5.3%	100.0%
	Male	Count	1	3	3	1	8
		% within Gendergroup	12.5%	37.5%	37.5%	12.5%	100.0%
Total		Count	1	10	15	2	28
		% within Gendergroup	3.6%	35.7%	53.6%	7.1%	100.0%

Table 5.63: A cross tabulation illustrating gender with respect to using social networks to learn

Seeking help online

Both genders are similar in that they mostly agreed or strongly agreed with online help being effective. A slightly higher proportion of males considered this to be effective in contrast to females.

			Using online help to learn			
			Strongly agree	Agree	Neither agree nor disagree	Total
Gendergroup	Female	Count	8	11	1	20
		% within Gendergroup	40.0%	55.0%	5.0%	100.0%
	Male	Count	7	1	0	8
		% within Gendergroup	87.5%	12.5%	.0%	100.0%
Total		Count	15	12	1	28
		% within Gendergroup	53.6%	42.9%	3.6%	100.0%

Table 5.64: A cross tabulation illustrating gender with respect to using online help to learn

Voice enabled chat rooms

For voice enabled chat rooms, a higher proportion of males disagreed that this was an effective learning method.

			Agree	Neither agree nor disagree	Disagree	Strongly disagree	Total
Gender		Count	0	0	0	0	1
		% within Gendergroup	100.0%	100.0%	100.0%	100.0%	100.0%
	Female	Count	1	7	5	5	18
		% within Gendergroup	5.6%	38.9%	27.8%	27.8%	100.0%
	Male	Count	0	1	5	2	8
		% within Gendergroup	0.0%	12.5%	62.5%	25.0%	100.0%
Total		Count	1	8	10	8	27
		% within Gendergroup	3.7%	29.6%	37.0%	29.6%	100.0%

Table 5.65: A cross tabulation illustrating gender with respect to using voice enabled chat rooms to learn

Mobile technology learning

With mobile technologies, an approximately even distribution of both males and females held similar views regarding it. With males there was an uneven distribution (e.g. the majority either strongly agreed or agreed or disagreed or strongly disagreed). With the female sample population it was evenly distributed.

			Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree	Total
Gender		Count	0	1	0	0	0	1
		% within Gendergroup	0.0%	100.0%	0.0%	0.0%	0.0%	100.0%
	Female	Count	2	4	4	6	2	18
		% within Gendergroup	11.1%	22.2%	22.2%	33.3%	11.1%	100.0%
	Male	Count	2	1	0	2	3	8
		% within Gendergroup	25.0%	12.5%	0.0%	25.0%	37.5%	100.0%
Total		Count	4	6	4	8	5	27
		% within Gendergroup	14.8%	22.2%	14.8%	29.6%	18.5%	100.0%

Table 5.66: A cross tabulation illustrating gender with respect to using mobile technologies to learn with

Online manuals

With using online manuals, there was an approximate even distribution between the two genders in both agreeing that this was an effective learning and support method.

			Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly Disagree	Total
Gender		Count	0	1	0	0	0	1
		% within Gendergroup	0.0%	100.0%	0.0%	0.0%	0.0%	100.0%
	Female	Count	1	11	6	1	1	20
		% within Gendergroup	5.0%	55.0%	30.0%	5.0%	5.0%	100.0%
	Male	Count	1	5	0	2	0	8
		% within Gendergroup	12.5%	62.5%	0.0%	25.0%	0.0%	100.0%
Total		Count	2	17	6	3	1	29
		% within Gendergroup	6.9%	58.6%	20.7%	10.3%	3.4%	100.0%

Table 5.67: A cross tabulation illustrating gender with respect to using online manuals to learn with

The male sample population were inclined to prefer discussion boards. Females showed non-preference towards chat rooms, discussion boards whereas they are inclined to prefer voice enabled chat rooms. Both male and females prefer web based instructions, online help and online manuals to learn with. Both males and females held mixed views about mobile technologies e.g. there were approximately even frequency distributions for each variable.

The next section provides the cross tabulations for gender comparisons with respect to aspects of virtual learning methods.

5.2.13 Gender comparisons with respect to aspects of virtual learning

Approximately the same proportion of both males and females held similar views in that virtual learning was considered a complicated medium, with the vast majority of the sample agreeing with this.

			Strongly agree	Agree	Neither agree nor disagree	Disagree	Total
Gender		Count	0	0	1	0	1
		% within Gendergroup	0.0%	0.0%	100.0%	0.0%	100.0%
	Female	Count	0	7	11	1	19
		% within Gendergroup	0.0%	36.8%	57.9%	5.3%	100.0%
	Male	Count	1	3	3	1	8
		% within Gendergroup	12.5%	37.5%	37.5%	12.5%	100.0%
Total		Count	1	10	15	2	28
		% within Gendergroup	3.6%	35.7%	53.6%	7.1%	100.0%

Table 5.68: A cross tabulation illustrating gender with respect to virtual learning as being complicated

Not being sure where to start

Approximately the same proportion of males and females shared similar views of not being sure where to start with virtual learning. A slightly higher proportion of females agreed to this, whereas the same approximate proportion of males disagreed.

			Strongly agree	Agree	Neither agree nor disagree	Disagree	Total
Gender		Count	0	0	1	0	1
		% within Gendergroup	0.0%	0.0%	100.0%	0.0%	100.0%
	Female	Count	2	7	8	2	19
		% within Gendergroup	10.5%	36.8%	42.1%	10.5%	100.0%
	Male	Count	1	2	2	3	8
		% within Gendergroup	12.5%	25.0%	25.0%	37.5%	100.0%
Total		Count	3	9	11	5	28
		% within Gendergroup	10.7%	32.1%	39.3%	17.9%	100.0%

Table 5.69: A cross tabulation illustrating gender with respect to not being sure where to start

Limited access to virtual technologies

The proportion of both genders had approximately even distributions in terms of having limited access to virtual technologies.

			Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly Disagree	Total
Gender		Count	0	1	0	0	0	1
		% within Gendergroup	0.0%	100.0%	0.0%	0.0%	0.0%	100.0%
	Female	Count	2	7	3	7	0	19
		% within Gendergroup	10.5%	36.8%	15.8%	36.8%	0.0%	100.0%
	Male	Count	1	3	0	3	1	8
		% within Gendergroup	12.5%	37.5%	0.0%	37.5%	12.5%	100.0%
Total		Count	3	10	4	10	1	28
		% within Gendergroup	10.7%	35.7%	14.3%	35.7%	3.6%	100.0%

Table 5.70: A cross tabulation illustrating gender with respect to having limited access to virtual technologies

Lacking confidence

The distribution was approximately the same for both males and females, with the latter having a higher rate of agreement in lacking confidence of using ICTs.

			Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly Disagree	Total
Gender		Count	0	0	0	1	0	1
		% within Gendergroup	0.0%	0.0%	0.0%	100.0%	0.0%	100.0%
	Female	Count	2	5	6	5	1	19
		% within Gendergroup	10.5%	26.3%	31.6%	26.3%	5.3%	100.0%
	Male	Count	1	3	1	2	1	8
		% within Gendergroup	12.5%	37.5%	12.5%	25.0%	12.5%	100.0%
Total		Count	3	8	7	8	2	28
		% within Gendergroup	10.7%	28.6%	25.0%	28.6%	7.1%	100.0%

Table 5.71: A cross tabulation illustrating gender with respect to lacking confidence in learning with virtual technologies

Limited awareness

The majority of the sample proportion of both males and females agreed with not having much awareness about virtual technologies and the benefits they can bring.

			Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly Disagree	Total
Gender		Count	0	1	0	0	0	1
		% within Gendergroup	0.0%	100.0%	0.0%	0.0%	0.0%	100.0%
	Female	Count	2	8	5	2	1	18
		% within Gendergroup	11.1%	44.4%	27.8%	11.1%	5.6%	100.0%
	Male	Count	3	4	1	0	0	8
		% within Gendergroup	37.5%	50.0%	12.5%	0.0%	0.0%	100.0%
Total		Count	5	13	6	2	1	27
		% within Gendergroup	18.5%	48.1%	22.2%	7.4%	3.7%	100.0%

Table 5.72: A cross tabulation illustrating gender with respect to not having much awareness about them

Lacking interest

A slightly higher proportion of both males and females both equally disagreed with lacking interest in using virtual technologies to learn with.

			Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly Disagree	Total
Gender		Count	0	0	0	1	0	1
		% within Gendergroup	0.0%	0.0%	0.0%	100.0%	0.0%	100.0%
	Female	Count	1	6	3	8	1	19
		% within Gendergroup	5.3%	31.6%	15.8%	42.1%	5.3%	100.0%
	Male	Count	2	1	1	4	0	8
		% within Gendergroup	25.0%	12.5%	12.5%	50.0%	0.0%	100.0%
Total		Count	3	7	4	13	1	28
		% within Gendergroup	10.7%	25.0%	14.3%	46.4%	3.6%	100.0%

Table 5.73: A cross tabulation illustrating gender with respect to lacking an interest in learning with virtual technologies

Concerns with content

The proportion for both genders was approximately the same; however, a higher proportion of males and females disagreed about having concerns over material content.

			Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly Disagree	Total
Gender		Count	0	0	0	1	0	1
		% within Gendergroup	0.0%	0.0%	0.0%	100.0%	0.0%	100.0%
	Female	Count	0	3	8	7	0	18
		% within Gendergroup	0.0%	16.7%	44.4%	38.9%	0.0%	100.0%
	Male	Count	1	1	3	0	3	8
		% within Gendergroup	12.5%	12.5%	37.5%	0.0%	37.5%	100.0%
Total		Count	1	4	11	8	3	27
		% within Gendergroup	3.7%	14.8%	40.7%	29.6%	11.1%	100.0%

Table 5.74: A cross tabulation illustrating gender with respect to having concerns over the content

Concerns with security

The sample proportions for both males and females were approximately the same, with females having slightly higher concerns over security than males.

			Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly Disagree	Total
Gender		Count	0	0	0	1	0	1
		% within Gendergroup	0.0%	0.0%	0.0%	100.0%	0.0%	100.0%
	Female	Count	2	5	6	4	0	17
		% within Gendergroup	11.8%	29.4%	35.3%	23.5%	0.0%	100.0%
	Male	Count	1	1	3	0	3	8
		% within Gendergroup	12.5%	12.5%	37.5%	0.0%	37.5%	100.0%
Total		Count	3	6	10	4	3	26
		% within Gendergroup	11.5%	23.1%	38.5%	15.4%	11.5%	100.0%

Table 5.75: A cross tabulation illustrating gender with respect to having security concerns

The next sub section considers non-parametric testing which was carried out with both genders and age groups. This was because it was important to ascertain any significant differences within the dataset. The non-parametric testing consists of two key tests: The Mann-Whitney (testing the differences between two variables e.g. gender) and the Kruskall-Wallis test (testing the differences between three variables e.g. the three age groups).

5.2.14 Non-parametric testing

A non-parametric test compares the medians of the data sets, and whether there is a significant difference between them, and thus the data. The non-parametric tests were carried out on ordinal data, and not scaled (as was the case with aspects of learning) methods. The reason non-parametric testing was chosen was because of the nature of the data that was collected. The tests do not assume that the data has normality, and it takes into consideration outliers (e.g. data that is numerically distant from the majority of the data). Further, it is useful for carrying out tests with categorical data e.g. the “quite strong important, neither important nor unimportant and quite strong unimportant” categories. (Whitley and Ball 2002). This research has specifically chosen the Mann-Whitney and Kruskall-Wallis non-parametric tests that were carried out on the data. Such non-parametric tests consider ranked data.

The first test to be carried out is called the Mann-Whitney test, and is described next.

5.2.15 The Mann-Whitney test between two variables

This test used two data sets (which are independent from one another). This method works with ordinal data, and as such variables which are ordinal will be used for comparisons. It tests the differences between the distributions of data and their median values. Rather than describing evidence that may cause an effect this is a test which determines whether or not the null hypothesis (meaning that no relationship exists between two sets of data) is rejected. If it is rejected then there is evidence to suggest a relationship exists between the two data sets. To illustrate the findings, a table has been used to summarise the hypotheses, p values (as explained) and results.

The gender has been grouped accordingly and compared with individual learning methods. The following illustrates how a Mann-Whitney test was conducted, which compares **gender** and **learning via a course**.

The null hypothesis (Ho) is to be set. This is a statement or assumption that is tested to be rejected. In this case it is: *That both males and females have not had different levels of learning to use ICTs via a course (e.g. that there are no course learning disparities between one gender and the other).*

Test Statistics[b]

	Learning via a course at an institution
Mann-Whitney U	56.000
Wilcoxon W	266.000
Z	-1.305
Asymp. Sig. (2-tailed)	.192
Exact Sig. [2*(1-tailed Sig.)]	.237[a]
Exact Sig. (2-tailed)	.240
Exact Sig. (1-tailed)	.124
Point Probability	.012

a. Not corrected for ties.
b. Grouping Variable: The gender of the participant

Table 5.76: A table output showing the p value (Asymp. Sig. (2-tailed)) from the Mann-Whitney test

The alpha level is to be set at 0.05 (this is an assumed value and one in which the p values are tested with). If the p value is lower than 0.05, then there is evidence to reject the null hypothesis that males and females have no differences in levels of learning via a course. A Mann-Whitney test ($p=0.192$) found no evidence ($0.192 > 0.05$) to reject the null hypothesis. It should be noted that the p value stands for "probability level". **This suggests that there is no difference in the propensity of males and females to learn ICTs via a course.**

Other variable tests (including this one) have been tabulated as shown:

Null Hypothesis (No difference between males and females in levels of learning to use ICTs via…)	**P-value**	**Result**
A course	0.192	No evidence to reject null hypothesis (0.192 > 0.05)
1 to 1 tuition	0.635	No evidence to reject null hypothesis (0.635 > 0.05)
Video tutorials	0.934	No evidence to reject null hypothesis (0.934 > 0.05)
Instruction manuals	0.504	No evidence to reject null hypothesis (0.504 > 0.05)
Learning via groups	0.133	No evidence to reject null hypothesis (0.133 > 0.05)
Internet learning	0.072	No evidence to reject null hypothesis (0.072 > 0.05) although values were close
Telephone learning	0.616	No evidence to reject null hypothesis (0.616 > 0.05)
Self-taught	**0.000**	**Evidence to reject null hypothesis (0.000 < 0.05) A higher proportion of *Males learned via self-teaching than females***
TV and Radio learning	0.166	No evidence to reject null hypothesis (0.166 > 0.05)
Audio books	0.494	No evidence to reject null hypothesis (0.494 > 0.05)

Table 5.77: A table showing differences between males and females with respect to the p value of individual variables (learning methods)

Differences between males and females with respect to p value of individual variables (virtual methods)

Null Hypothesis (No difference between males and females in levels of learning to use ICTs via…)	**P-value**	**Result**
Discussion boards	**0.05**	**Evidence to reject null hypothesis (0.05 <= 0.05*) A slightly higher proportion of males preferred to learn via discussion boards than females***
Chat rooms	0.868	No evidence to reject null hypothesis (0.868 > 0.05)
Web based instructions	0.79	No evidence to reject null hypothesis (0.79 > 0.05)
Social networks	0.828	No evidence to reject null hypothesis (0.828 > 0.05)
Online help	**0.026**	**Evidence to reject null hypothesis (0.026 < 0.05) *Both males and females agreed that using online help was effective. However, a higher proportion of males 'strongly agreed' with learning via online help***
Voice enabled chat rooms	0.348	No evidence to reject null hypothesis (0.348 > 0.05)
Mobile technologies	0.531	No evidence to reject null hypothesis (0.531 > 0.05)
Online manuals	0.570	No evidence to reject null hypothesis (0.570 > 0.05)

Table 5.78: A table showing the differences between males and females with respect to the p value of individual variables (virtual methods)

Null Hypothesis (No difference between males and females in levels of learning to use ICTs via…)	**P-value**	**Result**
Virtual learning as complicated	0.575	No evidence to reject null hypothesis (0.575 > 0.05)
Not being sure where to start	0.372	No evidence to reject null hypothesis (0.372 > 0.05)
Limited access with virtual technologies	0.695	No evidence to reject null hypothesis (0.695 > 0.05)
Lacking confidence in learning with them	0.913	No evidence to reject null hypothesis (0.913 > 0.05)
Limited awareness	**0.05**	**Evidence to reject null hypothesis (0.05 <= 0.05)** ***Again, the proportion of males and females who agreed to not being aware of what was on offer was approximately the same, although males were likely to 'strongly agree' to it***
Lacking interest	0.715	No evidence to reject null hypothesis (0.715 > 0.05)
Content concerns	0.792	No evidence to reject null hypothesis (0.792 > 0.05)
Security concerns	0.265	No evidence to reject null hypothesis (0.265 > 0.05)

Table 5.79: A table showing the differences between males and females with respect to the p value of individual variables (aspects of virtual methods)

To conclude the Mann-Whitney test was carried out with their respective variables. The significant results (e.g. those with probability values less than 0.05) are concentrated upon. In particular this focused upon whether significant differences were established between the ways males and females learned. A higher proportion of males were self-taught which suggests they prefer autonomy and independence over their learning in a self-directed manner. Males found self-teaching to be very effective compared with females (the majority who found it somewhat effective). With virtual methods there was a difference between males and females in finding online help to be an effective mechanism. A significantly higher proportion of males found online learning to be effective than females. However, a slightly higher proportion of females agreed with online help being effective. There was a limited awareness of the opportunities ICTs could offer. A higher proportion of males were less likely to be aware of such opportunities compared with females. This may suggest males need to reflect their goals that could potentially be fulfilled using ICTs and the opportunities that they provide. From these results, it indicates that males tend to slightly prefer a self-directed approach to learning compared with females. However, a higher portion of males used discussion boards to learn with, compared to females. Such a mechanism brings structure, support and guidance to the learning process, in a supportive, collaborative and virtual manner. It also indicated a slightly higher portion of males preferred learning in virtual community settings. This may suggest less of an emphasis is preferred with those considered traditional approaches, and on engaging and learning with the technology via experiential learning.

5.3 Learning needs and requirement with respect to learning methods, aspects of learning methods, virtual methods and aspects of virtual methods (Mann-Whitney test)

Using the same principle as before, the Mann-Whitney test has been carried out with each learning method, to determine whether there is or is not a difference between the older adult learner having any learning "needs or requirements" and how the older adult learner has learned to use the technology (e.g. the particular learning method). The probability level is still to be set at 0.05. The p values for the individual learning variables with respect to "any needs and requirements" are shown in the table:

A course	1 to 1 tuition	Video tutorials	Instruction manuals	In groups	The Internet	The telephone	Self-teaching	TV and Radio	Audio books	Software feature
P = 0.764	P = 0.705	P = 0.576	P = 0.031	P = 0.859	P = 0.173	P = 0.723	P = 0.001	P = 0.564	P = 0.384	P = 0.019

Table 5.80: A table showing individual learning variables and their subsequent p values.

As such, Mann-Whitney tests were carried out to determine whether there was a difference in the propensity of older adults who considered themselves to have learning needs and requirements and learned to use ICTs via a particular method. The variables which have p values lower than 0.05 have been highlighted in bold for clarity. The outcomes are summarised in Table 5.81:

Learning needs and requirements and learning methods

Null Hypothesis (that there is no difference in older adults who consider themselves to have learning needs and requirements and who learned to use ICTs via…)	**P-value**	**Result**
A course at an institution	0.764	No evidence to reject null hypothesis (0.764> 0.05)
1 to 1 tuition	0.705	No evidence to reject null hypothesis (0.705> 0.05)
Video tutorials	0.576	No evidence to reject null hypothesis (0.576> 0.05)
Group learning	0.859	No evidence to reject null hypothesis (0.859> 0.05)
Internet learning	0.746	No evidence to reject null hypothesis (0.746> 0.05)
Telephone learning	0.723	No evidence to reject null hypothesis (0.723> 0.05)
TV and Radio	0.564	No evidence to reject null hypothesis (0.564> 0.05)
Audio books	0.384	No evidence to reject null hypothesis (0.384> 0.05)
Instruction manuals	**0.031**	**Evidence to reject null hypothesis (0.031< 0.05)**
Self-teaching	**0.001**	**Strong evidence to reject null hypothesis (0.001< 0.05)**
Software features	0.19	No evidence to reject null hypothesis (0.19> 0.05)

Table 5.81: A table showing learning needs and requirements with respect to individual aspects of learning variables

Learning needs and requirements and virtual learning methods

Null Hypothesis (that there is no difference in older adults who consider themselves to have learning needs and requirements and who learned to use ICTs via…)	P-value	Result
Discussion boards	0.187	No evidence to reject null hypothesis (0.187> 0.05)
Chat rooms	0.598	No evidence to reject null hypothesis (0.598> 0.05)
Web based instructions	0.869	No evidence to reject null hypothesis (0.869> 0.05)
Social networks	0.664	No evidence to reject null hypothesis (0.664> 0.05)
Online help	0.85	No evidence to reject null hypothesis (0.85> 0.05)
Voice enabled chat rooms	0.102	No evidence to reject null hypothesis (0.102> 0.05)
Mobile technologies	0.703	No evidence to reject null hypothesis (0.703> 0.05)
Online manuals	0.977	No evidence to reject null hypothesis (0.977> 0.05)

Table 5.82: A table showing learning needs and requirements with respect to individual virtual learning variables

<u>Learning needs and requirements and aspects of virtual learning methods</u>

Null Hypothesis (that there is no difference in older adults who consider themselves to have learning needs and requirements and who consider virtual technologies to be or have…)	**P-value**	**Result**
Complicated	0.150	No evidence to reject null hypothesis (0.150> 0.05)
Lacking confidence	0.171	No evidence to reject null hypothesis (0.171> 0.05)
Limited awareness	0.657	No evidence to reject null hypothesis (0.657> 0.05)
Lacking interest	0.381	No evidence to reject null hypothesis (0.381> 0.05)
Content concerns	0.422	No evidence to reject null hypothesis (0.422> 0.05)
Security concerns	0.54	No evidence to reject null hypothesis (0.54> 0.05)
Not being sure where to start	**0.027**	**Evidence to reject null hypothesis (0.027< 0.05) Direction**
Limited access	**0.022**	**Evidence to reject null hypothesis (0.022<0.05)**

Table 5.83: A table showing learning needs and requirements with respect to aspects of virtual methods

There were a number of results produced from the tests that were considered significant. These were defined as having p values less than 0.05. Of those older adults who consider themselves to have learning needs and requirements and who learned to use ICTs via instruction manuals ($p=0.031$). This indicates that conceptually based instruction manuals (whether in hard copy or in virtual format) are important for those older adults who considered themselves to have learning needs and requirements when using ICTs. Similarly, self-teaching was also associated with those who considered themselves to have learning and support needs and requirements ($p=0.001$) which indicates that for such a group, dependent methods should be used to supplement independent learning. The issue of not being sure where to start ($p=0.027$) was also associated with those considering themselves to have learning and support needs and requirements, as well as having limited access to ICTs ($p=0.022$). It should be noted that this is not necessarily a cause and effect; just that one variable (learning and support needs and requirements) corresponds with another.

The next sub section provides the Kruskall-Wallis tests which compared any learning differences with the three age groups.

5.4 Establishing any differences in means to learn by the three age groups (Kruskall-Wallis test)

The Kruskall-Wallis is another non-parametric test. It is used to determine if there is a difference in the means of the data sets. The difference between this and the Mann-Whitney test is that it tests at least three groups (rather than the

Mann-Whitney test of groups). For example, it will determine whether each of the age groups (the 50 to 59, 60 to 69 and 70 and over age categories) have different means to learning via a particular method (e.g. a course at an institution) i.e. whether there is a significant enough difference between the groups. It therefore outputs any differences between learning preferences and all three age groups.

A null hypothesis, p value and the actual result have been tabulated in the same way as with the Mann-Whitney test.

Age groups and learning variables

Null Hypothesis	P-Value	Result
A course at an institution	0.501	No evidence to reject null hypothesis (0.501> 0.05)
1 to 1 tuition	0.936	No evidence to reject null hypothesis (0.936> 0.05)
Video tutorials	0.616	No evidence to reject null hypothesis (0.616> 0.05)
Instruction manuals	0.093	No evidence to reject null hypothesis (0.093> 0.05)
Group learning	0.145	No evidence to reject null hypothesis (0.145> 0.05)
Learning over the internet	0.704	No evidence to reject null hypothesis (0.704> 0.05)
Learning over the telephone	0.661	No evidence to reject null hypothesis (0.661> 0.05)
Learning via the TV and Radio	0.486	No evidence to reject null hypothesis (0.486> 0.05)
Audio books	0.654	No evidence to reject null hypothesis (0.654> 0.05)
Self-teaching	**0.05**	**Evidence to reject null hypothesis (0.05<=0.05)**
Software feature	**0.031**	**Evidence to reject null hypothesis (0.031<0.05)**

Table 5.84: A table showing age groups with respect to learning methods

<u>Age groups and virtual methods</u>

Null Hypothesis (that there is no difference between older adult age groups and learning via)	P-Value	Result
Discussion boards	0.637	No evidence to reject null hypothesis (0.637> 0.05)
Chat rooms	0.605	No evidence to reject null hypothesis (0.605> 0.05)
Web based instruction	0.632	No evidence to reject null hypothesis (0.632> 0.05)
Social networks	0.702	No evidence to reject null hypothesis (0.702> 0.05)
Online help	0.466	No evidence to reject null hypothesis (0.466> 0.05)
Voice chat rooms	0.280	No evidence to reject null hypothesis (0.280> 0.05)
Mobile technologies	0.561	No evidence to reject null hypothesis (0.561> 0.05)
Online manual	0.913	No evidence to reject null hypothesis (0.913> 0.05)

Table 5.85: A table showing age groups with respect to virtual methods

<u>Age groups and aspects of virtual methods</u>

Null Hypothesis (that there is no difference between older adult age groups and learning as or being…)	**P-Value**	**Result**
Complicated	0.541	No evidence to reject null hypothesis (0.541> 0.05)
Not being sure where to start	0.859	No evidence to reject null hypothesis (0.859> 0.05)
Limited access	0.243	No evidence to reject null hypothesis (0.243> 0.05)
Lacking confidence	0.827	No evidence to reject null hypothesis (0.827> 0.05)
Limited awareness	0.721	No evidence to reject null hypothesis (0.721> 0.05)
Lacking interest	0.605	No evidence to reject null hypothesis (0.605> 0.05)
Content concerns	0.083	No evidence to reject null hypothesis (0.083> 0.05)
Security concerns	0.700	No evidence to reject null hypothesis (0.700> 0.05)

Table 5.86: A table showing age groups with respect to aspects of virtual methods

There was a difference between older adults of differing age groups and learning via self-teaching ($p=0.05 < 0.05$) and via a software feature ($p=0.031 < 0.05$). The 50 to 59 age group found self-teaching to be relatively effective (33% to be very effective and 58% somewhat effective), and with the 60 to 69 age group (57% very effective and 43% somewhat effective). The over 70s found self-teaching to be much less effective (22% in each of the very effective, somewhat effective and not very effective categories) and 33% never used it. With learning via a software feature, this was on the whole not considered very effective, although differences were apparent with the three age groups. Learning by this method was most effective with the 50 to 59 age group (75% finding it somewhat effective), compared with the 60 to 69 and 70 and over age groups (38% and 22% finding it somewhat effective respectively). As the three age groups increased, those who never used such a method to learn also increased.

The next sub section considers a case summary of those who held reservations about aspects of learning virtually in terms of age groups.

5.5 A case summary representing reservations about aspects of virtual learning

The three age groups will firstly be compared to consider which group had the most reservations about **aspects of learning virtually**.

The total number of reservations for each age group has been accumulated as shown:

Agegroup	N	Mean
50 to 59	12	2.5000
60 to 69	8	2.3750
70 +	9	3.3333
Total	29	2.7241

Table 5.87: A case summary table showing age groups and number of reservations perceived ('N')

It counted all the 1's and 2's (which represented the strongly agree and agree categories) with each of the 8 perceptions of virtual learning (e.g. virtual learning being too complicated, not being sure where to start etc.) From this the over 70s had the most reservations compared with the other two age groups (with reference to the slightly higher mean value of 3.3). Interestingly the 60 to 69 age group had the least number of reservations (with an average of 2.3). The 50 to 59 group had a mean reservation value of 2.5 which was at the midway point of the other two groups.

Gendergroup	N	Mean
	1	1.0000
Female	20	2.9500
Male	8	3.6250
Total	29	3.0690

Table 5.88: A case summary table showing gender and reservations perceived

A higher proportion of males had reservations about aspects of virtual learning methods than females. The findings showed that male participants in the 50 to

59 age group had the most reservations about aspects of virtual learning methods than females in the same age group (50% compared to 35%). A higher proportion of females in the 70 + age group had reservations about learning virtually than males however (35% compared to 25%). With the middle age group (60 to 69 years) females had a slightly higher proportion of reservations about learning virtually than males (30% compared to 25%).

The gender of the participant	Agegroup	Number of reservations perceived
Male	50 to 59	4
	60 to 69	2
	70 +	2
	Total	8
Female	50 to 59	7
	60 to 69	6
	70 +	7
	Total	20
Total	50 to 59	11
	60 to 69	8
	70 +	9
	Total	28

Table 5.89: A case summary table showing both age group and gender in terms of reservations perceived

The next sub section describes the Non IT user's survey findings.

5.6 Non IT Users Survey Findings

This questionnaire was designed to find out why those who do not use ICTs do not use them, and what could be done to further their engagement with them. It comprised three separate topic areas: About non-use of ICTs, environmental and external factors that influenced non-use of ICTs and personal aims or aspirations that could be fulfilled via the use of ICTs. The following SPSS analyses were carried out

- Frequency comparisons between the variables within each topic area
- Age group comparisons with respect to the learning variables
- Gender comparisons with respect to the learning variables
- Mann Whitney test 1: Gender with respect to reasons for non-uptake, external and environmental factors, and personal aims and aspirations
- Mann Whitney test 2: Learning needs and requirements with respect to reasons for non-uptake, external and environmental factors and personal aims and aspirations
- Mann Whitney test 3: Age groups and reasons for non-uptake, personal aims and aspirations
- A case summary representing reservations for external and environmental factors that have influenced non-use of ICTs for the age group and gender groups

5.6.1 Frequency comparisons

<u>About non-use and reasons for non-uptake of ICTs</u>

The strongly agree and agree categories have been totalled to determine which issues were the most popular. The most universally agreed upon issue within the sample was that of **privacy (78.1%)** of the sample either agreed or strongly agreed that there were privacy issues with ICTs. This was followed by:

Security issues (72.9%)

ICTs being too complicated (67.1%)

Not being sure where to start (65.7%)

Lacking confidence when using ICTs (59.4%)

Unsuitable material (56.7%)

No access to ICTs (51.3%)

Not being sure of the benefits that ICTs could bring (45.9%)

Not having any use for ICTs (41.2%)

As a result, privacy, security, complexity and not being sure where to start were the top four issues attributed to non-use. On the other hand, the bottom four (not having any use for ICTs, not being aware of the benefits, no access to ICTs and unsuitable material) were not, relatively, considered to be issues, whereas there were mixed feelings about "lacking confidence". This is illustrated via the tables. See these in Appendices (section 1.1) for further details.

The security issues, complexities and not being sure where to start may be attributed to pre conceived notions that the older adult has about the learning experience and ICTs. With Trentin's (2004) study on ATM usage, there are safety issues associated with them, as well as older adults not having a requirement to use one. The study also found that there was insufficient knowledge on the utilisation of ATMs. Any material delivered should not contain too much non sense jargon and inadequate support.

External and environmental influences

The strongly agree and agree categories have been totalled to determine which external and environmental factors were considered important issues.

The most universally agreed upon issue within the sample was that of **the cost of equipment** (**72.7%**). This was followed by:

Course cost (64.7%)

No awareness of the training available (54.6%)

No access to ICTs (51.5%)

Not being sure what the benefits of ICTs would bring (48.5%)

No one to help with ICTs (45.5%)

Limited transport to computer stores (42.4%)

Limited internet access due to location (24.2%)

From this, the issues held in relatively high regard were the cost of the equipment, no awareness of the training available, no access to ICTs, cost of the course, insufficient internet access due to the geographical location, not being sure of the benefits and no one to help with ICTs. On the other hand not having sufficient internet access due to the geographical location was not considered that important. The tables in Appendices (section 1.2) can be referred to for details.

It was found in Findsen's (2003) study that the government was pivotal in providing formal education to cater for older adult's learning needs and requirements. The intervention is therefore necessary to broadcast and make such opportunities available and known. Further, the engagement with government bodies by older adults was considered popular (Trentin 2004).

<u>Personal aims and aspirations</u>

The variables have been ranked according to the level of “interest”.

ICTs can be used to communicate with others (39.4%)

The computer can help with a job (27.3%)

Making travel bookings (27.3%)

Internet shopping (21.2%)

Checking news and weather (21.2%)

Online banking (18.2%)

As such, communication was the most highly rated personal aim and aspiration. The least was using ICTs for online banking. The tables in Appendices (section 1.3) can be referred to for further details.

The study by SeniorNet (2012) found that older adults were mainly interested in ICTs for communication purposes. This was again reiterated in Mederios (2008) study which again found 'younger' older adults using ICTs for communication purposes. However, Trentin's (2004) study found some disorientation and uncertainty about communication via the internet. Further, Trentin’s (2004) study found that checking for news updates, engaging with local authorities such as councils, government bodies, associations e.g. sports and voluntary groups and financial reasons were key motivators.

The next sub section considers age group in relation to the individual variables.

5.6.2 Age group comparisons with respect to the variables

The age groups have been categorised into two main groups:

- 60 to 69 (the 1st group)
- 70 + (the 2nd group)

Each group has been compared with one another in terms of the learning variables and whether each learning method was effective or not e.g. it may be that one age group had a particular preference for learning than the other. The over 50s age group is very diverse, although there were no respondents in the 50 to 59 age category.

The following assumptions and rationalisation has been made: Sample proportions are to be considered. The "never used it" variable is going to be considered as a separate entity, and will be independent from the three variables: "very effective", "somewhat effective" and "did not find it effective" who used this learning method.

The percentages are based upon the sample responses e.g. the strongly agree and agree categories are totalled, which are then divided by the total percentage within each age group e.g. 3.3 + 10 = 13.3 / 26.7 = 49.8% for the 60 to 69 age group (strongly agree and agree).

<u>Non use and reasons for non-uptake of ICTs</u>

The variables for the two age groups were ranked in terms of strongly agree and agree. The ranked variables were used for quantitatively comparing the reservations for each variable. For the 60 to 69 age group the reasons for non-uptake in ascending order regarding the combination of the strongly agree and agree categories:

1) **ICTs being too complicated to use (75%)**
2) **Lacking confidence when using ICTs (63%)**
3) **Security issues (50%)**

4) **Not being sure where to start (50%)**
5) **Not having any use for ICTs (50%)**
6) **The material as unsuitable (48%)**
7) **Not being sure of the benefits – nil**

For the 70 and over age group the reasons for the non-uptake category in terms of the combination of the strongly agree and agree categories:

1) **Security issues (90%)**
2) **Not being sure where to start (68%)**
3) **The material as unsuitable (64%)**
4) **ICTs being too complicated to use (64%)**
5) **Not being sure of the benefits (59%)**
6) **Lacking confidence when using ICTs (54%)**
7) **Not having any use for ICTs (48%)**

The tables containing the statistics from the above are located in section 1.4 of the Appendices.

<u>External and environmental factors</u>

For the 60 to 69 age group the reasons (in ascending order) for environmental and external category in terms of the combination of the strongly agree and agree categories:

1) **The cost of equipment is expensive (87%)**
2) **The cost of the course is expensive (62%)**
3) **That there is no awareness of the training available (50%)**
4) **That there is no access to ICTs (50%)**
5) **That there is limited internet access in the location (25%)**
6) **That there is limited transport access to computer stores (24%)**

For the 70 and over age group the variables (in ascending order) for environmental and external category in terms of the combination of the strongly agree and agree categories:

1) **That there is no access to ICTs (90%)**
2) **The cost of equipment is expensive (73%)**
3) **The cost of the course is expensive (62%)**
4) **There is no awareness of the training available (59%)**
5) **There is limited transport access to computer stores (57%)**
6) **There is limited internet access on the location (28%)**

The tabulation of the statistics justifying the above are located in the section 1.5 of the Appendices.

Personal aims and aspirations

For the 60 to 69 age group the reasons (in ascending order) for the personal aims and aspirations category in terms of the interested category:

1) **That the computer can help with a job (86%)**
2) **That ICTs can be used for communicating with others (75%)**
3) **The news and weather can be checked online (57%)**
4) **That travel bookings can be made (57%)**
5) **That online banking can be carried out (57%)**
6) **That internet shopping can be done (37%)**

For the 70 and over age group the reasons (in ascending order) for the personal aims and aspirations category in terms of the combination of the strongly agree and agree categories:

1) **ICTs can be used for communication with others (33%)**
2) **That the news and weather can be checked (25%)**
3) **That internet shopping can be done (25%)**
4) **That the computer can help with a job (25%)**
5) **That travel bookings can be made (19%)**

6) That online banking can be carried out (14%)

The tables containing the statistics from the above are located in Section 1.6 of the Appendices.

5.6.3 Gender comparisons with respect to the Non IT users variables

Reasons for non-uptake of ICTs

The percentage proportion of variables that females strongly agreed or agreed with in ascending order:

1) **Security issues (80%)**
    1) **Privacy issues (80%)**

    3) Too complicated (76%)

    4) Not sure where to start (66%)

    5) Unsuitable material (62%)

    6) Lacking confidence (59%)

    7) Not having any use for ICTs (55%)

    8) Not being sure of the benefits ICTs can bring (45%)

The percentage proportion of variables that males strongly agreed or agreed with in ascending order:

1) **Privacy issues (90%)**
2) **Security issues (78%)**
3) **Not being sure where to start (60%)**
4) **Lacking confidence (55%)**
5) **Too complicated (50%)**
6) **Not being sure of the benefits ICTs can bring (45%)**
7) **Unsuitable material (40%)**
8) **Not having any use for ICTs (30%)**

The tables containing the statistics from the above are located in section 1.7 of the Appendices.

External and environmental factors

In ascending order, the percentage of females that stated they either strongly agreed or agreed with certain factors is as follows:

1) **Cost of equipment (81%)**
2) **Not sure of the benefits (79%)**
3) **Cost of the course is expensive (65%)**
4) **No awareness of training opportunities (57%)**
5) **No access to ICTs (55%)**
6) **Limited transport access to computer stores (52%)**
7) **No one to help with ICTs (50%)**
8) **Limited internet access in the location (35%)**

In ascending order, the percentage proportion of males who were inclined to strongly agree and agree with certain factors was as follows:

1) **Cost of equipment is expensive (70%)**
2) **Cost of course is expensive (60%)**
   2) No awareness of training available (60%)
   2) No access to ICTs (60%)

5) No one to help with ICTs (55%)

6) Not being sure of the lifestyle benefits (55%)

7) Limited transport access to computer stores (33%)

8) Limited internet access in the location (9.8%)

The tables containing the statistics from the above are located in section 1.8 of the Appendices.

Personal aims and aspirations

In ascending order, the percentage proportion of **females** who were "interested" with certain variable factors was as follows:

1) **Using ICTs for communication purposes: (43%)**
2) **Using ICTs to help get a job: (28%)**
3) **Using ICTs to check news and weather: (26%)**
4) **Using ICTs to make travel bookings: (26 %)**
5) **Using ICTs to carry out online shopping: (25%)**
6) **Using ICTs for online banking: (20%)**

In ascending order, the percentage proportion of **males** who were "interested" with certain variable factors was as follows:

1) **Using ICTs to help get a job: (50%)**
2) **Using ICTs for communication purposes: (45%)**
3) **Using ICTs to make travel bookings: (39%)**
4) **Using ICTs to carry out online shopping: (20%)**
5) **Using ICTs for online banking: (20%)**
6) **Using ICTs to check news and weather: (20%)**

The tables containing the statistics from the above are located in section 1.9 of the Appendices. The next sub section details the Mann-Whitney tests carried out with the age and gender groups.

5.7 Mann-Whitney test between the groups (the age and gender) and learning needs and requirements

This test has been used with two data sets (which are independent from one another). This method works with ordinal data, and as such variables which are ordinal have been used for comparisons. It tests the differences between the distributions of data and their median values (e.g. whether there is a significant enough difference).

Rather than describing evidence that may cause an effect this is a test to determine whether or not the null hypothesis (which states that no relationship exists between two sets of data) is rejected. If it is rejected then there is evidence to suggest a relationship exists between the two data sets. If the p value is less than an assumed and specified value (also known as the probability level) of 0.05 then there is sufficient evidence to reject the null hypothesis. Three different Mann-Whitney tests have been carried out: the gender, learning needs and requirements and the two age groups. There were just two age groups as no Non-IT user respondents were aged between 50 and 59. For each of the three themes (non-use of ICTs, external and environmental factors and personal aims and aspirations), those with evidence to reject the null hypothesis e.g. less than 0.05 have been described.

The next sub section presents the Mann-Whitney test with the gender.

5.7.1 Gender comparisons with respect to individual variables

<u>About non-use of ICTs</u>

The variable "not having any use for ICTs" was the "closest" to being rejected (0.070 > 0.05). In other words, there was close to a difference in the propensity of both males and females of not having any use for ICTs. This has been represented in the table:

	Not being sure where to start	Not having any use for ICTs	ICTs being too complicated to use	Lacking confidene when using ICTs	Not sure of the benefits ICTs can bring	That material may be unsuitable	That there are security issues	That there are privacy issues
Mann-Whitney U	129.000	90.000	110.000	156.000	180.000	123.500	126.500	124.500
Wilcoxon W	360.000	300.000	341.000	409.000	413.000	354.500	336.500	229.500
Z	-0.631	-1.809	-1.300	-0.289	-0.159	-0.819	-0.141	-0.590
Asymp.Sig. (2-tailed)	0.528	0.070	0.194	0.773	0.874	0.413	0.888	0.555
Exact Sig .[2*(1-tailed Sig.)]	0.561	0.083	0.222	0.795	0.891	0.434	0.899	0.592

Table 5.90: A table showing Mann-Whitney outputs (ASymp. Sig. (2-tailed)) for the gender with respect to the non-use and uptake of ICTs variables

External and environmental factors

There is a difference in the propensity of both males and females in having limited access to transport to access computer stores (0.039 < 0.05)

	That there is no access to ICTs	That the cost of equipment is expensive	That the cost of the course is expensive	That there is no awareness in the training available	That there is limited internet access in the location	That there is limited transport access to computer stores	That there is no one to help with ICTs	That ICTs would not bring benefits to the lifestyle
Mann-Whitney U	116.500	140.000	126.000	146.500	140.000	80.000	121.500	115.500
Wilcoxon W	326.500	371.000	231.000	377.500	350.000	311.000	212.500	325.500
Z	-0.846	-0.253	-0.515	-0.018	0.000	-2.060	-0.326	-0.547
Asymp.Sig. (2-tailed)	0.398	0.801	0.607	0.986	1.000	0.039	0.745	0.585
Exact Sig .[2*(1-tailed Sig.)]	0.416	0.829	0.641	0.987	1.000	0.046	0.758	0.598

Table 5.91: A table showing Mann-Whitney outputs for the gender with respect to external and environmental variables

Personal aims or aspirations

There is no difference in the propensity of both males and females in each of the aims and aspirations variables

	That ICTs can be used for communication with others	That the computer can help with a job	That internet shopping could be done	That the news and weather could be checked	That online banking could be carried out	That travel bookings could be made
Mann-Whitney U	112.500	89.000	138.500	99.000	125.000	101.500
Wilcoxon W	203.500	167.000	243.500	204.000	230.000	206.500
Z	-0.924	-0.948	-0.064	-1.1332	-0.620	-1.259
Asymp.Sig. (2-tailed)	0.355	0.343	0.949	0.183	0.536	0.208
Exact Sig .[2*(1-tailed Sig.)]	0.400	0.439	0.959	0.226	0.616	0.255

Table 5.92: A table illustrating the Mann-Whitney outputs for the gender with respect to the personal aims and aspirations variables

For completion purposes the p values compared the gender with respect to the appropriate variables has been provided.

Non-use of ICTs

Null Hypothesis (No difference between males and females in…)	P-value	Result
Not being sure where to start	0.528	No evidence to reject Null (0.528 > 0.05)
Not having any use for ICTs	0.070	No evidence to reject null hypothesis (0.070 > 0.05)
ICTs being too complicated	0.194	No evidence to reject null hypothesis (0.194 > 0.05)
Lacking confidence	0.773	No evidence to reject null hypothesis (0.773 > 0.05)
Not being sure of the benefits	0.874	No evidence to reject null hypothesis (0.874 > 0.05)
Unsuitable material	0.413	No evidence to reject null hypothesis (0.413 > 0.05)
Security issues	0.888	No evidence to reject null hypothesis (0.888 > 0.05)
Privacy issues	0.555	No evidence to reject null hypothesis (0.555 > 0.05)

Table 5.93: A table containing p values, their respective variables and results for the Mann-Whitney test of gender and non-use of ICTs

External and environmental factors

Null Hypothesis (No difference between males and females in…)	P-value	Result
No access	0.398	No evidence to reject null hypothesis (0.398 > 0.05)
Expensive equipment	0.801	No evidence to reject null hypothesis (0.801 > 0.05)
Course cost	0.607	No evidence to reject null hypothesis (0.607 > 0.05)
No awareness of training	0.986	No evidence to reject null hypothesis (0.986 > 0.05)
Limited internet access	1.000	No evidence to reject null hypothesis (1.000 > 0.05)
Limited transport to computer stores	0.039	Evidence to reject null hypothesis (0.039 < 0.05)
No one to help with ICTs	0.745	No evidence to reject null hypothesis (0.745 > 0.05)
No lifestyle benefits	0.585	No evidence to reject null hypothesis (0.585 > 0.05)

Table 5.94: A table containing p values, their respective variables and results for the Mann-Whitney test of gender and environmental and external factors

Personal aims or aspirations

Null Hypothesis (No difference between males and females in…)	P-value	Result
Used for communication	0.355	No evidence to reject null hypothesis (0.355 > 0.05)
Help with a job	0.343	No evidence to reject null hypothesis (0.343 > 0.05)
Internet shopping	0.949	No evidence to reject null hypothesis (0.949 > 0.05)
Checking news and weather	0.183	No evidence to reject null hypothesis (0.183 > 0.05)
Online banking	0.536	No evidence to reject null hypothesis (0.536 > 0.05)
Travel bookings	0.208	No evidence to reject null hypothesis (0.208 > 0.05)

Table 5.95: A table containing p values, their respective variables and results for the Mann-Whitney test of gender and environmental and personal aims and aspirations

The next sub section provides the learning needs and requirements with respect to the individual variables.

5.7.2 Learning needs and requirements with respect to individual variables

Non-use of ICTs

There is a difference in the propensity of learning needs and requirements between males and females in the material being unsuitable.

	Not being sure where to start	Not having any use for ICTs	ICTs being too complicated to use	Lacking confidene when using ICTs	Not sure of the benefits ICTs can bring	That material may be unsuitable	That there are security issues	That there are privacy issues
Mann-Whitney U	86.000	110.500	111.000	106.000	100.500	63.500	88.500	104.500
Wilcoxon W	164.000	188.500	321.000	184.000	178.500	141.500	154.500	182.500
Z	-1.377	-0.383	-0.385	-0.567	-0.779	-2.120	-0.742	-0.417
Asymp.Sig. (2-tailed)	0.169	0.701	0.715	0.571	0.436	0.034	0.458	0.677
Exact Sig .[2*(1-tailed Sig.)]	0.195	0.716	0.744	0.604	0.454	0.039	0.497	0.704

Table 5.96: A table showing the Mann-Whitney outputs for learning needs and requirements with respect to the personal aims and aspirations variables

External and environmental factors

There is no difference in the propensity of both males and females in the learning needs and requirements with external and environmental factors, apart from that there is "no one to help with ICTs" variable (0.022 < 0.05)

	That there is no access to ICTs	That the cost of equipment is expensive	That the cost of the course is expensive	That there is no awarene ss in the training available	That there is limited internet access in the location	That there is limited transport access to computer stores	That there is no one to help with ICTs	That ICTs would not bring benefits to the lifestyle
Mann-Whitney U	103.000	111.000	76.500	104.500	105.000	107.000	56.500	72.000
Wilcoxon W	181.000	189.000	154.500	182.500	183.000	317.000	122.500	138.000
Z	-0.680	-0.375	-1.595	-0.638	-0.609	-0.127	-2.282	-1.428
Asymp.Sig. (2-tailed)	0.496	0.708	0.111	0.523	0.543	0.899	0.022	0.153
Exact Sig .[2*(1-tailed Sig.)]	0.526	0.744	0.130	0.552	0.578	0.919	0.250	0.171

Table 5.97: A table showing the Mann-Whitney outputs for learning needs and requirements with respect to external and environmental factors variables

Personal aims and aspirations

There is no difference in the propensity of both males and females in the propensity of learning needs and requirements with personal aims and aspirations, apart from when the "computer being used to help find a job" variable (0.012 < 0.05).

	That ICTs can be used for communication with others	That the computer can help with a job	That internet shopping could be done	That the news and weather could be checked	That online banking could be carried out	That travel bookings could be made
Mann-Whitney U	96.000	48.500	112.000	102.500	115.500	112.000
Wilcoxon W	306.000	201.500	322.000	180.500	193.500	190.000
Z	-0.631	-2.509	-0.381	-0.5010	-0.208	-0.089
Asymp.Sig. (2-tailed)	0.528	0.012	0.703	0.616	0.835	0.929
Exact Sig .[2*(1-tailed Sig.)]	0.583	0.033	0.774	0.646	0.863	0.952

Table 5.98: A table showing the Mann-Whitney outputs for learning needs and requirements with respect to the personal aims and aspirations variables.

For completion purposes the p values have been provided.

Null Hypothesis (No difference between learning needs and…)	**P-value**	**Result**
Not being sure where to start	0.169	No evidence to reject Null Hypothesis (0.169 > 0.05)
Not having any use for ICTs	0.701	No evidence to reject Null Hypothesis (0.701 > 0.05)
ICTs being too complicated	0.715	No evidence to reject Null Hypothesis (0.715 > 0.05)
Lacking confidence	0.571	No evidence to reject Null Hypothesis (0.571 > 0.05)
Not being sure of the benefits	0.436	No evidence to reject Null Hypothesis (0.436 > 0.05)
Unsuitable material	**0.034**	**Evidence to reject Null Hypothesis (0.034 < 0.05)**
Security issues	0.458	No evidence to reject Null Hypothesis (0.458 > 0.05)
Privacy issues	0.677	No evidence to reject Null Hypothesis (0.677 > 0.05)

Table 5.99: A table containing p values, their respective variables and results for the Mann-Whitney test of learning needs and requirements and non-use of ICTs

Null Hypothesis (No difference between learning needs and…)	**P-value**	**Result**
No access	0.496	No evidence to reject null hypothesis (0.496 > 0.05)
Expensive equipment	0.708	No evidence to reject null hypothesis (0.708 > 0.05)
Course cost	0.111	No evidence to reject null hypothesis (0.111> 0.05)
No awareness of training	0.523	No evidence to reject null hypothesis (0.523 > 0.05)
Limited internet access	0.543	No evidence to reject null hypothesis (0.543 > 0.05)
Limited transport to computer stores	0.899	Evidence to reject null hypothesis (0.899 < 0.05)
No one to help with ICTs	**0.022**	**Evidence to reject null hypothesis (0.022 < 0.05)**
No lifestyle benefits	0.153	No evidence to reject null hypothesis (0.153 > 0.05)

Table 5.100: A table containing p values, their respective variables and results for the Mann-Whitney test of learning needs and requirements and external and environmental factors

Null Hypothesis (No difference between learning needs and…)	**P-value**	**Result**
Used for communication	0.528	No evidence to reject null hypothesis (0.528 > 0.05)
Help with a job	**0.012**	**Evidence to reject null hypothesis (0.012 < 0.05)**
Internet shopping	0.703	No evidence to reject null hypothesis (0.703> 0.05)
Checking news and weather	0.616	No evidence to reject null hypothesis (0.616 > 0.05)
Online banking	0.835	No evidence to reject null hypothesis (0.835> 0.05)
Travel bookings	0.929	No evidence to reject null hypothesis (0.929> 0.05)

Table 5.101: A table containing p values, their respective variables and results for the Mann-Whitney test of learning needs and requirements and personal aims and aspirations

The next sub section considers age group disparities with respect to the individual age groups.

5.7.3 Age group disparities with respect to individual variables

External and environmental factors

There is a difference in the propensity between the two age groups who have limited transport access to computer stores and also that ICTs would not bring benefits to the lifestyle.

	That there is no access to ICTs	That the cost of equipment is expensive	That the cost of the course is expensive	That there is no awareness in the training available	That there is limited internet access in the location	That there is limited transport access to computer stores	That there is no one to help with ICTs	That ICTs would not bring benefits to the lifestyle
Mann-Whitney U	53.000	80.000	80.000	74.000	74.000	43.000	65.000	13.000
Wilcoxon W	284.000	116.000	311.000	327.000	305.000	274.000	275.000	244.000
Z	-1.565	-0.402	-0.205	-0.684	-0.504	-2.063	-0.788	-3.294
Asymp.Sig. (2-tailed)	0.118	0.687	0.838	0.494	0.614	0.039	0.430	0.001
Exact Sig .[2*(1-tailed Sig.)]	0.139	0.730	0.867	0.534	0.649	0.047	0.469	0.001

Table 5.102: A table showing age group disparities in relation to external and environmental factors

Null Hypothesis (No difference between age groups and…)	**P-value**	**Result**
No access	0.118	No evidence to reject null hypothesis (0.118 > 0.05)
Expensive equipment	0.687	No evidence to reject null hypothesis (0.687 > 0.05)
Course cost	0.838	No evidence to reject null hypothesis (0.838> 0.05)
No awareness of training	0.494	No evidence to reject null hypothesis (0.494 > 0.05)
Limited internet access	0.614	No evidence to reject null hypothesis (0.614 > 0.05)
Limited transport to computer stores	**0.039**	**Evidence to reject null hypothesis (0.039 < 0.05)**
No one to help with ICTs	0.430	Evidence to reject null hypothesis (0.430 < 0.05)
No lifestyle benefits	**0.001**	**No evidence to reject null hypothesis (0.001 < 0.05)**

Table 5.103: A table to show the p values of age group disparities in relation to external and environmental factors

Personal aims and aspirations

There is a difference in the propensity between the two age groups in that the computer can help with a job (0.0012 < 0.05) and that travel bookings can be made (0.040 < 0.05). There may be some evidence to suggest that there is a difference in the propensity between the two age groups in that the news and weather can be checked (0.053 > 0.05).

	That ICTs can be used for communication with others	That the computer can help with a job	That internet shopping could be done	That the news and weather could be checked	That online banking could be carried out	That travel bookings could be made
Mann-Whitney U	53.000	12.500	71.000	40.500	60.500	40.000
Wilcoxon W	89.000	40.500	107.000	68.500	96.500	68.000
Z	-1.653	-3.464	-0.814	-1.9310	-1.408	-2.049
Asymp.Sig. (2-tailed)	0.098	0.001	0.415	0.053	0.159	0.040
Exact Sig .[2*(1-tailed Sig.)]	0.139	0.001	0.549	0.080	0.257	0.080

Table 5.104: A table showing age group disparities in relation to the personal aims and aspirations variables

With the non-use of ICTs factors, all Mann-Whitney tests were above the 0.05 threshold. Therefore, there was no evidence to reject the null hypotheses of there being age group differences with respect to these variables.

The tables for age group disparities with regards to individual learning variables have been tabulated as follows:

Null Hypothesis (No difference between age groups and…)	P-value	Result
Used for communication	0.098	No evidence to reject null hypothesis (0.098> 0.05)
Help with a job	**0.001**	**Evidence to reject null hypothesis (0.001 < 0.05)**
Internet shopping	0.415	No evidence to reject null hypothesis (0.415> 0.05)
Checking news and weather	**0.05**	**Evidence to reject null hypothesis (0.05 < 0.05)**
Online banking	0.169	No evidence to reject null hypothesis (0.169> 0.05)
Travel bookings	**0.04**	**Evidence to reject null hypothesis (0.04 < 0.05)**

Table 5.105: A table containing p values, their respective variables and results for the Mann-Whitney test of age group and personal aims and aspirations

With the non-use of ICTs' factors, all Mann-Whitney tests were above the 0.05 threshold ($p > 0.05$). Therefore, there was no evidence to reject the null hypothesis of there being age group differences with respect to these variables.

The next sub section provides the secondary analysis for the learning questions within the 'digital engagement' themed questionnaire.

5.8 'Digital Engagement' themed learning questions

The following questions from the 'Digital Engagement' questionnaire obtained data and information on:

- Whether older adults used formal learning as a way to learn how to use ICTs and the details of this formal training (Question 10)
- How older adults learned to use a particular technology or technologies (Question 11)
- How older adults would prefer to learn to use a particular technology or technologies (Question 12)
- How older adults resolved a problem and sought help when encountering a difficulty with a technology or technologies (Question 13)

The analysis was carried out on 128 learning responses. The findings and analyses have been tabulated in tables 5.106, 5.107 and 5.108:

Question number and descriptor	**Descriptor summarising the percentage proportions**
10) Any formal training (e.g. a course) to learn to use ICTs or aspects of ICTs (e.g. the internet).	Just over half of respondents used formal training as a way of learning how to use ICTs compared to “informal” training
11) Details of formal training	The computer course training ran and delivered by Age Concern was the most popular. This was followed by a traditional taught course at an educational institution, training offered at the library and an internet course
a) On own	Just over half the participants learned to use at least one digital technology on their own
b) personal teacher or trainer	Over double of respondents did not have a personal teacher or trainer to teach them to use ICTs
bi) Location of instruction from personal teacher or trainer	The location of being instructed or trained occurred mainly at the Age Concern venues. However, it is biased as the respondents were affiliated with Age Concern as part of the learning and support Other locations and ways of learning included via a mobile coach, at work, at college, via a friend, via the national trust and courses provided by employers
c) personal teacher or trainer	Just over half of participants had learned to use ICTs in an informal environment. This may be with colleagues, friends, tutors or a combination of all (e.g. for the facilitator to facilitate a collaborative learning process with others)
d) Real formal “face to face” situations	Approximately three times as many participants did not learn how to use ICTs in a “face to face” situation
e) With other people in learning situations via the internet	There were a limited number of older adults (about $1/10^{th}$) who had learned with other people over the internet.
f) Other	About $1/5^{th}$ of respondents had another way of learning.

Table 5.106: A table providing a summary of descriptors for questions 9 and 10 from the ‘digital engagement’ themed questionnaire

Question number and descriptor	Descriptor summarising the percentage proportions
12 a) Learning independently	Approximately three times as many respondents preferred not being on their own when learning how to use ICTs
b) Instructed by a personal trainer	The number of responses of 'not preferring' to have a personal teacher was double that of those who preferred to have one.
bi) Location of being instructed by a personal trainer	At home was the most popular location to receive instruction and tuition
c) Instructed via software (e.g. CD Rom or internet)	About 1/5th of responses showed that they preferred to use software to learn
d) Learning together with friends and family in "real face to face" situations	About 1/2 of respondents preferred to learn in this way
e) A course at an institution	About half of respondents would prefer to learn by a course at an institution
f) Learning with a moderated course on the web	About 1/5th of respondents prefer to learn with a moderated course on the web
g) Learning together with friends in "virtual situations" such as on the web	About 1/10th prefer to learn with friends virtually e.g. with a computer
h) Other	About 1/10th of respondents chose "other" as a preferred way to learn

Table 5.107: A table providing a summary of descriptors for question 12 from the 'digital engagement' themed questionnaire

Question number and descriptor	Descriptor summarising the percentage proportions
13) When getting stuck using a technology, what methods are used to overcome difficulties	
a) Spouse of partner	About 1/5th of respondents ask their spouse or partner for help when having difficulty with software or technology
b) and c) Children and Grandchildren	About ½ of respondents indicated that they would like to be trained by both children and grandchildren
d) Learning with friends	Just under ½ of respondents would prefer to learn with friends
e) Learning with neighbours	About 1/5th of respondents would prefer to learn how to use ICTs with neighbours
f) Reading a manual and guide	A ¼ of respondents prefer to use a manual or guide when learning how to use ICTs
g) Learning with a training video or animated tutorial	Approximately 1/10th of respondents prefer learning using an audio and video training tutorial
h) Online help	About 1/5th of respondents would like to learn how to use ICTs online
i) Technical support (telephone or online)	Approximately 1/3rd of respondents prefer to use this as a method of learning how to use ICTs
j) Technical support (telephone or online)	A total of 109 participants (out of 128) would give up using ICTs if they required help or had difficulty in learning to use it
k) Other	Just under 1/10th of respondents chose "other" as a method of resolving a difficulty when learning how to use ICTs

Table 5.108: A table providing a summary of descriptors for question 13 from the 'digital engagement' themed questionnaire

The second part of the secondary analysis contained 122 responses on the following:

- How older adults learn to use ICTs (Q 11)
- The methods that the older adults would prefer to use when learning how to use ICTs (Q 12)

The ‘resolving difficulties’ question was omitted due to a no response rate, as indicated in the previous table.

Question number and descriptor	**Descriptor summarising the percentage proportions**
11) How older adults learned to used ICTs	
a) Using a personal teacher to learn how to use ICTs	Just under half (47%) of respondents have used a personal teacher to teach them how to use ICTs
b) Details of using a personal teacher in the learning of ICTs	Having a personal teacher at home, in the library and at Age Concern courses were the most prevalent. With others (e.g. collaborative learning) and learning via a course were the next most popular methods
c) Learning in informal situations	30% of respondents prefer to learn in informal situations which suggest that informal learning should still be of considerable importance. However, 70% still prefer a formal approach to their learning. This suggests a mixed perspective regarding this.
d) Formal face to face learning	Interestingly 21% of participants would not prefer learning in a formal face to face situation
e) Learning via the internet	11% of participants would prefer to learn via the internet
f) Other	Just 3% selected 'Other' as other methods to learn how to use ICTs with

Table 5.109: A table providing a summary of descriptors for question 11 from the 'digital engagement' themed questionnaire

Question number and descriptor	Descriptor summarising the percentage proportions
12) When getting stuck using a technology, what methods are used to overcome difficulties	
a) Preferring to learn independently and on own	Interestingly just 3% of respondents indicated that they would prefer to learn how to use ICTs on their own
b) Preferring to learn with a personal teacher	22% of research participants favoured using a personal teacher to help them in their learning
c) Preferring to learn with a moderated course on the web	5% of participants would prefer to learn via a moderated course on the web
d) Preferring to learn via software (e.g. applications)	Interestingly, no participants indicated that they would prefer to learn via a software or application platform
e) Preferring to learn via Face to Face situations	23% of older adult respondents would prefer to learn to use technology via face to face situations
f) Course at an institution	13% of respondents would prefer to learn via a course at an institution

Table 5.110: A table providing a summary of descriptors for question 12 from the 'digital engagement' themed questionnaire

The next sub section provides the conclusions to the chapter.

5.9 Conclusions

As mentioned in the methodology section, both IT and Non IT users surveys were designed and produced due to the limiting scale and options within the secondary source 'digital engagement' themed questionnaire, as well as explore emerging themes. The data from both IT and Non IT surveys have been used to inform other data collection methods. It is however suggested that further research is carried out which contains a larger population sample size which may help ascertain or reinforce any differences. This is particularly with regards to the IT and Non IT users surveys. Such surveys also provide another dimension: the relationship between key primary variables (e.g. age groups) with respect to learning variables. The next chapter synthesises and combines both the quantitative and qualitative data findings and analyses in relation to the objectives of the research. It is appropriate to provide summaries from the quantitative results, starting by providing understandings of what the results from the non-parametric tests and subsequent cross tabulations mean. It then explores the meaning of the finding with the secondary source 'digital engagement' themed questionnaire learning responses. It also details findings of significance such as those factors associated with various age groups, and ones in particular considered issues. Those of particular significance will be summarised in the following sub section.

5.9.1 Non parametric testing summaries with regards to gender

The variable 'limited transport access to computer stores was of significance (0.039 < 0.05). It was found that there was a gender difference of those considering themselves to have transport links to computer stores. A slightly higher portion of females had limited access to computer stores compared with males. This may indicate that older adult males and females might be situated in geographical locations that are of an unpractical distance to computer stores. There may also be insufficient access travel points e.g. bus stops to locations in which computer stores are present. It should be noted that being in the presence of technologies in a computer store and examining them in person is of considerable importance in deciding on a purchase, rather than via a virtual medium. A user-friendly, simplified medium designed specifically for the purchase of technologies online would be beneficial to the older adult population.

Further, a higher proportion of the over 70s were not aware of the benefits ICTs could bring, which indicate an age group disparity. A higher proportion of the 60 to 69 age group found ICTs helping with a job to be important, as well as travel bookings than the 70 and over age group. With the news and weather a higher portion of the 60 to 69 age group found this to be a key motivator of using ICTs. Those variables considered significant (e.g. having a probability value less than 0.05) included the material being unsuitable (0.034 < 0.05). This indicated that what was suitable for one gender may be unsuitable for another. In other words, what males consider suitable material may be unsuitable for females. Such a factor is also a key deterrent from furthering engagement with ICTs. This could be attributed to a lack of material friendly applications, as well as filtering systems providing ‘clean’ content. This could be pre-installed within the digital technologies aimed at the older adult generation. A slightly higher proportion of females found no one being available to help with ICTs (0.022 < 0.05). A lack of technology community centres and older adult organisations in close proximity could contribute to such unavailability. In addition, adequate, simplified, user friendly support should be provided in the form of documentation for all digital technologies in a condensed yet coherent format. The conceptually based documentation should not be omitted as is the case with the Apple iPad product. It was found a slightly higher proportion of males found that the computer helped them with a job, compared to females (0.012 < 0.05). Job related applications are rare and a key motivator would be to include job applications within technology devices to provide information and facilities.

Support should consider the preferences of the older adult female population. In addition, adequate, simplified, user friendly support should be provided in the form of documentation for all digital technologies. The conceptually based documentation should not be omitted as is the case with the Apple iPad product which assumes most, if not all users can learn and utilise it easily.

5.9.2 'Digital engagement' themed learning responses summaries

Mixed perspectives were held with regards to informal and formal training. This indicates a combination of the two is required. An example is illustrated by courses hosted by organisations affiliated with the older adult learners. It consists of structured course facilitation from a tutor who is known to them. Such courses may not have the same social stigma as schools, colleges and educational institutions. Other support may be required to complement an independent and self-taught approach to learning. It should be flexible and optional (e.g. whether the older adult learner chooses it). Rapport, trust and friendship are important between teacher and learner. It is also important to minimise the barrier between the two, and create a comfortable working environment in which collaboration is necessary. The environment should be supportive, structured with dialogue. Conceptual based learning materials should be provided to the learner and used as an option to complement the learning. Informal learning is necessary, and face to face learning and discussions may be preferred. The results indicate that virtual learning in general needs improving, and is not as effective as discussions. Such internet learning is considered too complex and simplified interfaces as required. It is also a vast domain which can lead to uncertainty as to how to utilise such technologies to learn with. However, moderated structured web based courses which is a branch of internet learning could be simplified such as with the navigation and layout. A key reason for not wanting to learn independently was that participants did not want to be isolated. This suggests a social factor is required in engaging and collaborating with the other learners. The learners can then take the role of the teacher, and help other colleagues which have proved an efficient way to learn. Finally, the results indicated that children and grandchildren were the preferred method of being taught by, and this could be attributed to their language, approach and styles to learning.

5.9.3 Age groups with respect to individual variables

It was found that learning and support (and aspects that comprised it) different according to age group. Some learning mechanisms were prominent with the younger age group (50 to 59) than the older age group (70+). This may be attributed to the unavailability of certain learning mechanisms available and in use by the over 70 group e.g. the use of internet, which may have been used in workplace settings for the 50 to 59 age group. This strengthens the argument that the over 50s should be considered and studied in accordance to the different age groups in which learning practices may differ. However, to counter this, aspects of learning and support such as structure and dialogue were found to be common themes for all the age groups.

The next chapter presents the synthesis of the findings.

6. Synthesis of the qualitative and quantitative analyses in relation to the research outcomes

This chapter synthesises the qualitative and quantitative findings in relation to the first two research objectives and their subsequent questions. A strategy has been used to achieve this and is outlined below:

- Collate all similar questions and topics of discussion from the interviews, focus groups, research diaries and quantitative surveys in relation to the research objectives and their subsequent questions
- Use the collated findings from each of the specific data collection methods within both quantitative and qualitative domains to identify themes in relation to the research objectives and questions.
- Discard any unnecessary data
- Discuss the themes produced by each data collection method

The next sub section introduces objectives 1 and 2 and the four research questions and how the topics of discussion and questions within the data collection methods are related to and answer them.

6.1 Objective 1 – To identify and elaborate upon the learning and support mechanisms 'older adults' currently use and to what extent they are engaged with ICTs

The first objective comprises two research questions as follows:

1) What learning and support mechanisms do older adults currently use?
2) To what extent are older adults engaged with ICTs?

The questions and topics of discussion from each data collection method directly related to objective 1 and research questions 1 and 2 are detailed as follows:

Semi-structured in-depth interviews - Quantitative

- Factors that make successful and unsuccessful learning experiences (Question (Q) 1)
- The learning of ICTs including their applications via virtual based learning methods (Q1)
- Any specific learning needs or requirements when learning how to use ICTs (Q2)
- Any additional needs or requirements when first learning to use ICTs (e.g. any needs or requirements prior to using ICTs) (Q2)

Focus groups (1 and 2) - Qualitative

- How virtual platforms have enabled the learning of ICTs including their applications (Q1)
- General opinions about ICTs (Q 1 and 2)

- How ageing (e.g. motivations, attitudes, preferences, requirements and 'learning capacities') has influenced the learning and use of ICTs (Q2)
- Previous difficulties experienced when learning a specific aspect of ICTs or ICTs in general (Q2)

Focus group 3 - Qualitative

- Whether virtual learning (e.g. Web 2.0 technologies) methods were used previously and how they were learned (Q1)
- Successes of learning with virtual technologies (Q1 and 2)
- Perceived difficulties of using virtual technologies to learn with (Q2)
- What in particular made virtual technologies difficult to use (Q2)
- Common accessibility issues with virtual technologies on the market (Q2)

Research diaries - Qualitative

- Preferences and non-preferences with the iPad and Flip Camera (Q1 and 2)

Quantitative IT users survey - Quantitative

- How older adults learned to use ICTs (Q1)
- Learning how to use ICTs via virtual based methods e.g. Web 2.0 technologies including web based instruction and social networking platforms (Q 1)

- Age group comparisons with learning methods, aspects of learning methods, virtual learning methods and aspects of virtual learning methods (Q2)

- Gender comparisons with respect to learning methods, aspects of learning methods, virtual learning methods and aspects of virtual learning methods (Q2)

- Non parametric testing – Mann Whitney (gender and learning needs and requirements comparisons with respect to individual learning methods) and Kruskall-Wallis (age group comparisons with respect to learning methods and virtual methods) tests (Q2)

'Digital Engagement' themed survey - Quantitative

- Different types of informal and formal learning previously used when learning how to use ICTs (Q1)

6.1.1 Research question 1 – What learning and support mechanisms do older adults currently use?

Qualitative – Research diaries from cultural probe workshops with Apple iPad and Cisco Flip Camera mobile technologies

Two key themes were identified. The two technologies were learned via a **1) trial and error and experimentation approach** and **2) an assistance and informal help approach.**

Qualitative – Focus group 1

It was found that obtaining **informal help via children** was used and has been a successful learning method, as well as **using an instruction manual** (considered simple, jargon free, with a sequential step by step approach) **in addition to a traditional course**. **Personal tuition in a 1 to 1** setting was again considered effective (although it was also resource intensive). To overcome this, an e-learning programme with the incorporation of a virtual avatar could be used. It was found that **rehearsal and writing down what was actually done** should be carried out when using the technology for the next time that particular application or technology is utilised. **Experiential and active (also with the teacher) and learning via rote** approaches have been considered effective in the context of learning how to use ICTs. Making use of a **phonics based system** would also indirectly help older adults to learn technologies with, particularly where jargon and language may be an issue or in particular for those whose first language is not English. **Traditional learning based courses that offer flexibility** were also preferred by the older adult learners.

Qualitative – Focus group 2

It was found that traditional courses hosted at institutions were not considered effective mechanisms to learn with. This was attributed to too much non-sense jargon, breaks in the delivery of the course such as the absence of the tutor and different facilitators being used instead of one leading to inconsistencies. It is important to teach the basics first, and then build on this knowledge. Many traditional courses do not consider the basic needs and requirements in terms of subject matter of the older adults. Flexibility should be incorporated into traditional courses to meet such needs. In terms of the way the learning occurs, it was found that both a linear (e.g. in inter-related stages) and randomised structure were both considered successful. An independent approach to learning was considered effective and that fresh and up to date information and instructional guides accompanying the technology product during the learning course was important.

Qualitative – Focus group 3

The virtual technologies were used in the **work place** with **instruction manuals** (which should be considered coherent and designed to meet the needs of the older adult learner). Further, on screen instructions that are sequential, logical and structured enable the older adult learner to engage with the virtual technology experience in a step by step manner, while following on screen instructions. From such design needs, there were disparities between 'what a researcher or designer considers effective' and 'what the older adult virtual learner considers effective'. The use of games based learning by older adults is considered 'ineffective'. However, to counter this it has been suggested that games which appeal to the 'older generation' are also considered effective ways to learn.

Qualitative – Semi-structured in-depth interviews

The **traditional formal courses** were considered the most successful. This was followed by **informal help and support from others such as colleagues**. Trial and error mechanisms as well as independent and self-taught learning were again popular methods to learn with. Further, informal help from children or colleagues was considered an effective learning and support mechanism. A conceptual understanding of the technology being learned is important, and this can be achieved via appropriate guides and documentation accompanying the course or learning programme.

It was found that maintaining dialogue in small groups with tutor facilitation was of considerable importance and that the instructor or tutor should provide encouragement and seek to resolve any potential difficulties a learner may encounter. In terms of learning styles, the demographic learning style was considered effective, as it is 'directed based' and directed by the learners. The incorporation of modular design (e.g. using a linear stage by stage approach) within the structure of the programme was important, as the overall task can be accomplished in smaller components (or stages). The material that comprises the programme should be delivered at an appropriate pace, suitable for the older adult learners. The programme should be interactive, include multimedia as well as being collaborative incorporating similar age and 'level of experience' groups (e.g. one group of one age range, another group of another age range, those who have had no experience of the technology and those who have used it once or previously etc.) An active and experiential approach has again been regarded as being effective for the learning process. Further, it was found that any language use (either used by the product or manuals and guides accompanying the product) should be coherent, jargon free and have clarity.

A Barnados study by Healy and Anderson (2007) was centred on children's and young people's use of technology. In particular this was with the internet and mobile phones. Both groups were enthusiastic and preferred to discuss their computer related use. Their uses include surfing the internet, email and interactive social networking websites. It was a home setting where this took place. The children and young people had a relaxed attitude regarding the risks e.g. safety and privacy. The use of mobile phones was considered as a functional tool. As most children were unsupervised, this suggests an independent approach to learning and engaging with the technology. It also infers an unstructured approach to learning, perhaps using trial and error methods, as well as using informal discussions. It seems that those in the study preferred to use an informal approach to learning. This is further exemplified by a young people's community study by Bruce (2009). It showed that learning and ICTs are synonymous in structured settings e.g. schools or entertainment outside of schooling. However, it discusses three projects which were set up to create spaces for young people to learn about new technologies and develop enhance their education by self-expression. Their learning and engagement of new media were carried out in an arts, culture and communication academy, an afterschool library as well as digital story telling. The digital story telling refers to the integration of youth experiences with new activities and supports border learning. The border learners engage in problem solving in the context of specific community challenges, rather than draw upon textbook knowledge.

As such, there are disparities between the way younger people engage and learn new technology compared to older people. In order for older adults to achieve best practice, a number of methods are to be combined, and usually involves being complemented by a theoretical approach. It therefore challenges the universality of learning digital technologies. However, such older adult learning could make use of creating spaces for self-expression and conversing with friends and other learners. The combination of learning methods and approaches that older adults prefer to use is therefore unique to the context.

Quantitative - Learning responses from 'digital engagement' themed questionnaire findings

The learning and support mechanisms previously utilised to use ICTs

From the secondary analysis, it was found that **just over half of respondents had learned formally while just under half learned informally**. This, to a certain degree, reflects the findings of a study by Goodman et al (2003) and report by Ofcom (2009) that found formal and informal learning to be the most popular learning and support approach respectively.

In ascending order, **formal learning (61%), informal learning (43%), independent learning (52%), personal teacher or instructor (43%) 'real time face to face' learning (24%)** and the **internet (11%)** were the most popular methods an older adult has learned to use ICTs with. The actual location of being taught by an instructor predominantly occurred at Age UK training venues. However as mentioned previously this finding was slightly biased as the population sample was obtained from members affiliated with the Age UK organisation.

In terms of **formal learning mechanisms**, computer courses offered by Age UK were the most popular (30% of respondents), followed by a traditional taught class at another institution such as an adult education college (14%) and the library (4%). Learning via the internet (2%) was also considered an effective learning and support mechanism.

How older adults would prefer to learn to use ICTs

It was found that learning **via a course at an institution such as a college (49%)** as well as **via friends and family (48%)** were the most popular preferred learning mechanisms to learn ICTs with. This was followed by a **personal teacher (38%)** and **being on own e.g. learning independently (27%)**. Those learning and support mechanisms with not as much significance and those that were less preferred (<16%) included software tutorials e.g. on CD or DVD media, a moderated web based course and with friends in virtual settings.

A key disparity between methods previously utilised and a method that older adults in the population sample would prefer to utilise is through the use of friends and family. This is a method that has had minimal usage in terms of previous learning and support utilised, yet would be considered effective as a potential mechanism. A lesser proportion of the sample preferred to learn independently (27%) when compared with previously learning independently

(52%) which indicates that other factors may be involved e.g. establishing dialogue with others to ensure a successful learning experience.

How older adults resolved difficulties with ICTs

Unfortunately, the vast majority of older adults who get into difficulty when learning to use **ICTs give up (85%).** However, **friends (44%), children (50%) and grandchildren (33%)** (if applicable) were the most sought out methods of resolving difficulties. A manual or guide was also a popular choice (33%). Interestingly **a spouse or partner and neighbours were considered relatively unpopular methods (both <14%) as well as using training videos and online help (<13%)**. Technical support was considered relatively significant as 25% of the sample population agreed to use this method to resolve difficulties with.

Quantitative – Survey responses from the IT Users' survey

The learning and support mechanisms previously utilised to use ICTs and their effectiveness

	Very effective		Somewhat effective		Didn't find it very effective	
	Count	Row N %	Count	Row N %	Count	Row N %
Learning via a course at an institution	11	64.7%	5	29.4%	1	5.9%
Learning via one to one tuition	8	66.7%	4	33.3%	0	.0%
Learning via video tutorials	2	14.3%	9	64.3%	3	21.4%
Learning via instruction manuals	4	16.7%	15	62.5%	5	20.8%
Learning in groups	4	18.2%	12	54.5%	6	27.3%
Learning over the internet	9	42.9%	11	52.4%	1	4.8%
Learning via the telephone	3	17.6%	9	52.9%	5	29.4%
Self teaching	10	40.0%	12	48.0%	3	12.0%
Learning via the TV and radio	3	50.0%	3	50.0%	0	.0%
Learning via audio books	0	.0%	0	.0%	2	100.0%
Learning via a software feature	1	4.8%	14	66.7%	6	28.6%

Table 6.1: A table to show the effectiveness of various learning and support methods used by older adults

From this, **one to one tuition** and **a course at an institution** were considered very effective methods (over 65%) whereas **self-teaching, learning via the TV and radio** and **internet learning** were considered relatively effective (40 and 50% respectively). The learning methods **learning via video tutorials, instruction manuals, in groups, over the telephone, audio books** and **via a software feature** (<18%) were not considered very effective.

A key note and observation from the table is that those who 'never used' a particular learning method were omitted, so the statistics represent the percentage proportions of those who 'actually used' each learning method.

The virtual learning and support mechanisms previously utilised to use ICTs and their effectiveness

	Strongly agree		Agree		Neither agree nor disagree		Disagree		Strongly disagree	
	Count	Row N %	Count	Row N %	Count	Row N %	Count	Row N %	Count	Row N %
Using discussion boards to learn	1	3.7%	6	22.2%	12	44.4%	6	22.2%	2	7.4%
Using chat rooms to learn	1	3.6%	2	7.1%	7	25.0%	10	35.7%	8	28.6%
Learning via web based instructions	2	6.9%	12	41.4%	12	41.4%	3	10.3%	0	.0%
Using social networks to learn	3	10.7%	7	25.0%	5	17.9%	6	21.4%	7	25.0%
Using online help to learn	15	53.6%	12	42.9%	1	3.6%	0	.0%	0	.0%
Using voice chat rooms to learn	0	.0%	1	3.7%	8	29.6%	10	37.0%	8	29.6%
Using mobile technologies to learn	4	14.8%	6	22.2%	4	14.8%	8	29.6%	5	18.5%
Using online manuals to learn	2	6.9%	17	58.6%	6	20.7%	3	10.3%	1	3.4%

Table 6.2: A table to show virtual methods in terms of an 'agreeableness' scale

In terms of being considered 'relatively effective' (as determined by the total of the 'strongly agree' and 'agree' choices) in comparison with all the other variables, **using online help was considered relatively effective with 96%**

either agreeing or strongly agreeing. **Using online manuals to learn** with was considered relatively effective at **65.5%**, as was **learning via web based instructions** at **48%**.

Those that were considered to show a 'relative level of interest', yet still needed to be improved were **using discussion boards (26%), using social networks (35%) and mobile technologies (37%)** to learn. Those that were not considered relatively effective virtual mechanisms to learn with included **voice enabled chat rooms (3.7%)** and **chat rooms (10%)**.

The next sub section provides the data synthesis for research question 2.

6.1.2 Research question 2 - To what extent are older adults engaged with ICTs?

Qualitative – Research diaries from cultural probe workshops with Apple iPad and Cisco Flip Camera mobile technologies

The ageing themes and influences identified were related to the physical dimensions of the device, the design and user interface as well as the perceived complexities with them. The complexity issues included 'fear factors' associated with the technology, as well as holding perceptions that they are 'all too new', and designed for the younger generation. A number of themes arose which were related to manual dexterity issues associated with the mobile devices. The icons were too small (as there were challenges with locating them), and the 'main button' on the iPad was out of synchronisation with the rest of the touch screen input buttons (which were considered difficult to utilise, especially the virtual keyboard), as well the physical button requiring discovering. In addition a key touch input (the ‘slider’) was difficult to use, as well as transitioning from one software application to the other, and starting the technology up and shutting it down. Another key barrier was actually figuring out how to access the internet, and this was attributed to the small internet icon and how it was represented and portrayed. This suggests that standardisation is necessary and was reinforced by compatibility issues being present compared to that of the PC. Other age related perceptions and changing circumstances included ‘cognitive issues’ related to the processing and ‘cognition being out of tune’ with such up to date technology devices, as well as memory factors being present (e.g. limited recall in how an application or technology was learned). Another age related perception was that such mobile technology devices have no uses for older adults, and that disparities are present between the younger and older generation as factors change. It is also important to identify particular motivations to actually want to learn to use the technology, relating it to the needs and requirements of the older adult learner.

Qualitative – Semi-structured in-depth interviews

Key deterrents related to the new dynamics of ageing include digital technologies that were considered ‘too complicated’, irrelevant to the needs of older adults (e.g. how it can benefit them) and taking ‘too much time’ to learn to use. Such technologies are therefore required to be simplified and naming conventions and acronyms are considered an issue. These attributes can lead to decreased learning and disengagement from ICTs. The internet facility is a key motivator for using ICTs, and such an application is considered key to technology devices. However, mobile technologies are considered relatively inaccessible, compared to laptops and PCs, so this hinders successful learning. It is important for older adults, when learning, to engage in group dialogue with other members of the group who are 'known' to them, embracing a democratic style to learning. This entails reaching a goal as a group. This was reinforced by the notion that an independent approach is used less than learning in collaborative and group settings, which may be conducted in both informal (e.g. following a democratic style) and formal (e.g. traditional classroom based methods) settings. In terms of e-mail, complexity issues were apparent which was attributed to their navigational and non-simplistic nature, often incorporating many other additional functionality features rather than focusing on the basics. Environmental and external factors can also play a role in deterring the learning, which was attributed to changes in the nature of work (if previously learned to use a particular technology at work).

Qualitative – Focus group 1

The findings reiterated the notion that there were complexity perceptions about ICTs which was a key theme that emerged from the semi-structured interviews and research diaries. It was found that key motivational influences included using ICTs for authoring purposes in addition to the utilisation of Web 2.0 technologies. The use of digital TVs was also a key use for older adults due to the channel diversity on offer. There was a lack of access to transport to travel to computer stores and technology outlets and this posed a considerable barrier to learn and engage with ICTs. Similarly, this was coupled with the unavailability of broadband due to a particular rural geographical location. Other changing circumstances leading to disengagement from ICTs and in particular e-commerce applications were due to security issues. Many benefits can be gained from online purchasing e.g. deals and discounts on products or services being offered. There were also informational issues associated with such applications (e.g. many Web 2.0 technologies including travel booking systems being considered too complex due to too much information being present as well as with the interfaces and advertisements). A simpler, accessible version should be used and was a requirement. Applications such as Skype were considered simplistic and due to this are easy to learn to use. An increasing number of older adults expressed views on communicating online, predominantly via e-mail (which was a key motivator for wanting to learn to use a PC or mobile device), yet interestingly there was little desire to use social networking applications. Unfortunately a lack of confidence was still present with ageing factors, and this was attributed to minimal prior experience with the technology. Books and manuals were not considered effective, and for effective learning to take place, engaging with the experience was required several times, and that phonics based systems and learning via rote was an effective way to learn and engage with ICTs. This was especially important for understanding jargon within applications and the technology device.

Qualitative – Focus group 2

Such ICTs were considered ‘frustrating’ and confusing to learn how to use, and change over time. This was attributed to the non-standardisation of many of the products on the mass market. Further, there were physical accessibility issues which resulted in the disengagement with ICTs. Three key motivating reasons for the engagement with ICTs included the sending of documents via email, information retrieval from the internet and report writing. The reasons particular applications were learned in the workplace was related to increasing productivity from quicker and automated transactions. Those who have used ICTs in the workplace were likely to have greater experience, which may contribute to greater learning progression. Interestingly there was a widely held perception that technology can actually reduce knowledge, and that ICTs can impede education and learning in terms of learning languages and problem solving (rather than using dictionaries and calculators to resolve them). Conversely, ICTs can be used to maintain certain skills and learning and general knowledge can be gained. Other key issues were related to banking, and that such use is reduced due to potential security issues. It was found that computing courses that were created and made available in organisations closely affiliated to its members were considered successful due to such membership. In terms of age related perceptions, the use of ICTs can enable older adults to lead an active lifestyle, with many ‘real life’ applications being carried out via ICTs, as well as knowledge transfer taking place. The ‘big brother’ phenomenon in the form of privacy issues is still present, yet there are sociological assumptions and influences to own and use ICTs. This is coupled with time being a requirement which is considered limited. It is often the case that older adults are required to learn different applications, and not just one, a predominant one being gaining access to TV online (e.g. BBC's iPlayer application).

Qualitative – Focus group 3

A fear factor was involved in not being able to resolve issues adequately, and that preconceived notions of not being technology oriented can deter the learning of virtual technologies. Further, adjustment difficulties were experienced, especially when transitioning to learn to use virtual technologies. In particular, the complexities of mobile devices were attributed to their advanced functionality often incorporating unnecessary features.

Quantitative – IT users survey

Comparisons were made between different groups and learning variables to establish preferences among certain groups. This called for cross tabulations (of age and gender groups) and non-parametric testing. The key disparities have been identified between the groups. It was found that the 50 to 59 age group found learning via a course, self-teaching and 1 to 1 tuition to be, on the whole, and relatively effective methods to learn to use ICTs with. Similarly, the 60 to 69 age group found learning via a course and self-teaching methods to be relatively effective. The 70 and over age group found 1 to 1 tuition and learning via the internet to be relatively effective.

In terms of virtual learning, the 50 to 59 age group found online help and learning with mobile technologies to be relatively effective. The 60 to 69 age group found seeking help online and using online manuals to be effective learning mechanisms. The 70 and over age group found web based instructions, online help and online manuals to be effective learning and support mechanisms to use ICTs with. In terms of aspects of virtual learning, both the 50 to 59 and 60 to 69 age groups found online help to be relatively effective. The over 70 age group found learning via web based courses and online help to be effective ways to learn.

With gender comparisons, it was found that disparities were apparent with self-teaching, in which males preferred it to females, whereas females preferred to learn via a course and over the telephone increasingly than males. In terms of aspects of learning methods, it was found that males preferred to use technology to learn, have a teacher to facilitate the process, as well as learn informally compared to females. In terms of virtual leaning, it was found that males preferred to use discussion boards, whereas females were inclined to prefer voice enabled chat rooms. With aspects of virtual learning, both males and females held approximately similar views with regards to all individual variables relating to the learning of virtual technologies.

With the Mann-Whitney test, it found there were gender differences with the self-taught and online help learning variables, as well as there being limited awareness of what virtual technologies had to offer. In terms of differences being apparent for older adults who consider themselves to have learning needs and requirements and preferred to learn via specific variables (or aspects of these), such preferences were apparent with instruction manuals and being self-taught. The differences were also apparent in not being sure where to start and having limited access to virtual technologies.

The next section introduces objective 2 and its two associated research questions.

6.2 Objective 2 – To identify new learning and support mechanisms to further 'older adult's engagement with ICTs by also considering aspects of established learning methods and platforms

The second objective comprised two research questions as follows:

3) What new learning and support mechanisms could be used to further an older adults' engagement with ICTs?
4) What aspects of established learning and support methods which were considered effective could be considered to inform new learning and support?

The questions and topics of discussion from each data collection method directly related to objective 2 and research questions 3 and 4 are detailed as follows:

<u>Semi-structured in-depth interviews -Qualitative</u>

- Learning and support methods which could improve engagement with ICTs (Q3)
- Potentially entertaining learning and support methods (Q3)
- Virtual learning (Q3)

- Factors that make a successful learning experience in general (Q 4)
- Factors that do not make a successful learning experience in general (Q4)
- Effective learning and support provision of ICTs (Q4)
- Ineffective learning and support provision of ICTs (Q4)
- Specific learning and support needs and requirements when learning how to use ICTs (Q4)
- Anything that furthers engagement with ICTs (Q4)
- Anything that inhibits engagement with ICTs (Q4)

Focus groups (1 and 2) – Qualitative

- General opinions about ICTs (Q3)
- How older adults would best like to learn to use ICTs (Q3)
- Any alternative learning methods to further engagement with ICTs (Q3)
- The virtual learning of ICTs (Q3)
- Any other comments (Q3)
- General opinions about ICTs (Q4)
- Specific reasons for older adults to use ICTs (Q4)
- Any specific aspects of ICTs that older adults have had difficulty in using previously (Q4)
- The virtual learning of ICTs (Q4)

- Any other comments (Q4)

Focus group 3 – Qualitative

- How virtual technologies could be improved (Q3)
- Common problems associated with accessibility (Q3)
- Any other comments (Q3)
- What aspects made particular virtual technologies easy to use (Q4)
- What aspects made particular virtual technologies difficult to use (Q4)
- How virtual technologies could be improved (Q4)
- Common problems associated with accessibility (Q4)
- At least one way of learning how to use virtual technologies (Q4)
- What makes effective feedback (Q4)
- Any other comments (Q4)

Research diaries – Qualitative

- How the piece of technology could be improved (Q3 and 4)
- What was liked about the technology (Q 4)
- What was not liked about the technology (Q4)

IT users survey - Quantitative

- Aspects of learning methods that increased or decreased the accessibility of ICTs (Q4)

- Aspects of virtual learning that increased or decreased the accessibility of ICTs (Q4)

Non IT user's survey - Quantitative

- Non-use of ICTs (Q3)
- External and environmental influences (Q3)
- Personal aims and aspirations (Q3)
- Age and gender group comparisons with learning variables (Q4)

'Digital Engagement' themed survey – Quantitative

- Preferred learning methods (Q3)
- How difficulties were resolved (Q3)

The next sub section provides the data and information synthesis for research question 3.

6.2.1 Research question 3 – What learning and support mechanisms could be used to further an older adult's engagement with ICTs?

Qualitative – Research diaries from cultural probe workshops with the Apple iPad and Cisco Flip Camera mobile technologies

An in-built help or instruction guide made available on the main screen or interface of the technology (which appears when activated) would provide information to assist the older adult learner navigate the technology. Such a guide could also be output in audio format to allow for easier information processing and thus interpretation.

Qualitative – Focus group 1

One to one virtual personal tuition in the form of a virtual avatar could take place virtually over a Web 2.0 platform which would allow older adults to interact and learn the technology with other members of the group. The virtual setting should be structured (e.g. stage by stage learning) and collaborative. The group size is important, and it is suggested that an optimum group number of 6 is used. An example of Web 2.0 learning would be via the use of a social networking platform. Here the virtual avatar could be a ‘real’ teacher or instructor, providing guidance over the internet. Further, there may be previous experience with such a Web 2.0 technology, which could be capitalised on from a learning perspective. A ‘basic’ Web 2.0 platform specifically designed for learning could be very effective, which does not incorporate unnecessary features that other social networking platforms tend to do. A key idea to address here is to allow the older adults to learn to use other technologies, as a result of this interaction. Further, an active approach in which dialogue is exchanged with the facilitator is considered the ‘best’ and most appropriate. The instructor should provide intervention when necessary, as a result of the individual learner’s progress. A notepad should also be provided, either on screen or in hard copy format to help support and supplement existing knowledge, while reinforcing learning material. With instruction and guidance (whether it be in ‘real’ or virtual domains), encouragement when accomplishing a task should be provided, as this can result in further learning progression and enhanced use of ICTs. Appropriate and constructive feedback, outlining strengths and weaknesses of the learning outcomes should also be provided, to again help the learner improve. It was found that courses should start at the basics, even for those with pre-requisite knowledge of the subject. This is particularly important in building confidence, which can allow effective learning to take place. For those whose first language is not English, a phonics based system should be utilised, to help process and understand the terminology and information.

Qualitative – Focus group 2

It is essential for any learning and support system to start with the basics first and build on such knowledge. Taught courses should be flexible by taking into consideration any learning or topic needs or requirements of the older adult learners, and address such potential issues prior to starting the course. In terms of virtual learning, an artificial intelligence based avatar would help to guide and direct the learning. This is a mechanism which takes the form of an animated character either in 2D or 3D format and outputs instructions to guide the learner usually in the form of text (or audio). It should output instructions in accordance to how the learner responds and engages with the learning application, and is as such an event driven system. It should prompt the user in accordance to how they respond e.g. whether they get into difficulty. The key difference between such a mechanism and mechanisms widely available is that the functionality of the absolute basics should be adhered to. It should be made as an option, rather than interfering during the learning process. An in-built mechanism could detect the older adult learners' responses and adapt to provide help and assistance where necessary. It should outline the goals and sub-goals of what in particular is being learned. This would also reduce resources. Such e-learning methods should be incorporated into a 'real time' classroom based environment, to blend a mixture of traditional and virtual learning. Learning and support mechanisms should be standardised and kept consistent when teaching older adults how to use particular applications or technologies. It has been found that children and grandchildren provide very effective learning and support, and their language could be transcribed and adapted to help deliver material effectively to older adults in a virtual format or instruction manuals. It was found the games based learning, combined with a structured and modular approach e.g. with defined sub goals would also be considered an effective learning and support mechanism.

Qualitative – Focus group 3

The instruction manuals, guides and prompts accompanying virtual learning mechanisms should be numerical and sequential (e.g. pressing 1 to display a particular sub menu). They should be structured, sequential, logical and readable.

Quantitative – Non IT user's survey

There are various factors that should be considered which contribute significantly to furthering engagement with ICTs, which are described. Such option choices were chosen as a result of the findings from the semi-structured interviews and focus groups. Privacy, security, complexity issues and not being sure where to start were key reasons why older adults did not learn to use ICTs. As such, ICTs and their applications should be designed to minimise such factors. In terms of external and environmental factors, the cost of the equipment, course cost, no awareness of the training available and no access to ICTs were considered to be particular issues. With personal aims and aspirations, ICTs being used to communicate with others was the most sought after factor. Following this, job searching, and making travel bookings were other motivating factors. Learning for satisfaction and pleasure was another key motivator why older adults would use ICTs.

Quantitative - Learning responses from 'digital engagement' themed questionnaire findings

In terms of how older adults would prefer to learn to use ICTs and resolve difficulties when using them the most popular methods were via friends and family, at a course at an institution with children and grandchildren and friends, as well as via a personal teacher. Learning via a personal teacher was not considered as effective as the other learning mechanisms. In terms of difficulties, methods to resolve them included learning with children and grandchildren, friends and technical support (either online or over the telephone).

The next section provides the data synthesis for research question 4.

6.3 Research question 4 – What aspects of learning and support methods which were considered effective could be used to inform new learning and support?

Qualitative semi-structured in-depth interviews

It was found that appropriate facilitation and simple, non-jargon language was considered necessary for a successful learning experience. In particular, an informal and friendly approach should be used when delivering material. Small groups of 6 were considered the optimum size. This group number applied to both 'real' and virtual environments. With learning in a group setting, the learning should be synchronised and structured by incorporating defined sub goals, as well as being set for an appropriate duration (e.g. not for too long). It was also important to establish a mixed group that differs in both age and experience, as learning can occur as a result of collaboration between learners based on such characteristics; those considered experienced can help and assist (and learn themselves) those considered less experienced. This can take the form of a "problem based learning" approach either in a 'real' or virtual environment. Such an approach should however focus directly on the application or technology, without a scenario based approach. It was important for any learning programme to incorporate some flexible time whereby the learner can self-reflect and articulate their learning needs and requirements and consider new ones. It was of considerable importance that dialogue is maintained, to provide the learner with a 'learner centred' approach so there is a personal approach for the older adult learners. A 'help desk' facility whether incorporated into the virtual or 'real' environment (or over the telephone) is important in providing appropriate support. Such a learning environment should be free from noise and other distractions, as well as being considered comfortable. The dialogue whether in text or audio form should be in 'real time'. The instructors should keep a 'check list' of learning outcomes and sub-goals, to help them ascertain the progression of the learner. Any instructions considered essential to the learning process should be concise, logical, and simplistic which does not incorporate any unnecessary information. It should be noted the use of instructional documentation as a conceptual approach differs when considering younger people. As younger people have been surrounded by video games and TV, rather than reading. As a result, because of the use and familiarity with digital media providing documentation is considered a disservice to students (Kipnis and Childs 2005).

All training should start from the basics (or at least give the learner the option to) so that knowledge can be built upon. The approximate duration in minutes should be assigned to each goal and sub goal, as it is important to equip and familiarise the learner with such information, so that they are aware of how long they should approximately spend on particular components of the learning programme. The use of sub goals also helps maintain pace with other learners.

Interestingly, younger people have had difficulties with the way information is managed, which does not seem to be an issue so much as with older adults. For example, the presentation of results, as well as the search interfaces. This has been attributed to a lack of support by teachers and carers (Valenza 2006).

It was also important to provide 'post it' notes, so that the older adults can note key aspects of the technology or learning process, they consider important and refer to them accordingly. The material should not be delivered 'short and quickly' but any key aspects mentioned should be elaborated upon and explained, to reinforce appropriate understanding of the material. The material should be delivered in a linear format (therefore minimalizing a randomised learning approach while incorporating a logical, sequential and structured way to learn). In terms of digital technology device accessibility, any buttons on the physical design should be kept minimal, at an appropriate size and focus on the 'basic' functions that the particular technology device exhibits.

Any learning and support mechanism that allows the older adult learner to actually engage and use the technology via an experiential and active learning approach, rather than a passive style to learning is considered effective. This should also be underpinned by a conceptual approach to learning, to help the older adult learner gain familiarity with the device, and the subject matter. This can be achieved in the form of notes or a booklet. It may also involve exchanging dialogue with other learners or the facilitator prior to the learning experience. In order to get the best out of successful learning, the process should be repeated without the use of any instructions in an independent manner.

A key component of this is learning and support is through the use of a conceptual approach to complement the experiential approach to learning. This was omitted from studies of children's and younger people's learning of technology. In a study by Williams and Rowlands (2007) it was found that learning is best when pictorial representations are used, rather than instructions (although instructions are still of considerable importance). The use of symbols to convey emotion was also considered to be important as part of the learning process. It was found 'real time' communication between student and teacher was more reassuring than instructional documentation. There is thus a disparity here in that younger people do not prefer so much a conceptual approach to learning whereas older adults do. It is imperative when naming acronyms, not to mislead the user in terms of the choice of words that are used. There are many acronyms on mass marketed products that lead to confusion as to what their functionality entails. Further, to help with successful learning, the input functionality should be divided so that "essential functionality" is partitioned in one section (e.g. the letters and numbers), and "additional functionality" (e.g. command keys) in another. The use of CD or DVD based learning was previously a very effective way of learning via encyclopaedias such as via the software program Encarta. Such learning platforms were considered accurate and reliable, compared to 'unofficial' sources on internet (which can therefore act as a deterrent). Successful learning is a result of motivation, and it was important to identify motivational factors that further engagement with ICTs. There was also a requirement to change the terminology to something appropriate, as it can be a cause of misinterpretation by the older adult learners. Such terminology is included within the device itself as well as the manual and instruction guides. The layout of the technology or application should be simplified with appropriate fonts and minimising unnecessary information, as well as maintaining additional functionality. These can cause complexity issues and are not necessarily required.

Qualitative – Research diaries from cultural probe workshops with Apple iPad and Cisco Flip Camera mobile technologies

In terms of aspects of learning and support, that are effective and ease the learning process, it was found that digital technologies that were light, not big and cumbersome to use and portable were considered best. The key features of such digital technologies included internet availability, games applications, photography and maintaining contacts with others. The keyboard was considered imperative to the device's accessibility, and such a virtual keyboard proved effective to use. In terms of specific accessibility features which affected the learning process, the virtual icons could have been made larger, as well as the physical buttons on the side of the iPad. Further, the location of the on and off switch should be placed in an obvious position. A tablet based device similar to the iPad could be improved by being designed in accordance to the PC. This is because PCs are a prominent technology, and prior experience may have been acquired making learning easier. This is with reference to the standardisation of ICTs, which incorporate a similar layout among technology products and their applications. Basic instructions should be provided, which may also provide the option of playing them back in audio format. Further, a quick help guide should be provided on the screen, to help familiarise the older adult learner with the technology and the functionality on offer. The applications (also known as apps) the older adult learner considers should be situated on the main menu, and not be obtained externally e.g. in the form of apps. Successful learning of such mobile technologies is through the simplified language of children (or even better, them teaching the older adult learners on a tuition basis). This could be transcribed or transferred to a virtual form. However there is a lack of availability.

Qualitative – Focus group 1

An outline of any requirements or needs in terms of the learning process itself or of particular applications of the technology should be provided to the facilitator. This can help ensure effective facilitation. If a training course is provided, it should be flexible catering for the needs and requirements of the older adult learners. The material issues may need to be revised throughout the course and focus on the essential and important learning outcomes the older adult learners wish to achieve as a cohort. The applications should be simplified e.g. the email clients. Further, such communication mediums such as simplified chat rooms and user groups incorporating avatars should be set up and made available for a specific learning purpose. This can be achieved by a virtual communication medium with a basic layout and appropriate fonts and instructions, as well as a dialogue box for optional communication. It is important to combine multimedia in learning programs e.g. chat rooms which incorporate audio and video avatars to assist with the learning process. If the older adult learner gets into a difficulty, to help resolve the problem a guide should make itself available both in hardcopy and virtual format. An in-built artificial intelligence application should be incorporated into the technology device to prompt dialogue messages to help the older adult learner resolve any potential difficulties that may arise. Further, common problems should be identified to help with this. In terms of learning via social networking, such platforms should be 'simplified' and basic incorporating all the functionality considered important and necessary. Notes should also be made to help with rehearsing and recalling the material. These could be produced by the instructor and edited by the learner.

Qualitative – Focus group 2

Ineffective learning and support is attributed to physical accessibility limitations. In terms of the learning structure, both a linear and randomised structure is considered best. It was again reiterated that the course should be continuous with no breaks, using the same tutor, as well as providing appropriate feedback which was considered necessary. Along with this, personal attention by the facilitator should be provided to ensure any needs or requirements are met. It was again found that accessibility was a key issue, and this was attributed to the menu icons, windows and layout of the application.

The menus themselves should incorporate necessary functions with no additional options. With instruction manuals, there were index problems in order to search for a solution to a particular problem. The key words could be reconsidered and chosen to suit the needs of the older adult learner; the assumptions of the designer may be different. It was found that starting from the beginning and basics was required, as well as a learning programme that also allowed an independent approach and trial and error method to learning. This should be supplemented by facilitation. The location of certain functionality features such as the 'on' switch was also considered 'hidden' within the technology device. The standardisation of digital technologies was again considered an important aspect to learning them successfully. In order to learn how to engage with technology virtually, step by step instructions should be accompanied either in 'real' or virtual form. A guide can also accompany other applications associated with Web 2.0 technologies for example as electronic commerce (e-commerce). This is the buying and selling of a product or service online. The combination of simple layouts, minimising unnecessary functionality, larger buttons as well as an instruction manual incorporating larger fonts, a structured and systematic style is important for effective learning. Certain functionality features should be incorporated into particular applications and technologies, depending on older adult learner preferences. In order for learning progression to occur with multimedia learning applications, security flaws should be minimised. It is very important that fresh and up to date information is maintained with each application or product. Feedback by older adults with regards to specific instructions relating to specific commands related to the technology device is again imperative, in order to improve such instructions relating to a particular instance. The error messages require clarity, and recommendations should be provided to help the older adult learner make progress. Further, on-screen prompts should be represented in a numerical sequence. There should be prompts from this to help find a solution to the problem. Various safeguards and privacy filters should be put in place when learning how to use particular applications as this is a leading barrier to furthering older adult engagement with ICTs.

Focus group 3 – Qualitative

Information kiosks are considered 'easy' to use, and this was attributed to their big touch screen buttons, on-screen instructions, logical and sequential step by step instructions with limited jargon as well as standardisation. The numerical sequencing of instructions within a menu or sub menu is again considered important. Conversely automated voice responses were not considered effective and that may be associated with help over the telephone. The language is a key issue that is of considerable importance and can enhance or hinder the learning process. It should be kept simple, understandable and consistent to help with the interpretation of it. This includes the spoken word and written instructions in the form of onscreen dialogue prompts. Further, there were general readability issues with virtual technologies, as well as buttons which are considered to decrease with accessibility. A key drawback with virtual technologies is that the text in many cases requires modification, and little is known by the older adult learner on how to resolve this and make the text appropriate. In terms of learning feedback, a balance of both negative and positive feedback should be used. The incorporation of a games based mechanism held mixed perspectives as the sample both agreed and disagreed with its effectiveness. A structured approach to learning is considered best.

Non IT user's survey – Quantitative

In terms of aspects of learning variables the 50 to 59 age group found the course structure, non-jargon language, course duration, pace and dialogue to be relatively important. With the 60 to 69 age group, it was found that appropriate facilitation with a teacher, non-jargon language, duration and appropriate pace were quite strongly important. The 70 and over age group considered having a teacher, appropriate non-jargon language and course duration to be quite strongly important. With formal and informal learning, all three age groups indicated indifferent views towards them. The results from the IT users survey reinforced the findings from the 'digital engagement' questionnaire in terms of finding learning via a course as a preferred method to learn, as well as independently (e.g. on own).

In terms of aspects of virtual learning, one particular aspect of learning was considered of significance, and that was there being limited awareness of the learning opportunities available. The other aspects of virtual learning variables shared similar views in that a higher proportion of participants were in agreement with virtual learning being complicated, as well as being not sure where to start. There was also an agreement with there being limited access to virtual technologies, lacking confidence and concerns over security. However, the respondents were inclined to disagree that they lacked an interest in virtual learning as well as considering concerns with the content.

With the 60 to 69 age group, it was found that ICTs were considered too complicated to use, as well as the older adults lacking confidence when using them. The cost of the equipment to be too expensive, followed by the course cost. The 60 to 69 age group shared strong preferences towards the computer helping with a job, as well as being used for communication purposes. With the 70 and over group, it was found that security issues, not being sure where to start, unsuitable material and complexity issues were key factors that attributed to their non-uptake of ICTs. With the over 70s age group, not having access to ICTs as well as the cost of equipment being expensive were the leading factors prohibiting the learning of ICTs. Similarly the over 70s shared agreement about ICTs being used for communication with others.

In terms of gender comparisons it was found that females were concerned with security, privacy and complexity factors. With males, privacy, security and not being sure where to start were the leading factors that prohibited engagement with ICTs. It was females who were inclined to agree that the cost of equipment, not being sure of the benefits and the cost of the course being expensive were key factors prohibiting the engagement with ICTs. With males the key factors included the cost of equipment and course being expensive, no awareness of the training available and access to ICTs. It was females who were predominantly interested in using ICTs for communication purposes, while males too were interested in using them for this, as well as to get a job and make travel bookings.

Gender differences were apparent with respect to individual learning variables, in terms of the limited access to transport to travel to computer stores, unsuitable material, no one being available to help with ICTs and that the computer can help with job factors.

It was found that differences between the two groups were apparent as there was limited access to transport to travel to computer stores, that the computer can help with a job that the weather can be checked and that travel bookings can be made.

6.4 Conclusions

A number of key themes emerged throughout each data collection method, both within the qualitative and quantitative domains. It was important to consider key themes that were present in at least two data collection methods, to merit appropriate validity. To elaborate there were some themes present in one set of findings (e.g. produced from a particular data collection method) that were not in others. While such themes present in one paradigm (e.g. either qualitative or quantitative) were considered key themes in relation to the research question, there is even greater validity if the themes were present in both qualitative and quantitative findings.

The two key roles of the quantitative findings were to both reinforce and test findings produced from the qualitative domain. The key learning and support themes that emerged from the qualitative and quantitative data domains were traditional formal courses delivered at institutions, obtaining informal help from others such as friends and colleagues and an independent approach to learning**.** The use of coherent, jargon free instruction manuals included other key themes that were re-iterated in the research diaries, focus groups and reinforced by the quantitative surveys.

Participant #3 (interview) stated: "*Good written instruction is very helpful*"

It was however found that the importance of informal group learning with friends or colleagues was reiterated in the qualitative paradigm consisting of interviews, focus groups, semi-structured interviews yet was not considered effective (yet was still present) with the two surveys in the quantitative domain thus indicating a disparity.

Participant #1 (interview) stated: "I really did get a lot of assistance by talking to friends" and "Any interactive method is good"

The use of an appropriate facilitator moderating the pace of learning and providing appropriate encouragement was again found in both quantitative and qualitative paradigms.

Particpant #10 (interview) stated: "*Consequently because it was all too rushed in a short space of time, I didn't learn from it*"

There were however a number of key instances which arose from the themes that was present in the quantitative paradigm domain which concerned learning via the TV and radio. With the qualitative paradigm, the focus groups indicated that a phonics based systems should be used as a basis for learning in particular with technical terms and jargon within applications. An independent and self-taught approach was a theme that occurred in the semi-structured interviews, yet not so much in the surveys which suggests that some form of support (whether virtual or 'real') is required. It was found that younger people did not like being passive recipients of information (Kipniss and Childs 2005) or that they want to learn through exploration (Windham 2005). These relate to the internet and CD-ROM learning, as well as electronic resources.

It was found that perceived and actual complexity issues were apparent with ICTs which were the key themes identified. Others included accessibility issues related to the compatibility and non-standardisation of technology devices, icon accessibility including the complexities associated with mobile devices and applications, as well as the physical accessibility related to manual dexterity.

Participant #2 (interview) stated: "*So they were asking me how to teach them Windows 7 and I haven't actually used it*"

There were also age related perceptions as well as security issues which were key deterrents in the learning uptake of ICTs. This was coupled with ICTs being irrelevant to the needs and requirements (in terms of motivational influences) as well as a general lack of interest in such digital technologies. It was found that ICTs both impeded and enhanced knowledge transfer. It enhanced knowledge transfer as a result of increased connectivity with other learners or through direct use of the technology itself e.g. correspondence via email and with web based learning respectively. An increase of information and thus knowledge is presented to the older adult learner. In terms of impeding knowledge transfer, it can present the learner with incorrect or dated information (although less so if it is an encyclopaedia). Further progress can be impeded as a result of traditional, non-computational methods.

Participant #10 stated: "*I went to the cash desk, they scanned it in and it wouldn't work, something they tried to do with technology and it wouldn't work*"

Traditional methods of transferring knowledge such as real life conversation and telephone calls are used less due to the increasing use of technologies and in particular the internet to access and share information. As such ICTs can impede knowledge transfer in such conventional ways. In addition, ICTs may also present rigid methods in reaching solutions, and lesson the creative elements in terms of solving a problem via traditional methods. ICTs can also increase isolation making informal conversation less prevalent. In terms of learning styles the key themes emerged included a combination of experiential and cognitive styles of learning, which use courses, independent learning and seeking online help in learning to use ICTs. It was found that older adults did not prefer to incorporate games based approaches into their learning. With younger people, it was argued that gaming technologies can be used to engage users in new and exciting ways (Squire 2005). However, care is needed and while such techniques can interest, it can deter learning.

With virtual tuition, such learning should be based upon Web 2.0 technologies and be structured and collaborative with an optimum group size of 6 learners. The platform should be basic with dialogue and a facilitator to guide the learning process by intervention where necessary, and providing feedback in real-time.

Participant #2 stated: “*With a professional Apple employee who talked me through anything I wanted to know about such technology as it’s quite broad ranging*”

Appropriate dialogue should be exchanged via virtual avatars. It was very important to start with the basics initially. Flexibility should be incorporated that takes into consideration the older adult learners’ needs and requirements. A traditional classroom based approach should be used which incorporates modular based e-learning methods. With instructional guides, the instructions should be both numerically and sequentially based. The language used within such instructions should be simplified.

Finally, the learning itself should be structured by incorporating sub goals with an appropriate learning duration for each. A problem based learning approach which follows the democratic learning style is considered effective, without the use of scenario based approaches. The learners decide how to reach a solution to a given problem collaboratively. The learning programme should incorporate a session whereby the learners can self-reflect upon the learning process. Instructional guides or ‘post-it’ notes should accompany the learner and technology device. A combination of a cognitive (e.g. with appropriate instruction manuals) and experiential (e.g. engaging with the technology) styles were considered the best. The functionality of a particular digital technology should be basic with the option of choosing additional functionality (e.g. that is not necessarily required). A multimedia based approach to learning with the inclusion of virtual avatars is effective in terms of Web 2.0 based learning. A virtual character which was interactive and provided brief, non-jargon information was considered effective. (Interview 1, potentially entertaining learning and support mechanisms). This was emphasised via a 1 to 1 tuition approach which could be fulfilled via a virtual assistant (participant 1, 5 and 7 in focus group 2). This virtual avatar tuition can be considered an effective way to learn as it is considered entertaining. It would also help identify the learner with the virtual character so that their learning is personalised, and structured which is attributed to the dialogue and learning progression with two or more virtual avatars. Further, a study by Falloon (2010) found that when an inquiry approach to learning (in which learners have 'ownership' of their learning by exploration and questioning and gathers and analyses information to make decisions and read solutions) is combined with avatar based virtual environments, a powerful, motivating and educationally valuable learning opportunity can be created. It should include a real world context, student-led approach, collaborative groups and flexible software to be utilised.

The next chapter provides the learning strategies and recommendations based upon this synthesis as well as the conclusions of the entire thesis. This was carried out in a categorical manner. The next chapter answers objective 3 and research questions 5 (how the learning strategies can be formulated based upon the knowledge, understanding and synthesis) and 6 (the production of the learning strategies and recommendations from this) which comprise this objective.

7. Learning strategies within a framework consisting of different categories and Conclusions

This chapter presents the learning strategies within a framework consisting of different categories from the synthesis of the qualitative and quantitative data analyses (presented in chapters 4, 5 and 6) and thesis conclusions. The learning strategies within a framework consisting of different categories answer objective 3 and research questions 5 and 6. Such learning strategies are based upon the themes identified from the synthesis of the data, and is presented as learning strategies within a framework consisting of different categories. The conclusions section includes discussions on how the findings relate and contribute to both the research questions and literature review respectively. It also considers comments based on those considered 'key' findings in terms of the actual learning strategies. This categorical learning framework is directly based upon the knowledge and understanding constructed as a result of older adults' needs and requirements in terms of the learning and support of ICTs.

The next sub section outlines objective 3 and research questions 5 and 6 that comprise it. The platform for the formulation of learning strategies is provided.

7.1 Objective 3 – To establish a platform for formulating learning strategies within a framework consisting of different categories

Research question 5 is outlined as follows: How can learning strategies be formulated that help further and enhance older adult engagement with ICTs and provide social policy, research, design and practice recommendations?

The first step was to identify the key themes that arose within the data synthesis. A theme is considered when at least two instances appear in at least two data collection methods. In general this ranged from a few to several instances (in which such instances represented one theme). The instances were obtained from the data analyses in chapters 4 and 5 and synthesis in chapter 6. Similarly related themes were then grouped which comprised a category. A platform was used to achieve this and is represented in the diagram below:

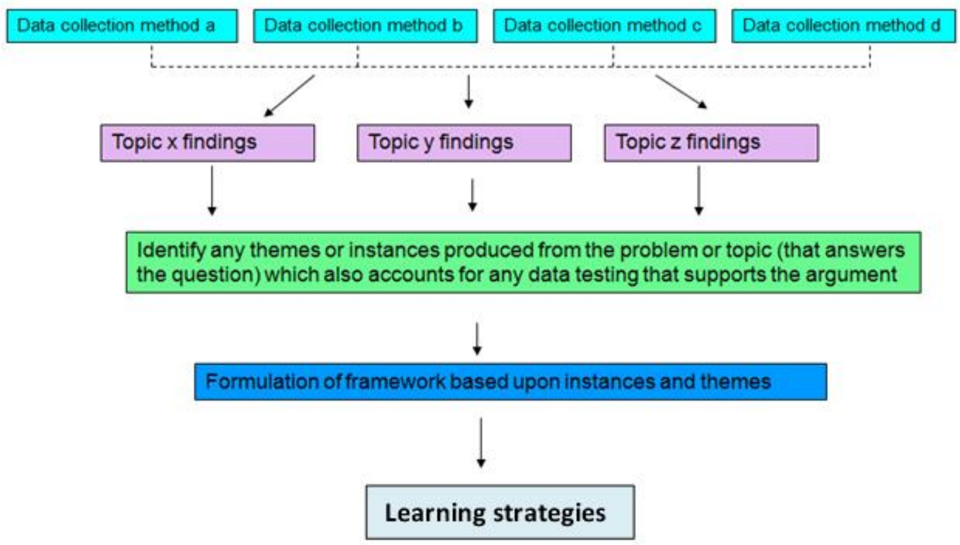

Figure 7.1: A diagram showing the process of formulating learning strategies within a framework consisting of different categories based upon the mixed methods approach

The framework was therefore categorically based (e.g. consisting of different categories) as well as a number of different themes (produced from instances). This has largely been achieved in combination with the synthesis and platform. This platform is then used for answering the next research question, formulating learning strategies within a framework consisting of different categories as discussed.

Research question 6 is outlined as follows: What learning strategies can be used to help further older adult engagement with ICTs and provide social policy, research, design and practice recommendations?

To answer this research question, the categorical framework of learning strategies and recommendations is provided next. Each sub-heading represents a category and within this a numerical theme (comprising a number of instances) is presented below.

<u>Instruction manuals, guides and other documentation to support and enhance learning of ICTs</u>

1. Use simplified, non-jargon and colloquial language
2. It is important to keep to the absolute 'basic functionality outputs' of the device rather than incorporating instructions regarding 'advanced features' of the application or device (although these may considered necessary).
3. Pictorial representations should be used to accompany the description instructions where necessary.
4. The font should be of an appropriate size and format
5. Help guides should be available both in print and on-screen (virtual) format
6. The instructions should be numerically sequenced e.g. 1,2,3 etc. to provide structure as well as being logical and sequential. This simplifies inputs

7. The index should be revised to incorporate all keywords that an older adult user would consider in relation to the content, and direct them to the appropriate page number within the instruction document
8. The instruction manual format should consist of several pages of A4 perhaps in card format. There should be an additional blank page or two in which the learner can record notes to help reinforce their learning
9. A small notepad should be provided to allow notes to be written down to help with recall
10. At the end of the document a glossary with key words and their descriptors the older adult learner may potentially not understand should be provided
11. The use of Acronyms should be minimised where necessary, and if they are used the choice of words should be carefully chosen based upon older adults preferences
12. A phonics based system of learning should also be used as an alternative option
13. Language, terminology and acronyms contained in such guides and instruction manuals should be transcribed from children's language and appropriately modified
14. The number of pages used should be kept minimal in order not to result in information overflow

15. The use of ‘post it’ notes should be provided in which the older adult learners record their notes to help them with the learning process when they return to it
16. Any manual or booklet should be provided prior to learning and engaging with the technology so a conceptual understanding of it is obtained. This can then ease the overall learning of it, and complement an experiential learning style.
17. A completely separate instruction manual or guide that incorporates the use of analogies should be utilised, as an alternative support mechanism
18. Alongside a manual, another document should accompany it providing solutions to potentially common problems, and presented in the same manner as suggested previously
19. Introductory application and software starter packs should be made available via post in hard copy. These alternatives may also be made available with the technology product or application.

An illustrative example of preferred practice for instruction documentation is shown. The technology is similar to the Apple iPad with a few adaptations and takes place in an A4 card type form.

How to start using your new "Learner Pad" in 5 simple steps!

1. Please press the "On" button located at the bottom of the Learner Pad. You will be presented with the main screen
2. Select an application of your choosing by pressing the appropriate icon once on the main screen
3. For further guidance on how to use individual applications if required, please refer to the other Help Cards
4. To return to the main screen menu, press the "Main Screen" button
5. Once finished using the technology, please press the "Off" button, again found at the bottom of the screen

One photograph of the device with labels indicating input functionality and outputs

Figure 7.2: An illustration of the layout of preferred instruction documentation

This could be applied in similar instances and scenarios e.g. other technologies and technology. The key emphasis here is on the transitioning of non-users with minimal experience to users of the application or technology.

An illustrative example of the technology:

Figure 7.3: An illustration of a preferred usable and accessible technology

The bottom segment of the screen consists of physical buttons while the rest of the device is touch screen inputs. The input functionality can also accompany an icon e.g. directly below it.

This takes place in an A4 card format.

Virtual learning

1. A simplified e-learning program should be used which incorporates an intelligence based virtual avatar to provide message prompts where necessary
2. A simplistic games based approach to learning of appropriate situations should be used with an appropriate ‘older aged’ theme in accordance to older adult preferences
3. A collaborative approach should be used in which the learner learns with those who are known rather than those considered unknown
4. A multimedia based approach to learning in which software application media should accompany the product on ‘how to get started’. This can be played back when necessary to facilitate learning and should be considered an optional learning and support strategy to use
5. The multimedia approach should be made available for TV playback as TVs are in general widely owned technologies
6. The avatar should be a ‘real life’ teacher entity or an artificial intelligence entity portrayed in a user friendly manner
7. Instructional guidance and feedback should be provided based upon how far the learner has progressed. An artificial intelligence method

would be feasible as it reduces resources and its availability is based upon the presence of the learner. This is an event driven system which is designed to provide intervention where necessary in accordance to user inputs and make the learning process easier for the learners and help them get the best use of the application or technology. It is based on a set of basic and common issues and seeks to resolve them, should the need arise for the learner

8. Communication mediums (such as those used for social network learning) should contain simplified layouts in a consistent manner with unnecessary items and objects causing distraction
9. Web based instructions should be kept simplified, sequential and in a numerical sequence. The navigation should be logical and consistent with as few buttons as necessary
10. Virtual learning with touch input devices should make use of relatively large touch screen inputs, on screen instructions, presented in a logical and sequential step by step way.
11. Limited jargon as well as standardisation and consistency with the layout e.g. during window transitions, each window should be kept in approximately the same format, with the same buttons and menus in the same positions.
12. With the incorporation of an artificial intelligence virtual character, the basics of the application and tips should be provided as well as tips and advice on how to complete a task where necessary

13. Learning in a virtual environment should also be made an option perhaps after a traditional based classroom approach, to supplement the knowledge and understanding obtained by it or just as an alternative approach to learning
14. The aim of using a virtual technology to learn should be to practically deliver solutions e.g. to use applications to learn how to use and further engagement with other applications and technologies
15. A Web 2.0 social networking platform should be simplified, structured and collaborative with the learning goals and sub goals clearly stated and acknowledged as the learner completes them and incorporates instructional modular design in a group setting.
16. Communication does not necessarily have to be in ‘real time’ and synchronous but it is important for virtual dialogue to be present e.g. one learner requesting help with something, and another learner responding at a later period. This should be incorporated into a chat based medium with the use of virtual avatars to make the experience accessible and user friendly. Such an approach also allows for flexibility.

A virtual based Web 2.0 technology environment with the inclusion of avatars is as shown:

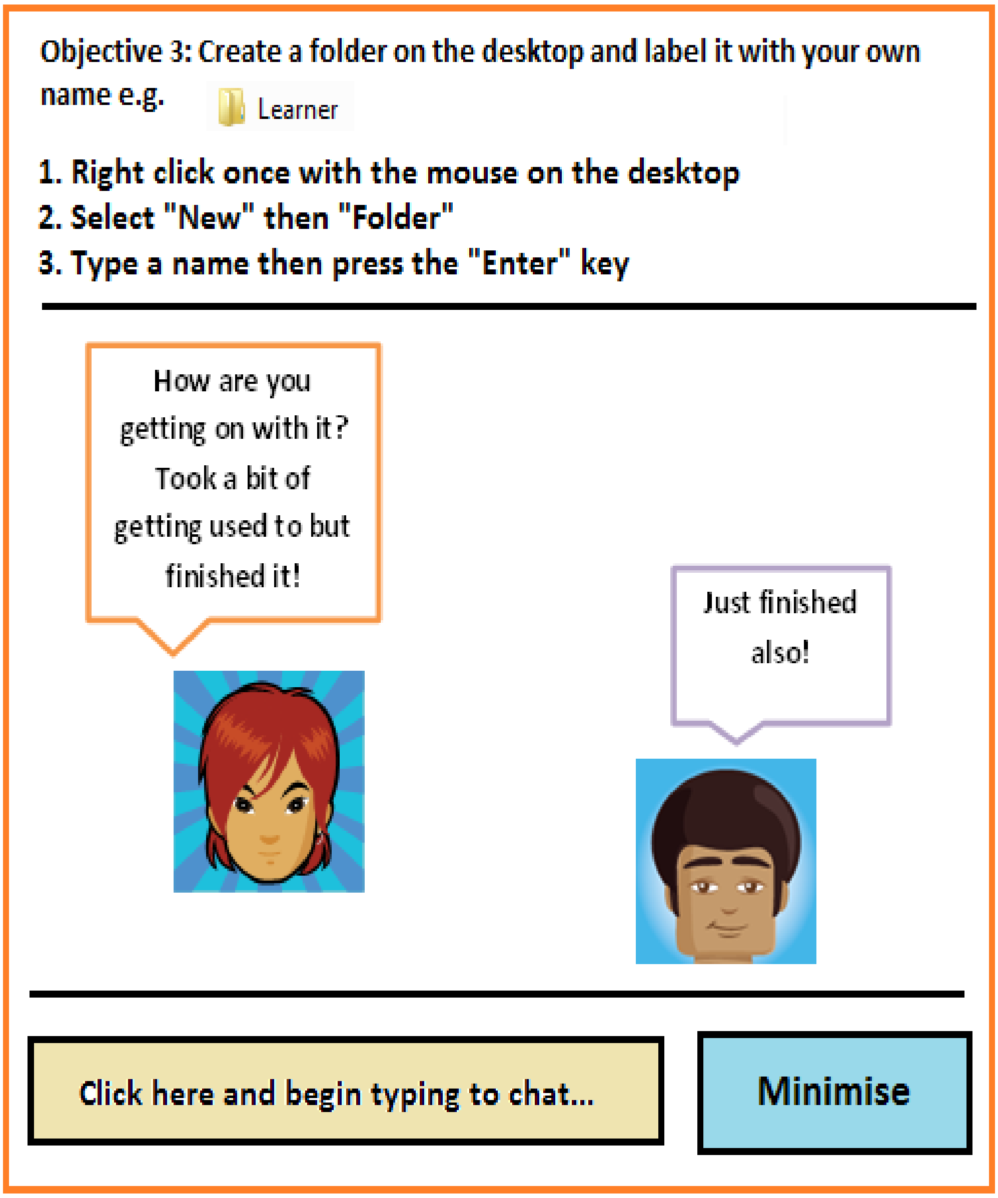

Figure 7.4: An illustration showing Web 2.0 based learning using avatars. There would be a scroll bar to the right of the screen

Multimedia learning

1. Both CD and DVD media should be produced that provide training tutorials and are focused specifically on technology introductory courses.
2. In terms of application learning, the same principle should be applied. So CD and DVD media should be produced that focuses upon the application similar to the Encarta encyclopaedia based multimedia learning mechanism
3. The video and audio output should be of a relatively high output quality
4. Multimedia learning applications should be fun and incorporate a variety of games, as well as maintaining a contact list
5. Some of the mechanisms and functions within Encarta (which closed in 2009) incorporating a combination of text, photographs video and audio to help people learn should be used, in an appropriate media format to supplement the learning programme. This should be structured, with few input buttons, a defined navigational structure, a suitable and prominent search facility with appropriate font sizes and overall simplistic and user friendly layout. However, a structured, numerical format should be used, keeping information, guidance and instruction to a minimum. Links should be made available to more detailed information about the digital technology or application
6. A trivia game similar to Encarta's Mind Maze in which learning is in the form of a puzzle game should be made available. The learning is

interactive and could be applied to the context of learning individual digital technologies and their applications

Learning styles

1. The learning and support mechanism should incorporate an experiential approach underpinned by a trial and error method. This should be used in combination with a conceptual approach (e.g. via the use of documentation)
2. Learning via rote should be an option
3. The experiential and conceptual approach should be used which also incorporates a democratic style to learning whereby other members of the group work towards a common goal (or sub goals that comprise it)
4. The learning process itself should be designed to be simplistic and does not incorporate unnecessary learning components
5. Learning styles should be noted prior to the lesson commencing so that the facilitator can accommodate the learner and adapt their teaching technique where necessary e.g. providing instruction documentation to those who consider themselves to prefer conceptually based learning or a hands on and practical approach for those who prefer experiential learning
6. The learning approach should be influenced by the informational style in that unnecessary information is kept to a minimum so that

complexity issues are avoided. Key information pertaining to the learning should be incorporated

7. The learning approach should also be underpinned by the psychosocial learning style in that the personal and professional benefits are made available and addressed to the older adult learner

Learning structure

1. A small and appropriate group size (e.g. with an optimum number of 6 learners) with tutor facilitation is considered best. The group collaboration may be in 'real' (e.g. particularly with those new to technology) or 'virtual' (e.g. for those who would like to further their engagement with technology)
2. Instructional modular design should be incorporated into the course or learning programme (e.g. stage by stage learning with defined goals and sub goals). The overall task or goal should comprise a number of smaller components
3. Appropriate facilitation either in 'real' or 'virtual' format should be made available
4. While a linear format was considered best, there should also be the option of a non-linear approach (or randomised learning structure) in which the learner can learn components of the work as chosen by them. This may be for example based upon interest
5. The groups (either virtual or 'real') should be divided according to those who considered themselves to be of a particular level of experience e.g.

never used an application or technology before, some familiarity with the application or technology etc.

6. A ‘check list’ of tasks accomplished within the training programme should be maintained by the facilitator to assist with the appropriate pace of learning. This would also be beneficial to the older adult learner in keeping a record of their progress
7. The approximate duration taken to achieve each sub goal and overall goal should be assigned to the older adult learner to help them maintain appropriate pace. There should be an option of abiding by such guidelines as the ‘recommended pace’ could deter some learners while motivating others
8. The learning should provide the facilitator an outline of any particular requirements or needs
9. The learners should have the option of choosing to compete in a quiz based setting in a collaborative manner
10. Courses should be tailored towards practical applications with direct solutions, focusing less on acquiring what may be considered as unnecessary knowledge

Usability and Accessibility

1. The user interface should be of a simple design without incorporating unnecessary and additional functionality in accordance to the ‘basic’ commands

2. Standardisation and consistency should be used with the input functions in terms of aesthetics and positioning. This helps to ensure compatibility between different digital technologies
3. The icons should be of an appropriate size and not too small
4. The navigation should be kept simple and structured with similar items and objects grouped together
5. Web 2.0 e-commerce applications should be simplistic with minimal text, information and larger input buttons and standardisation
6. The functions considered 'basic' should be separated from 'additional' and 'advanced' functionality to minimise potential complexity issues
7. The hardware input functions should be of an appropriate size and structured in a consistent manner to cater for potential manual dexterity issues or make the technology easier to use and learn with
8. Many standard and widely used programs such as e-mail clients should be structured systematically with easy navigation and minimal but necessary functions
9. Remote controls for TVs are considered inaccessible due to the small size of the devices with many functionality buttons which contributes to their complexities. There needs to be fewer functionality inputs with larger input buttons that correspond to functions that are used the most
10. Other simplistic versions attributed to the interface layout design and appropriate number of functionality features of Web 2.0

technologies such as social networking platforms and online booking systems should be made available. This may include requiring a different, accessible version. Such complexity is also attributed to information management. This is particularly important in this instance, namely in producing non-redundant data via data reduction

11. An option should be made available to enable and activate specific accessibility functions e.g. a generic command to increase the font size
12. There should be minimal number of windows, menus and options, as this can cause complexity issues. Such additional functionality can also deter an older adult from learning and engaging with the technology, based upon a complex system design
13. In relation to the standardisation principle, there should be consistency with the layout of the technology and applications that comprise it
14. There should not be too many functionality options within the menus. Further, the number of menus should be limited too
15. The learners should be made aware of the relevance of particular applications or technologies which can be achieved by providing sufficient course content and assessing the learners comments about the training programme. Flexibility should also be incorporated into it

Pedagogical and andragogical influences in classroom based environments

1. The material should be kept simplistic and delivered at an appropriate pace with minimal jargon
2. The aspects of the course that are considered the ‘basics’ should be identified and taught first
3. A linear (e.g. inter-related stages) and randomised approach (e.g. learning components of the course in the preferred order of the older adult learner) are two suggested approaches to learning
4. The formal courses should be complemented by an informal approach in which the facilitator provides the advice and guidance where necessary e.g. intervention to help resolve difficulties as well as encouragement to motivate the learners
5. The ‘show how’ method of using the technology in classroom based environments should be used by the teacher to individual learners for the entire cohort if necessary
6. Courses should be divided into two categories: Those in which pre-requisite knowledge (which may be gained conceptually or through experience) is not required and those in which pre-requisite knowledge is required. This can cater for those who consider themselves to have two different levels of experience. The majority of (if not all) courses should be designed to cater for those with no or limited experience, as many participants that attend courses do

so because they have not had access to the particular digital technology device

7. The basics should be explained so that a conceptual understanding of the application or technology is gained, prior to any experiential use. This could be produced via an A4 card document
8. Material where necessary should be repeated and reiterated to enable the learner to recall it, although in various forms e.g. material taught as well as contained in an accompanying document to supplement the lesson. This should contain only the required information
9. Each lesson should be divided into a number of sections e.g. with a 1 hour slot, 50% (of time) assigned to material delivery, 25% group working and application of knowledge and reflecting on material issues and 25% to allow the teacher to provide facilitation where necessary and evaluate the learning outcomes of the learners. This allows for a democratic style to teaching.
10. Flexibility should also be incorporated in to the above in that the learners can universally agree upon the time duration assigned to each element of the learning course
11. An interactive whiteboard should be made available in which the learner can also deliver the material that has been learned to the other learners. It has been found that learning through peers and colleagues (with this learning and teaching being facilitated by the instructor) has been successful and is underpinned by a problem

based approach to learning. This technology allows the learner to interact and engage with it, in an experiential manner compared with other traditional classroom boards. The learner can take the role of the teacher and deliver material to other learners which will also help them to learn. This is also known as peer based learning.

12. A scenario based approach should not be used yet problem based learning following the democratic style with peers is considered effective which involves reaching goals and sub goals in a collaborative manner
13. Material (in the form of a booklet) should be used to reinforce what has been learned with optional exercises provided to the learners so that learning can be enhanced without the use of technology, and in a paper format instead
14. A workshop based learning environment should be used to enable familiarisation
15. Core values on a device as well as the 'hidden' values e.g. to use technology for personal interests and social interaction should be addressed and made aware of. In other words, benefits that may not have been considered by the learner

<u>Motivations</u>

The following list provides the motivations that influence older adult's desires to use ICTs. These are based upon both the software applications and hardware that comprise such ICTs.

1. The technology should incorporate internet facilities to establish connectivity as the internet as a key motivator for wanting to learn to use internet embedded ICTs. The internet is considered a key utility with many digital technology devices
2. A common and widely acknowledged reason why older adults choose to learn to use particular digital technologies is for authoring purposes e.g. constructing letters and emails to those who are known to them
3. Information retrieval and management e.g. using search engines to retrieve information about specific topics and using and managing it accordingly are key motivators to ascertaining knowledge and understanding of a particular subject
4. Sending material content via email such as word processed letters and picture files are used for work and leisure related activities. These include enriching the social connectivity with those who are known to the older adult, as well as for administration purposes
5. For using tele-health applications and technologies in which older adults can get up to date health and wellbeing information via a communications technology. This could be very effective if integrated into commonly used technologies such as mobile devices and computer laptops
6. The facilitator should bring compassion in a pastoral manner to the learners by working with them where necessary, and supporting

and encouraging them and addressing any issues. Feedback from the learner should be sought

7. For personal administration to enable and promote independence and autonomy e.g. maintaining events in diaries and managing bank accounts (not necessarily online but on a spread sheet for example)
8. Technologies connected to the internet can be used for searching and retrieving information about job and leisure related activities. Such a channel allows for a vast amount of information of a job or activity, including contact details of members affiliated with such groups
9. For photography applications that store and share picture files with those who are known to the older adult, and maintain social mobility
10. Learning in general through the use of technologies is a key motivator in which knowledge transfer occurs and enhances understanding of a subject
11. Maintaining contact with those who are known via e-mail and Skype applications were considered key motivational influences in engaging with ICTs

Feedback

1. Feedback should be balanced and constructive with aspects of the learning outlined which were considered successful and aspects which could be improved
2. This feedback should provide encouragement regardless of the performance of the learner as well as providing improvement strategies at the end of the learning programme
3. A feedback sheet should be designed and provided so that the learner can consult it when required and the statements sequenced numerically
4. Feedback should be compassionate, yet seek to help the learner improve
5. There should also be tips and recommendations to further learning progress and enhance knowledge and understanding

Perceptions

1. Complexity issues should be minimised by use of appropriate advertising and marketing of learning courses with the benefits and learning mechanisms addressed
2. Privacy issues should be addressed with applications associated with e-commerce Web 2.0 technologies. They should as such be designed with minimal information, functionality inputs and use a basic layout
3. Security issues should be addressed and minimised particularly where the technology is connected to the internet

4. The learning of digital technologies for those with no prior experience should be designed with a smooth transition by providing the appropriate pre-requisite knowledge prior to starting the course
5. Perceptions about the actual learning should be considered from the perspective of what the material and course can help the older adult to do (e.g. understanding the core values), as well as for satisfaction, pleasure, understanding and social reasons (e.g. the hidden values).

Collaborative learning

1. When learning in group (or collaborative) settings, the pace of learning should be synchronised to accommodate all learners by the facilitator. This allows the learner to complete the sub tasks more or less together and can enhance the dynamics of the group. This also includes moderating the dialogue so that material is delivered in accordance to the learning progression of all learners
2. A problem based learning approach should be used, which does not take into consideration 'scenario based learning'. This follows the democratic style (or "learner centred" approach) in which learners seek to achieve the sub goals and overall goal with other members of the group
3. A group number of around 6 and no more than 10 should be used
4. There should be structure by setting goals and sub goals by incorporating instructional modular design. This allows the learners to work in a synchronised and systematic manner, stage by stage

Learning reflection and evaluation and practices the older adult learner should use

1. The older adult learner should reflect and evaluate their learning mechanisms (and aspects of learning mechanisms) as well as articulate their motivational desires in terms of what ICTs can fulfil. This allows learning progression to be furthered. The following flowchart is used to illustrate this:

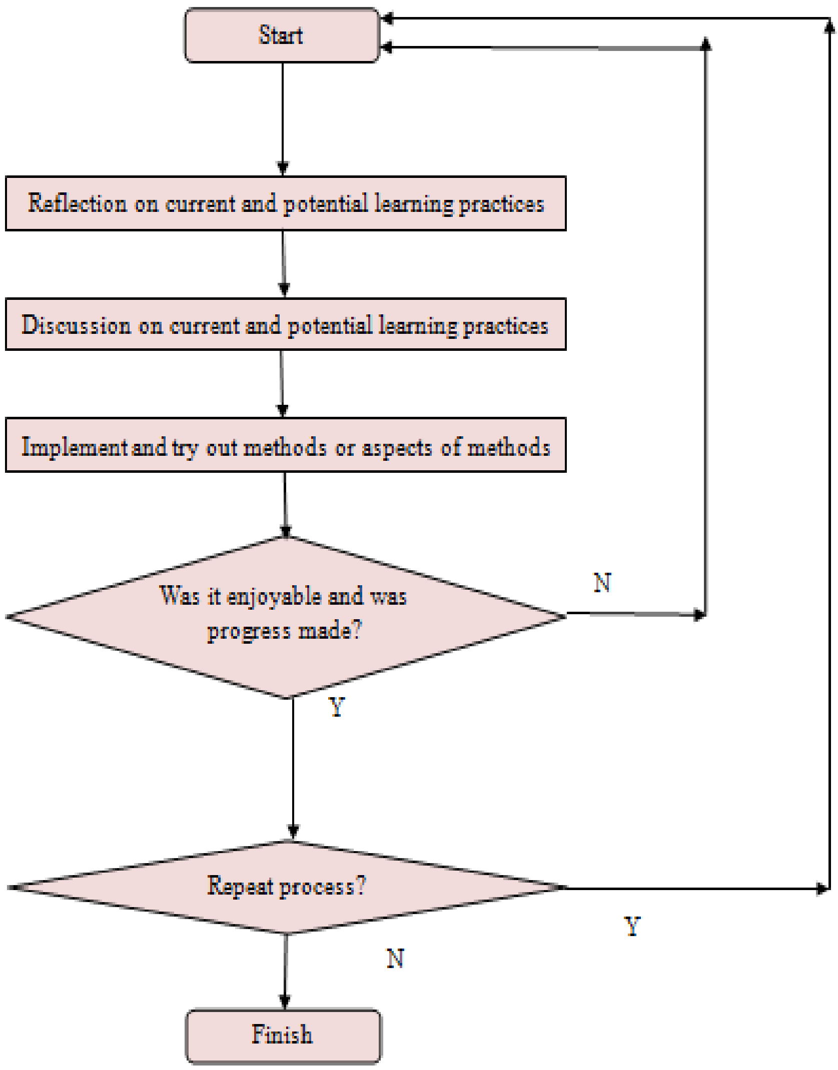

Figure 7.5: A flowchart showing the self-reflection and evaluation process that the learner should embrace to maximise their learning opportunities to further technology engagement

2. Such a strategy should be considered at the end of the course or training programme

Facilitation

1. The facilitator should be compassionate and work with the learners as well as providing encouragement for them
2. An informal and user friendly approach should be used
3. The same facilitator should be used throughout the learning programme
4. The facilitator should provide the learners with a number of learning options prior to each learning programme dependent upon their style of learning with some flexibility incorporated into it
5. When presenting feedback the facilitator should establish informal discussions with the older adult learners
6. The facilitator should help to keep the learner on task as well as provide encouragement
7. Further goals should be identified via independent learner-teacher collaboration

Other issues

1. It is imperative that an older adult learner engages in the process of self-reflection and evaluation of their learning preferences and potential alternatives as well as needs and requirements in terms of what the various digital technologies can offer them

2. An increase of broadband and wireless hubs should be placed in and around locations where there is often limited availability e.g. geographical rural locations
3. The digital technologies should be designed to be intuitive and user friendly, by simple and accessible design geared towards the older adult learner

4. A virtual helpdesk in which the helper is an 'artificial intelligence' program should be used to supplement the learning environment (e.g. the older adult learner can select it and choose from an option menu if they would prefer to resolve a difficulty or learn a completely new aspect of the program altogether such as authoring letters or browsing the internet)
5. The language, terminology and acronyms used on applications such as word document packages, and internet browsers should be coherent, user friendly and understanding
6. Learning programmes via the post should be made available with the appropriate documentation and instructions with CD or DVD based media to complement the learning material
7. Endorsement by appropriate organisations of learning and training programmes would enhance trust as the older adult is likely to participate in the course e.g. via affiliation
8. Advertisements should target the over 50s and emphasise the uses of such technology as well as its simple accessibility. This can be

achieved via TV advert broadcasts, leaflets, websites, community centres, local councils and the government

9. Error messages should be understood and be of appropriate clarity to help the older adult learner resolve an issue or difficulty
10. Isolation from other people should be minimised where necessary, and learning virtually and in group settings with other learners is a solution to this
11. The fees of traditional courses should be reduced with set up and installation fees free, to enhance participation and engagement
12. The best places to learn are considered classroom environments, libraries, community centres and workshops etc which are considered a comfortable environment

The next section provides the conclusions to the thesis.

7.2 Conclusions

This section outlines and evaluates a number of areas pertaining to the key components of the research, as well as how the work contributes and fits into the general direction of the overall field. It discusses transferability and a theoretical contribution. It has been found that a number of key learning and support mechanism themes emerged and these were contained within various categories. The themes were based upon the views. These themes ranged from optimisation; techniques and recommendations of older adult learning and support needs and requirements. As mentioned these categorical themes have been produced by triangulation. In some cases however, opposing views (and those which were considered to be equally popular) were held. Further, relationships were established between the syntheses of the findings and some of the key theoretical positions put forward by learning theorists. The research objectives, their subsequent questions and aim were formulated based upon the literature surveyed and in particular the limited empirical based literature surrounding the subsequent questions. To reiterate, this was how older adults currently learn and were engaged with ICTs, new learning and support mechanisms to utilise aspects of these for furthering and enhancing their engagement with them, as well as learning strategies formulated based upon this. The research question and each respective data collection method question (or topic of discussion) is presented in Chapter 3, the Methodology chapter. The key points addressed are developed from the literature review, methodology and findings, analyses and interpretations sections. The next sub section discusses how the findings relate to the research objectives and their subsequent questions. This is developed from the Methodology section.

7.2.1 How the findings relate to the research objectives and subsequent questions

The synthesis of the findings was both as a result of the analyses and interpretations of the primary data collection method which corresponded to each research question. Each of the questions was designed based upon the secondary source findings from the literature, the other primary and secondary data collection method questions. This was also used to fulfil each research question domain, and objectives of the research. This was to ensure the aim of the research was met in providing the knowledge and understanding, synthesis as well as learning strategies contained within a framework consisting of different categories obtained from this. The appropriate link between each data collection method question and research objective has been established. The nature of each data collection method and research question is provided in the Methodology section. The following sequence used is shown:

1) **Survey empirical based literature to formulate research questions and objectives to fulfil the aim**
2) **Design and formulate research question 1**
3) **Formulate data collection method questions based upon research question 1's domain and on pre-requisite research questions and findings**
4) **Repeat for each of the other research questions**

A key component of this was to also reinforce and test previous findings to ensure appropriate validity. Some themes are inter-related and share similarities with others, and all themes underpinned the main ways an older adult learns in relation to ICTs. A few strategies did however require external and government intervention. The quantitative and qualitative findings and subsequent syntheses were pre-requisites to formulating the learning strategies. All the findings forming themes were relevant to each research objective and their subsequent questions are contained, and any unnecessary or unrelated data has been discarded.

The next sub section outlines how the findings have contributed to and are related to the literature in the field. In particular the categories and themes of learning strategies were identified as a direct result of a combination of the research questions and current and new methods (and aspects of these).

7.2.2 Key discrepancies and limitations within the research

In terms of the sample population of the surveys, there was bias towards female participants, and as a result it was difficult to determine statistically significant differences between male and female respondents. This was because of higher female attendance at the Age UK lunch clubs, and due to the time and resource constraints of the research it was difficult to gather a significantly higher number of male respondents without appropriate use of time and other resources. Further research could be carried out to address this issue. Just two participants joined the third focus group. While considerable depth was explored with these two participants, it was limited in terms of a wider variety of perspectives being put forward and elaborated upon. There was also the problem of longevity in that if technologies change by a substantial amount or there is inception of emerging technologies, then new learning mechanisms could ensue. This notion was identified and reinforced by a participant in Focus group 2 in that ICTs have changed, which could affect the learning and usage of them. There were also differences in the preconceived complexity of ICTs and how the technology could benefit older adults.

There were discrepancies that arose (even challenging the themes) in that a few participants preferred a non-linear and randomised learning structure, based on their preferences for a particular learning topic within the subject.

Participant #1 (interview) stated: "*Very little learned through structured training at all*"

This view was opposed to the main theme that a linear and structured format should be used, in which each module or stage of learning within the learning programme is a pre-requisite to another. Further it was found that a combination of informal and formal based learning was preferred, although it was still of considerable importance to incorporate both dialogue (e.g. informal based) and structure (e.g. formal based) into the learning process.

Participant #4 (interview) stated: "*You sit around the table again and talk about progress and what they're learning*"

This was also reinforced by a discrepancy that found those aged 55 and over much preferred informal learning (Kirsti et al 2008). It was further found that learning with at least one learner (e.g. either in real or virtual environments) was considered key to successful learning, whether within the learning itself or the hidden curriculum associated with it e.g. gaining friendship and personal benefits. However, the other learners may not always be present when the older adult wants to learn (unless group learning is provided at a structured training venue such as a course) so there is a certain amount of inflexibility about such availability. It was found in a study by Boulton-Lewis (2008) that gender affects levels of learning, and that a higher proportion of females participated in learning programmes than males. This reflected the gender participation rates. Another discrepancy was found with social network learning in that reservations were held about learning with them, yet as established such platforms have a significant amount of scope for learning with in collaborative settings. Such views were also similar to other Web 2.0 technologies, such as e-commerce applications and it has been proposed that a simpler, accessible version is introduced to increase accessibility, reduce preconceived complexity and confidence notions and further learning engagement and thus technology usage.

Participant #4 stated: "*The other deterrent is that sometimes the complexity impression they've got rather than having it explained to them*"

There were also reservations about learning via instruction manuals, although this was attributed to their current format. Suggestions have been proposed to optimise and improve instruction manuals for learners, as a conceptual based approach from rehearsing and understanding material is a key aspect of successful learning. Manuals can be used to provide pre-requisite knowledge and understanding about the technology to ease the learning process.

Although some digital technologies were used increasingly than others in the research (e.g. the PC, laptop and mobile devices) the knowledge, understanding and learning strategies were based upon all digital technologies. This knowledge and understanding is intended to apply to future technologies. This is because they are purely based on human perception factors and usage of them, and what eases, helps or inhibits the learning process. Such needs, requirements and perceptions should also be considered when considering, designing, producing and promoting new and future technologies. The key design principles are based around such needs and requirements.

7.2.3 How the discussion of the findings contribute and are related to the literature in the field

The findings from the research are distinguished from the literature surveyed in that the synthesis of the knowledge and understanding as well as the learning strategies between the older adult learning of ICTs with respect to the new dynamics of ageing are identified from repeated themes and key topics of discussion of the research. The literature consisted of key learning demographic statistics and the relationship between older adults and technologies, but was limited in exploring how the technology was learned with respect to the new dynamics of ageing, and what could be done to further engagement between the two entities. The studies also lacked a mixed methods approach which was underpinned by the principles of participatory action research that involved working collaboratively with the participants. It also considers all digital technologies and not just one which was the focus of various studies. This implies that the learning strategies proposed are associated with a broad spectrum of digital technologies, rather than just one. The way an older adult learned to use one digital technology may differ compared to learning with another. It is thus imperative to consider the learning strategies of both technologies, and produce the strategies in a framework consisting of different categories. This also allows increasing opportunities to explore and identify various learning categories which may not have been identified while studying just one digital technology. The consideration of various digital technologies was therefore imperative in producing the learning strategies framework consisting of different categories. In terms of the methodological approach, this research uses a mixed methods research methodology with a qualitative participatory action research emphasis. This has not been used before within the field and is unique because it works collaboratively with participants to contribute to knowledge and understanding. It furthers Entwistle et al's (2001) research on classroom optimisation and a matching technique can be used to compare key learning styles identified by Honey and Mumford (1989) as well as by new learning styles established by other theorists, educators and researchers which were identified in the literature review chapter. The empirical based studies considered just one technology, and focused less on the learning of them but on their usage. They also informed theoretical positions by proposing learning styles of older adults with technologies. The categories are of relevance to a number of learning and support domains in which older adults interact, whether this is pedagogically based in a classroom setting or within the applications and technologies themselves. The findings from those who have had minimal engagement with ICTs were also provided, as well as the relationships between age and gender groups and learning strategies and styles. However, research could be carried out to establish relationships between such factors and the learning and support.

In terms of motivational influences, one of the key motivators was related to information retrieval and management which was also identified as part of Kirsti et al's (2008) study on the learning opportunities offered to older adults by ICTs. However this study focused on the opportunities afforded by ICTs to older adults. A motivational study carried out by Wlodkowski (2000) suggested that teachers must be attuned by the influences of culture on motivation and hence learning. These include factors such as establishing inclusion and high and low teaching contact variations. Another motivational influence identified from Boulton-Lewis et al's (2006) study was that of knowledge transfer through discussions or the learning outcomes set. Other motivations included understanding social change while conversely; demotivating barriers included lacking self-confidence and interest, although they did not explore these concepts further (Purdie et al 2003).

The learning mechanisms are underpinned by an experiential and constructivist style (in which knowledge is built on experiences) to learning in combination with conceptual based approaches. In particular Huang (2002) proposed instructional guidelines based upon a constructivist style within online learning environments. This was however based upon one domain. It reinforced that an experiential style to learning was required for a successful learning experience with the older adult learning of ICTs. The research found that learning occurs best within comfortable environments which consisted of being at home or in community centres with those who are known and familiar to the older adult learner.

Participant #1 (interview) stated: "*What I would regard as a successful learning experience is an interactive learning experience whereby I could feel comfortable*"

However, a study by Eaton et al (2005) found learning was the most successful in computer laboratory based settings, although not in other environments where distractions were present which was commonly associated with multipurpose rooms. A key component of this research considered the notion of self-reflection and evaluation of learning mechanisms. It was found that a similar notion known as 'self-efficacy' within virtual environments (which was again contained within one context). It also did not consider 'older adults' but 'mature students' instead (although this could qualify for those over 50 too). In terms of facilitated instruction, it was found that the facilitator or tutor should be aware of older adults' learning styles and consider adjusting to their teaching approach. This was similar to a report which found the same findings, although it was limited in that it was conducted just with 'adult learners' (Russell 2006). A key theme found with the research was that dialogue should be maintained with those known to the learner in a structured setting (e.g. with defined sub goals) as well as with facilitation and instruction where necessary. A computer assisted study of interactive learning in a multicultural environment by Liang et al (1999) found that those who considered themselves 'introverted' preferred to establish dialogue via virtual mediums, while those 'extroverted' preferred 'real' communication dialogue. It should be noted however that the terms 'introvert' and 'extravert' should not necessarily be considered as separate entities, and that a learner may consider to be both reflecting a preference for 'real' and virtual communication environments. Further, a Malaysian study by Merriam et al (2000) found that older adults learned via an experiential and informal approach and that 90% of older adults who were engaged with learning projects were self-directed (Merriam et al 2000). A study by Eisma et al (2004) found a number of learning and support problems with older adults and ICTs, but these focused upon the attitudes and perceptions expressed by older adults in terms of actual ICT usage. This research considers previous experience of ICTs, attitudes towards them as well as factors that the older adult learners considered effective or ineffective in terms of technology learning.

In terms of the actual digital technologies learned it was found that they for the most part matched those identified in the Ofcom report (Ofcom 2010). These were the computer, mobile telecommunication devices and handheld devices. Although print media and radios were considered prevalent in the Ofcom survey, they were not found to be as prevalent in the research. This survey also did not take into consideration the applications that comprised such technologies. The key barriers to disengagement with ICTs were that of informational factors (limited awareness of the learning courses and technologies available) and psychosocial factors (the learners attitudes, perceptions and pre conceived notions in terms of learning and technologies) (Findsen 2002). In terms of Honey and Mumford's (1989) learning framework, each of the four styles (experiential, cognitive, reflector and pragmatist) underpinned methods of current learning as well as potential learning methods although the most prevalent was a combination of the experiential and cognitive learning styles. The trial and error method was underpinned by the pragmatist style while the learning reflection and evaluation approach was the reflector style. This was outlined in detail within the learning strategies within a framework consisting of different categories. In terms of updated learning styles with respect to the learning of ICTs, the collaborative and democratic styles were prevalent. This was in relation to collaborative learning. The two key learning styles identified by Vermunt (1994) were the learning orientation and dialogue model of learning styles. Further, the research found the following factors were related to Entwistle et al's (2001) strategic approach to curriculum design: courses that take into account pre-requisite knowledge, issuing appropriate feedback and establishing dialogue with a group of learners. These factors were not however considered further and in detail in terms of attributes considered successful to them.

7.2.4 How the work contributes and fits into the general direction of the overall field and the contribution

This thesis is primarily focused on "learning". In particular it is about understanding how people (and in particular those over the age of 50) learn with respect to a specific context (ICTs). Due to this learning emphasis, the thesis resides predominantly in the "educational studies" field. Also, as the thesis has wider implications from a social policy perspective, it also resides within a societal domain. As such it draws from three key disciplines: Learning, society and technology which reside within the "educational studies" field.

Although the thesis is of an inter-disciplinary nature, it resides in the "educational studies" domain due to the central theme which is "learning" (in a particular context). It is to educate how older adults can use technologies effectively, to ease their learning and increase the accessibility of ICTs, either directly or indirectly (e.g. by informing social policy, research, design and practice). This also includes disability groups. It therefore extends the forefront of the discipline by considering the learning and support of all older adults (regardless of ability) in the learning and support of ICTs.

The contribution to knowledge has been achieved in the following ways:

<u>The empirical contribution</u>

An empirical domain has been investigated and proposed while no such domains exist in the field. No learning strategies have been previously proposed based upon the knowledge and understanding obtained on the learning and support of older adults with ICTs with respect to the new dynamics of ageing. This is unique and is of substantial significance in promoting autonomy and independence for older adults and thus minimising the barriers to the uptake of ICTs and providing appropriate solutions in the form of learning strategies. There is also a theoretical contribution which links to the empirical contribution in terms of the learning strategies presented. The quote "There is nothing so practical as a good theory" from Kurt Lewin reflects this.

<u>The methodological theoretical contribution</u>

The Methodology has been adapted in that it used a mixed methods approach which was underpinned by the principles of PAR. This was unique to the context of the study in that it co-constructed knowledge by working collaboratively with older adults. It was found that the adaptation of the Methodology was successful in fulfilling the research aim. The environments used were familiar to the older adult learner and this was one of the key factors that contributed to PAR.

Transferability of findings

In terms of the empirical contribution to knowledge, the notion of transferability is of considerable importance. The findings can be transferred to similar contexts, situations and environments and are generalizable to an extent. This is in particular regard to universal design and disability areas. The study invited anyone over the age of 50 who wanted to take part. In particular transferability also considers the relationships between age and gender and other factors and valid inferences were drawn from such variables

The universal design concept considers people with disabilities, regardless of their age, ability or status in life which is a central theme of this research. Due to such a universal design notion being incorporated into the research, it considers people with all abilities and characteristics, including those who consider themselves to have disabilities. This research meets this by providing strategies to enable simple and intuitive use and tolerance for error. The environments in which the research took place were within community based settings which the older adults were familiar with e.g. Age UK and Nottingham

Elders Forum. It was designed to be as accessible as possible for all those who were taking part in the research, with help and assistance being offered to those who required it. As such, the findings could be transferred in similar situations in other locations and settings. Such learning and educational based settings are unlikely to change by a significant amount in the future, for older adult learners, which contributes to the importance of it.

Disability is a significant concern and those who consider themselves to have disabilities can take advantage of many of the opportunities offered by ICTs. To reiterate, the term “disability” refers to the inability to use technology to a personal satisfaction level. In the context of this thesis it is largely subjective and is based upon the opinion of the older adults who were part of the research.

The next sub section considers some final comments to conclude the thesis.

7.2.5 Final comments

To conclude the contribution to knowledge has been achieved by providing the knowledge and understanding on the learning and support needs and requirements of older adults with ICTs with respect to the new dynamics of ageing. The learning needs and requirements focused upon previous engagement of ICTs and learning as well as new learning and support. This has also been furthered by the formulation of learning strategies within a framework consisting of different categories and recommendations for older adults to use, as well as to inform social policy, research, design and practice. In terms of further work, research could be conducted into establishing the relationships between individual differences and learning needs and requirements, whether current and potential in relation to ICTs. If resources allowed, a learning environment could be artificially set up with a number of widely available technologies, with a number of learning and support devices at their disposal to complement the research.

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Appendices

Frequency tables

1.1 About non-use of ICTs

Not being sure where to start

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly agree	12	32.4	34.3	34.3
	Agree	11	29.7	31.4	65.7
	Neither agree nor disagree	4	10.8	11.4	77.1
	Disagree	6	16.2	17.1	94.3
	Strongly disagree	2	5.4	5.7	100.0
	Total	35	94.6	100.0	
Missing	System	2	5.4		
Total		37	100.0		

Not having any use for ICTs

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly agree	9	24.3	26.5	26.5
	Agree	5	13.5	14.7	41.2
	Neither agree nor disagree	9	24.3	26.5	67.6
	Disagree	10	27.0	29.4	97.1
	Strongly disagree	1	2.7	2.9	100.0
	Total	34	91.9	100.0	
Missing	System	3	8.1		
Total		37	100.0		

Lacking confidence when using ICTs

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly agree	10	27.0	27.0	27.0
	Agree	12	32.4	32.4	59.5
	Neither agree nor disagree	7	18.9	18.9	78.4
	Disagree	8	21.6	21.6	100.0
	Total	37	100.0	100.0	

Not sure the benefits of ICTs can bring

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly agree	8	21.6	21.6	21.6
	Agree	9	24.3	24.3	45.9
	Neither agree nor disagree	10	27.0	27.0	73.0
	Disagree	8	21.6	21.6	94.6
	Strongly disagree	2	5.4	5.4	100.0
	Total	37	100.0	100.0	

That material may be unsuitable

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly agree	9	24.3	25.7	25.7
	Agree	12	32.4	34.3	60.0
	Neither agree nor disagree	5	13.5	14.3	74.3
	Disagree	7	18.9	20.0	94.3
	Strongly disagree	2	5.4	5.7	100.0
	Total	35	94.6	100.0	
Missing	System	2	5.4		
Total		37	100.0		

That there are security issues

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly agree	17	45.9	51.5	51.5
	Agree	10	27.0	30.3	81.8
	Neither agree nor disagree	3	8.1	9.1	90.9
	Disagree	2	5.4	6.1	97.0
	Strongly disagree	1	2.7	3.0	100.0
	Total	33	89.2	100.0	
Missing	System	4	10.8		
Total		37	100.0		

1.2 External and environmental factors' tables

That there is no access to ICTs

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly agree	10	27.0	29.4	29.4
	Agree	9	24.3	26.5	55.9
	Neither agree nor disagree	4	10.8	11.8	67.6
	Disagree	7	18.9	20.6	88.2
	Strongly disagree	4	10.8	11.8	100.0
	Total	34	91.9	100.0	
Missing	System	3	8.1		
Total		37	100.0		

That the cost of equipment is expensive

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly agree	16	43.2	45.7	45.7
	Agree	11	29.7	31.4	77.1
	Neither agree nor disagree	5	13.5	14.3	91.4
	Disagree	3	8.1	8.6	100.0
	Total	35	94.6	100.0	
Missing	System	2	5.4		
Total		37	100.0		

That the cost of the course is expensive

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly agree	10	27.0	29.4	29.4
	Agree	12	32.4	35.3	64.7
	Neither agree nor disagree	10	27.0	29.4	94.1
	Disagree	2	5.4	5.9	100.0
	Total	34	91.9	100.0	
Missing	System	3	8.1		
Total		37	100.0		

That the cost of the course is expensive

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly agree	10	27.0	29.4	29.4
	Agree	12	32.4	35.3	64.7
	Neither agree nor disagree	10	27.0	29.4	94.1
	Disagree	2	5.4	5.9	100.0
	Total	34	91.9	100.0	
Missing	System	3	8.1		
Total		37	100.0		

That there is no awareness of the training available

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly agree	6	16.2	17.1	17.1
	Agree	15	40.5	42.9	60.0
	Neither agree nor disagree	4	10.8	11.4	71.4
	Disagree	9	24.3	25.7	97.1
	Strongly disagree	1	2.7	2.9	100.0
	Total	35	94.6	100.0	
Missing	System	2	5.4		
Total		37	100.0		

That there is limited internet access in the location

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly agree	7	18.9	20.6	20.6
	Agree	1	2.7	2.9	23.5
	Neither agree nor disagree	12	32.4	35.3	58.8
	Disagree	9	24.3	26.5	85.3
	Strongly disagree	5	13.5	14.7	100.0
	Total	34	91.9	100.0	
Missing	System	3	8.1		
Total		37	100.0		

That there is limited transport access to computer stores

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly agree	7	18.9	20.6	20.6
	Agree	7	18.9	20.6	41.2
	Neither agree nor disagree	10	27.0	29.4	70.6
	Disagree	8	21.6	23.5	94.1
	Strongly disagree	2	5.4	5.9	100.0
	Total	34	91.9	100.0	
Missing	System	3	8.1		
Total		37	100.0		

That there is no one to help with ICTs

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly agree	5	13.5	15.2	15.2
	Agree	13	35.1	39.4	54.5
	Neither agree nor disagree	6	16.2	18.2	72.7
	Disagree	3	8.1	9.1	81.8
	Strongly disagree	6	16.2	18.2	100.0
	Total	33	89.2	100.0	
Missing	System	4	10.8		
Total		37	100.0		

That ICTs would not bring benefits to the lifestyle

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly agree	7	18.9	21.2	21.2
	Agree	9	24.3	27.3	48.5
	Neither agree nor disagree	6	16.2	18.2	66.7
	Disagree	6	16.2	18.2	84.8
	Strongly disagree	5	13.5	15.2	100.0
	Total	33	89.2	100.0	
Missing	System	4	10.8		
Total		37	100.0		

1.3 Personal aims and aspirations

That ICTs can be used for communicatin with others

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Interested	16	43.2	47.1	47.1
	Might be interested	6	16.2	17.6	64.7
	Not interested	12	32.4	35.3	100.0
	Total	34	91.9	100.0	
Missing	System	3	8.1		
Total		37	100.0		

That the computer can help with a job

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Interested	9	24.3	30.0	30.0
	Might be interested	2	5.4	6.7	36.7
	Not interested	19	51.4	63.3	100.0
	Total	30	81.1	100.0	
Missing	System	7	18.9		
Total		37	100.0		

That internet shoppping could be done

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Interested	7	18.9	20.6	20.6
	Might be interested	4	10.8	11.8	32.4
	Not interested	23	62.2	67.6	100.0
	Total	34	91.9	100.0	
Missing	System	3	8.1		
Total		37	100.0		

That the news and weather could be checked

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Interested	10	27.0	30.3	30.3
	Might be interested	8	21.6	24.2	54.5
	Not interested	15	40.5	45.5	100.0
	Total	33	89.2	100.0	
Missing	System	4	10.8		
Total		37	100.0		

That online banking could be carried out

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Interested	7	18.9	20.6	20.6
	Might be interested	5	13.5	14.7	35.3
	Not interested	22	59.5	64.7	100.0
	Total	34	91.9	100.0	
Missing	System	3	8.1		
Total		37	100.0		

That travel bookings could be made

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Interested	10	27.0	30.3	30.3
	Might be interested	6	16.2	18.2	48.5
	Not interested	17	45.9	51.5	100.0
	Total	33	89.2	100.0	
Missing	System	4	10.8		
Total		37	100.0		

Age groups with respect to individual learning variables

1.4 Age groups and non-use of ICTs

Agegroup * Not being sure where to start Crosstabulation

			Not being sure where to start					
			Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree	Total
Agegroup	60 to 69	Count	1	3	1	2	1	8
		% of Total	3.3%	10.0%	3.3%	6.7%	3.3%	26.7%
	70+	Count	9	6	3	3	1	22
		% of Total	30.0%	20.0%	10.0%	10.0%	3.3%	73.3%
Total		Count	10	9	4	5	2	30
		% of Total	33.3%	30.0%	13.3%	16.7%	6.7%	100.0%

Agegroup * Not having any use for ICTs Crosstabulation

			Not having any use for ICTs					
			Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree	Total
Agegroup	60 to 69	Count	1	2	1	4	0	8
		% of Total	3.4%	6.9%	3.4%	13.8%	.0%	27.6%
	70+	Count	7	3	5	5	1	21
		% of Total	24.1%	10.3%	17.2%	17.2%	3.4%	72.4%
Total		Count	8	5	6	9	1	29
		% of Total	27.6%	17.2%	20.7%	31.0%	3.4%	100.0%

Agegroup * ICTs being too complicated to use Crosstabulation

			ICTs being too complicated to use				
			Strongly agree	Agree	Neither agree nor disagree	Disagree	Total
Agegroup	60 to 69	Count	3	3	1	1	8
		% of Total	10.0%	10.0%	3.3%	3.3%	26.7%
	70+	Count	7	7	4	4	22
		% of Total	23.3%	23.3%	13.3%	13.3%	73.3%
Total		Count	10	10	5	5	30
		% of Total	33.3%	33.3%	16.7%	16.7%	100.0%

Agegroup * Lacking confidence when using ICTs Crosstabulation

			Lacking confidence when using ICTs				Total
			Strongly agree	Agree	Neither agree nor disagree	Disagree	
Agegroup	60 to 69	Count	2	3	0	3	8
		% of Total	6.3%	9.4%	.0%	9.4%	25.0%
	70+	Count	6	7	6	5	24
		% of Total	18.8%	21.9%	18.8%	15.6%	75.0%
Total		Count	8	10	6	8	32
		% of Total	25.0%	31.3%	18.8%	25.0%	100.0%

Agegroup * Not sure the benefits of ICTs can bring Crosstabulation

			Not sure the benefits of ICTs can bring					Total
			Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree	
Agegroup	60 to 69	Count	0	0	2	5	1	8
		% of Total	.0%	.0%	6.3%	15.6%	3.1%	25.0%
	70+	Count	7	7	7	2	1	24
		% of Total	21.9%	21.9%	21.9%	6.3%	3.1%	75.0%
Total		Count	7	7	9	7	2	32
		% of Total	21.9%	21.9%	28.1%	21.9%	6.3%	100.0%

Agegroup * That material may be unsuitable Crosstabulation

			That material may be unsuitable					Total
			Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree	
Agegroup	60 to 69	Count	1	1	1	3	2	8
		% of Total	3.3%	3.3%	3.3%	10.0%	6.7%	26.7%
	70+	Count	7	7	4	4	0	22
		% of Total	23.3%	23.3%	13.3%	13.3%	.0%	73.3%
Total		Count	8	8	5	7	2	30
		% of Total	26.7%	26.7%	16.7%	23.3%	6.7%	100.0%

Agegroup * That there are security issues Crosstabulation

			That there are security issues					Total
			Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree	
Agegroup	60 to 69	Count	3	1	1	2	1	8
		% of Total	10.7%	3.6%	3.6%	7.1%	3.6%	28.6%
	70+	Count	12	6	2	0	0	20
		% of Total	42.9%	21.4%	7.1%	.0%	.0%	71.4%
Total		Count	15	7	3	2	1	28
		% of Total	53.6%	25.0%	10.7%	7.1%	3.6%	100.0%

1.5 Age groups and external and environmental factors

Agegroup * That there is no access to ICTs Crosstabulation

			That there is no access to ICTs					
			Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree	Total
Agegroup	60 to 69	Count	2	0	0	5	1	8
		% of Total	6.9%	.0%	.0%	17.2%	3.4%	27.6%
	70+	Count	8	7	2	1	3	21
		% of Total	27.6%	24.1%	6.9%	3.4%	10.3%	72.4%
Total		Count	10	7	2	6	4	29
		% of Total	34.5%	24.1%	6.9%	20.7%	13.8%	100.0%

Agegroup * That the cost of equipment is expensive Crosstabulation

			That the cost of equipment is expensive				
			Strongly agree	Agree	Neither agree nor disagree	Disagree	Total
Agegroup	60 to 69	Count	4	3	0	1	8
		% of Total	13.3%	10.0%	.0%	3.3%	26.7%
	70+	Count	10	6	4	2	22
		% of Total	33.3%	20.0%	13.3%	6.7%	73.3%
Total		Count	14	9	4	3	30
		% of Total	46.7%	30.0%	13.3%	10.0%	100.0%

Agegroup * That the cost of the course is expensive Crosstabulation

			That the cost of the course is expensive				
			Strongly agree	Agree	Neither agree nor disagree	Disagree	Total
Agegroup	60 to 69	Count	2	3	2	1	8
		% of Total	6.9%	10.3%	6.9%	3.4%	27.6%
	70+	Count	6	7	7	1	21
		% of Total	20.7%	24.1%	24.1%	3.4%	72.4%
Total		Count	8	10	9	2	29
		% of Total	27.6%	34.5%	31.0%	6.9%	100.0%

Agegroup * That there is no awareness of the training available Crosstabulation

			That there is no awareness of the training available					
			Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree	Total
Agegroup	60 to 69	Count	0	4	2	2	0	8
		% of Total	.0%	13.3%	6.7%	6.7%	.0%	26.7%
	70+	Count	6	7	2	6	1	22
		% of Total	20.0%	23.3%	6.7%	20.0%	3.3%	73.3%
Total		Count	6	11	4	8	1	30
		% of Total	20.0%	36.7%	13.3%	26.7%	3.3%	100.0%

Agegroup * That there is limited internet access in the location Crosstabulation

			That there is limited internet access in the location					
			Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree	Total
Agegroup	60 to 69	Count	2	0	2	2	2	8
		% of Total	6.9%	.0%	6.9%	6.9%	6.9%	27.6%
	70+	Count	5	1	7	5	3	21
		% of Total	17.2%	3.4%	24.1%	17.2%	10.3%	72.4%
Total		Count	7	1	9	7	5	29
		% of Total	24.1%	3.4%	31.0%	24.1%	17.2%	100.0%

Agegroup * That there is limited transport access to computer stores Crosstabulation

			That there is limited transport access to computer stores					
			Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree	Total
Agegroup	60 to 69	Count	1	1	2	2	2	8
		% of Total	3.4%	3.4%	6.9%	6.9%	6.9%	27.6%
	70+	Count	6	6	7	2	0	21
		% of Total	20.7%	20.7%	24.1%	6.9%	.0%	72.4%
Total		Count	7	7	9	4	2	29
		% of Total	24.1%	24.1%	31.0%	13.8%	6.9%	100.0%

1.6 Personal aims and aspirations

Agegroup * That ICTs can be used for communicatin with others Crosstabulation

			That ICTs can be used for communicatin with others			
			Interested	Might be interested	Not interested	Total
Agegroup	60 to 69	Count	6	0	2	8
		% of Total	20.7%	.0%	6.9%	27.6%
	70+	Count	7	4	10	21
		% of Total	24.1%	13.8%	34.5%	72.4%
Total		Count	13	4	12	29
		% of Total	44.8%	13.8%	41.4%	100.0%

Agegroup * That the computer can help with a job Crosstabulation

			That the computer can help with a job			Total
			Interested	Might be interested	Not interested	
Agegroup	60 to 69	Count	6	1	0	7
		% of Total	24.0%	4.0%	.0%	28.0%
	70+	Count	3	1	14	18
		% of Total	12.0%	4.0%	56.0%	72.0%
Total		Count	9	2	14	25
		% of Total	36.0%	8.0%	56.0%	100.0%

Agegroup * That internet shoppping could be done Crosstabulation

			That internet shoppping could be done			Total
			Interested	Might be interested	Not interested	
Agegroup	60 to 69	Count	3	0	5	8
		% of Total	10.3%	.0%	17.2%	27.6%
	70+	Count	4	1	16	21
		% of Total	13.8%	3.4%	55.2%	72.4%
Total		Count	7	1	21	29
		% of Total	24.1%	3.4%	72.4%	100.0%

Agegroup * That the news and weather could be checked Crosstabulation

			That the news and weather could be checked			Total
			Interested	Might be interested	Not interested	
Agegroup	60 to 69	Count	4	1	2	7
		% of Total	14.3%	3.6%	7.1%	25.0%
	70+	Count	3	5	13	21
		% of Total	10.7%	17.9%	46.4%	75.0%
Total		Count	7	6	15	28
		% of Total	25.0%	21.4%	53.6%	100.0%

Agegroup * That online banking could be carried out Crosstabulation

			That online banking could be carried out			
			Interested	Might be interested	Not interested	Total
Agegroup	60 to 69	Count	3	1	4	8
		% of Total	10.3%	3.4%	13.8%	27.6%
	70+	Count	3	2	16	21
		% of Total	10.3%	6.9%	55.2%	72.4%
Total		Count	6	3	20	29
		% of Total	20.7%	10.3%	69.0%	100.0%

Agegroup * That travel bookings could be made Crosstabulation

			That travel bookings could be made			
			Interested	Might be interested	Not interested	Total
Agegroup	60 to 69	Count	4	1	2	7
		% of Total	14.3%	3.6%	7.1%	25.0%
	70+	Count	4	2	15	21
		% of Total	14.3%	7.1%	53.6%	75.0%
Total		Count	8	3	17	28
		% of Total	28.6%	10.7%	60.7%	100.0%

1.7 Gender comparisons and reasons for non-use

Gendergroup * Not being sure where to start Crosstabulation

			Not being sure where to start					
			Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree	Total
Gendergroup		Count	1	2	0	1	0	4
		% of Total	2.9%	5.7%	.0%	2.9%	.0%	11.4%
	Female	Count	9	5	2	3	2	21
		% of Total	25.7%	14.3%	5.7%	8.6%	5.7%	60.0%
	Male	Count	2	4	2	2	0	10
		% of Total	5.7%	11.4%	5.7%	5.7%	.0%	28.6%
Total		Count	12	11	4	6	2	35
		% of Total	34.3%	31.4%	11.4%	17.1%	5.7%	100.0%

Gendergroup * Not having any use for ICTs Crosstabulation

			Not having any use for ICTs					Total
			Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree	
Gendergroup		Count	0	0	3	1	0	4
		% of Total	.0%	.0%	8.8%	2.9%	.0%	11.8%
	Female	Count	8	3	4	4	1	20
		% of Total	23.5%	8.8%	11.8%	11.8%	2.9%	58.8%
	Male	Count	1	2	2	5	0	10
		% of Total	2.9%	5.9%	5.9%	14.7%	.0%	29.4%
Total		Count	9	5	9	10	1	34
		% of Total	26.5%	14.7%	26.5%	29.4%	2.9%	100.0%

Gendergroup * ICTs being too complicated to use Crosstabulation

			ICTs being too complicated to use				Total
			Strongly agree	Agree	Neither agree nor disagree	Disagree	
Gendergroup		Count	0	2	2	0	4
		% of Total	.0%	5.7%	5.7%	.0%	11.4%
	Female	Count	8	8	2	3	21
		% of Total	22.9%	22.9%	5.7%	8.6%	60.0%
	Male	Count	3	2	3	2	10
		% of Total	8.6%	5.7%	8.6%	5.7%	28.6%
Total		Count	11	12	7	5	35
		% of Total	31.4%	34.3%	20.0%	14.3%	100.0%

Gendergroup * Lacking confidence when using ICTs Crosstabulation

			Lacking confidence when using ICTs				Total
			Strongly agree	Agree	Neither agree nor disagree	Disagree	
Gendergroup		Count	1	2	1	0	4
		% of Total	2.7%	5.4%	2.7%	.0%	10.8%
	Female	Count	7	6	4	5	22
		% of Total	18.9%	16.2%	10.8%	13.5%	59.5%
	Male	Count	2	4	2	3	11
		% of Total	5.4%	10.8%	5.4%	8.1%	29.7%
Total		Count	10	12	7	8	37
		% of Total	27.0%	32.4%	18.9%	21.6%	100.0%

Gendergroup * Not sure the benefits of ICTs can bring Crosstabulation

			Not sure the benefits of ICTs can bring					
			Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree	Total
Gendergroup		Count	0	2	1	1	0	4
		% of Total	.0%	5.4%	2.7%	2.7%	.0%	10.8%
	Female	Count	6	4	6	4	2	22
		% of Total	16.2%	10.8%	16.2%	10.8%	5.4%	59.5%
	Male	Count	2	3	3	3	0	11
		% of Total	5.4%	8.1%	8.1%	8.1%	.0%	29.7%
Total		Count	8	9	10	8	2	37
		% of Total	21.6%	24.3%	27.0%	21.6%	5.4%	100.0%

Gendergroup * That material may be unsuitable Crosstabulation

			That material may be unsuitable					
			Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree	Total
Gendergroup		Count	0	4	0	0	0	4
		% of Total	.0%	11.4%	.0%	.0%	.0%	11.4%
	Female	Count	8	5	2	4	2	21
		% of Total	22.9%	14.3%	5.7%	11.4%	5.7%	60.0%
	Male	Count	1	3	3	3	0	10
		% of Total	2.9%	8.6%	8.6%	8.6%	.0%	28.6%
Total		Count	9	12	5	7	2	35
		% of Total	25.7%	34.3%	14.3%	20.0%	5.7%	100.0%

Gendergroup * That there are security issues Crosstabulation

			That there are security issues					
			Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree	Total
Gendergroup		Count	1	3	0	0	0	4
		% of Total	3.0%	9.1%	.0%	.0%	.0%	12.1%
	Female	Count	11	5	1	2	1	20
		% of Total	33.3%	15.2%	3.0%	6.1%	3.0%	60.6%
	Male	Count	5	2	2	0	0	9
		% of Total	15.2%	6.1%	6.1%	.0%	.0%	27.3%
Total		Count	17	10	3	2	1	33
		% of Total	51.5%	30.3%	9.1%	6.1%	3.0%	100.0%

Gendergroup * That there are privacy issues Crosstabulation

			That there are privacy issues					Total
			Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree	
Gendergroup		Count	1	3	0	0	0	4
		% of Total	2.9%	8.8%	.0%	.0%	.0%	11.8%
	Female	Count	8	8	1	2	1	20
		% of Total	23.5%	23.5%	2.9%	5.9%	2.9%	58.8%
	Male	Count	5	4	1	0	0	10
		% of Total	14.7%	11.8%	2.9%	.0%	.0%	29.4%
Total		Count	14	15	2	2	1	34
		% of Total	41.2%	44.1%	5.9%	5.9%	2.9%	100.0%

1.8 External and environmental factors

Gendergroup * That there is no access to ICTs Crosstabulation

			That there is no access to ICTs					Total
			Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree	
Gendergroup		Count	0	2	1	1	0	4
		% of Total	.0%	5.9%	2.9%	2.9%	.0%	11.8%
	Female	Count	8	3	3	4	2	20
		% of Total	23.5%	8.8%	8.8%	11.8%	5.9%	58.8%
	Male	Count	2	4	0	2	2	10
		% of Total	5.9%	11.8%	.0%	5.9%	5.9%	29.4%
Total		Count	10	9	4	7	4	34
		% of Total	29.4%	26.5%	11.8%	20.6%	11.8%	100.0%

Gendergroup * That the cost of equipment is expensive Crosstabulation

			That the cost of equipment is expensive				Total
			Strongly agree	Agree	Neither agree nor disagree	Disagree	
Gendergroup		Count	2	1	1	0	4
		% of Total	5.7%	2.9%	2.9%	.0%	11.4%
	Female	Count	10	7	1	3	21
		% of Total	28.6%	20.0%	2.9%	8.6%	60.0%
	Male	Count	4	3	3	0	10
		% of Total	11.4%	8.6%	8.6%	.0%	28.6%
Total		Count	16	11	5	3	35
		% of Total	45.7%	31.4%	14.3%	8.6%	100.0%

Gendergroup * That the cost of the course is expensive Crosstabulation

			That the cost of the course is expensive				Total
			Strongly agree	Agree	Neither agree nor disagree	Disagree	
Gendergroup		Count	2	1	1	0	4
		% of Total	5.9%	2.9%	2.9%	.0%	11.8%
	Female	Count	5	8	5	2	20
		% of Total	14.7%	23.5%	14.7%	5.9%	58.8%
	Male	Count	3	3	4	0	10
		% of Total	8.8%	8.8%	11.8%	.0%	29.4%
Total		Count	10	12	10	2	34
		% of Total	29.4%	35.3%	29.4%	5.9%	100.0%

Gendergroup * That there is no awareness of the training available Crosstabulation

			That there is no awareness of the training available					Total
			Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree	
Gendergroup		Count	0	3	0	1	0	4
		% of Total	.0%	8.6%	.0%	2.9%	.0%	11.4%
	Female	Count	5	7	2	6	1	21
		% of Total	14.3%	20.0%	5.7%	17.1%	2.9%	60.0%
	Male	Count	1	5	2	2	0	10
		% of Total	2.9%	14.3%	5.7%	5.7%	.0%	28.6%
Total		Count	6	15	4	9	1	35
		% of Total	17.1%	42.9%	11.4%	25.7%	2.9%	100.0%

Gendergroup * That there is limited internet access in the location Crosstabulation

			That there is limited internet access in the location					
			Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree	Total
Gendergroup		Count	0	0	2	2	0	4
		% of Total	.0%	.0%	5.9%	5.9%	.0%	11.8%
	Female	Count	6	1	4	4	5	20
		% of Total	17.6%	2.9%	11.8%	11.8%	14.7%	58.8%
	Male	Count	1	0	6	3	0	10
		% of Total	2.9%	.0%	17.6%	8.8%	.0%	29.4%
Total		Count	7	1	12	9	5	34
		% of Total	20.6%	2.9%	35.3%	26.5%	14.7%	100.0%

Gendergroup * That there is limited transport access to computer stores Crosstabulation

			That there is limited transport access to computer stores					
			Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree	Total
Gendergroup		Count	0	0	0	4	0	4
		% of Total	.0%	.0%	.0%	11.8%	.0%	11.8%
	Female	Count	6	5	7	1	2	21
		% of Total	17.6%	14.7%	20.6%	2.9%	5.9%	61.8%
	Male	Count	1	2	3	3	0	9
		% of Total	2.9%	5.9%	8.8%	8.8%	.0%	26.5%
Total		Count	7	7	10	8	2	34
		% of Total	20.6%	20.6%	29.4%	23.5%	5.9%	100.0%

Gendergroup * That there is no one to help with ICTs Crosstabulation

			That there is no one to help with ICTs					
			Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree	Total
Gendergroup		Count	0	3	1	0	0	4
		% of Total	.0%	9.1%	3.0%	.0%	.0%	12.1%
	Female	Count	4	6	3	3	4	20
		% of Total	12.1%	18.2%	9.1%	9.1%	12.1%	60.6%
	Male	Count	1	4	2	0	2	9
		% of Total	3.0%	12.1%	6.1%	.0%	6.1%	27.3%
Total		Count	5	13	6	3	6	33
		% of Total	15.2%	39.4%	18.2%	9.1%	18.2%	100.0%

Gendergroup * That ICTs would not bring benefits to the lifestyle Crosstabulation

			That ICTs would not bring benefits to the lifestyle					Total
			Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree	
Gendergroup		Count	0	0	3	1	0	4
		% of Total	.0%	.0%	9.1%	3.0%	.0%	12.1%
	Female	Count	5	6	3	2	4	20
		% of Total	15.2%	18.2%	9.1%	6.1%	12.1%	60.6%
	Male	Count	2	3	0	3	1	9
		% of Total	6.1%	9.1%	.0%	9.1%	3.0%	27.3%
Total		Count	7	9	6	6	5	33
		% of Total	21.2%	27.3%	18.2%	18.2%	15.2%	100.0%

1.9 Personal aims and aspirations

Gendergroup * That ICTs can be used for communicatin with others Crosstabulation

			That ICTs can be used for communicatin with others			Total
			Interested	Might be interested	Not interested	
Gendergroup		Count	3	1	0	4
		% of Total	8.8%	2.9%	.0%	11.8%
	Female	Count	9	3	9	21
		% of Total	26.5%	8.8%	26.5%	61.8%
	Male	Count	4	2	3	9
		% of Total	11.8%	5.9%	8.8%	26.5%
Total		Count	16	6	12	34
		% of Total	47.1%	17.6%	35.3%	100.0%

Gendergroup * That the computer can help with a job Crosstabulation

			That the computer can help with a job			Total
			Interested	Might be interested	Not interested	
Gendergroup		Count	0	0	4	4
		% of Total	.0%	.0%	13.3%	13.3%
	Female	Count	5	0	13	18
		% of Total	16.7%	.0%	43.3%	60.0%
	Male	Count	4	2	2	8
		% of Total	13.3%	6.7%	6.7%	26.7%
Total		Count	9	2	19	30
		% of Total	30.0%	6.7%	63.3%	100.0%

Gendergroup * That internet shoppping could be done Crosstabulation

			That internet shoppping could be done			Total
			Interested	Might be interested	Not interested	
Gendergroup		Count	0	3	1	4
		% of Total	.0%	8.8%	2.9%	11.8%
	Female	Count	5	1	14	20
		% of Total	14.7%	2.9%	41.2%	58.8%
	Male	Count	2	0	8	10
		% of Total	5.9%	.0%	23.5%	29.4%
Total		Count	7	4	23	34
		% of Total	20.6%	11.8%	67.6%	100.0%

Gendergroup * That the news and weather could be checked Crosstabulation

			That the news and weather could be checked			Total
			Interested	Might be interested	Not interested	
Gendergroup		Count	3	1	0	4
		% of Total	9.1%	3.0%	.0%	12.1%
	Female	Count	5	3	11	19
		% of Total	15.2%	9.1%	33.3%	57.6%
	Male	Count	2	4	4	10
		% of Total	6.1%	12.1%	12.1%	30.3%
Total		Count	10	8	15	33
		% of Total	30.3%	24.2%	45.5%	100.0%

Gendergroup * That online banking could be carried out Crosstabulation

			That online banking could be carried out			Total
			Interested	Might be interested	Not interested	
Gendergroup		Count	1	2	1	4
		% of Total	2.9%	5.9%	2.9%	11.8%
	Female	Count	4	2	14	20
		% of Total	11.8%	5.9%	41.2%	58.8%
	Male	Count	2	1	7	10
		% of Total	5.9%	2.9%	20.6%	29.4%
Total		Count	7	5	22	34
		% of Total	20.6%	14.7%	64.7%	100.0%

Gendergroup * That travel bookings could be made Crosstabulation

			That travel bookings could be made			Total
			Interested	Might be interested	Not interested	
Gendergroup		Count	1	3	0	4
		% of Total	3.0%	9.1%	.0%	12.1%
	Female	Count	5	2	12	19
		% of Total	15.2%	6.1%	36.4%	57.6%
	Male	Count	4	1	5	10
		% of Total	12.1%	3.0%	15.2%	30.3%
Total		Count	10	6	17	33
		% of Total	30.3%	18.2%	51.5%	100.0%

Potential inferences from secondary analysis of 'digital engagement' themed questionnaire

128 responses

Q 11

Question number and descriptor	Potential inferences (PIs) – Contained in the Appendix section
9) Any formal training (e.g. a course) to learn to use ICTs or aspects of ICTs (e.g. the internet).	Potential Inference 1 (PI 1): Learning could consist of a structured learning programme either in person or virtually Potential Inference 2 (PI 2): A combination of informal and formal techniques could be widely popular and adopted by many older adults. For example, using a formal course structure of informal collaboration with a facilitator such as a tutor in addition to colleagues or friends
10) Details of formal training	PI 1: The methods of formal training indicate that both structure, guidance and assistance are key components of learning how to use ICTs PI 2: While learning ICTs via the internet was the least popular choice, there may have been

	misconceptions associated with learning in this manner e.g. it being considered as 'too complex'. Furthermore, the older adult participants may not have been aware of learning via such a system
b) personal teacher or trainer	PI 1: This reinforces learning independently (but also gives dependent learning with friends or a tutor etc validity) PI 2: Not having a personal trainer may indicate that the participants prefer to learn at their own pace. The cost of the course or other fees may also be an issue PI 3: The flexibility of when and where to learn may be reduced by having a teacher or trainer PI 4: However, from the responses structure, guidance and assistance in the learning provision is required. PI 5: A "virtual" instructor (or instruction) may be a solution e.g. similar to the animation characters

	that MS word uses but used primarily to train older adults how to use ICTs
<u>bi) Location of instruction from personal teacher or trainer</u>	PI 1: The older adult learner may prefer to be instructed at home. This could be achieved via virtual instruction where they can interact when convenient PI 2: There may also be a comfort factor that is involved. A participant may like to learn in a particular location and be taught in a home environment. There are however additional costs in this learning approach as it is resource intensive
<u>c) Informal Situations</u>	PI 1: This does not necessarily mean that an unstructured approach to learning should be used. For example, modules, step by step instruction and facilitation are aspects to incorporate to provide structure PI 2: Informal situations could have a variety of variants such as the learning environment, the nature of the learning (e.g. working together as a

	team or informally with a teacher or facilitator) PI 3: The responses indicate that formal learning environments are an important approach to effective learning
<u>d) Real formal "face to face" situations</u>	PI 1: The response indicates that other forms of learning such as in a virtual setting could be used as an alternative PI 2: It may also be related to individual differences in that the learners prefer not want to be taught in this manner PI 3: The flexibility of learning may be impeded due to the learning resources available (e.g. the tutor or presence of colleagues) PI 4: Another variant of this may prove to be very effective via virtual instruction
<u>e) With other people in learning situations via the</u>	Older adults not having such technology made available to them

internet	Older adults not having the opportunity to learn with such ICTs They may not have been aware of such opportunities They may have had misinformed perceptions of what learning with others via the internet is about They may have also been put off by the technical jargon (many of us are familiar with the term "internet" but older adults might associate complexities with it or are not sure what it is about) They may not be aware of what the internet has to offer e.g. chatting constructively online to friends to help with something as well as providing instructional guides on a wide range of topics that are quick and free to access
f) Other	From this it suggests that constructive collaboration with others is very important in the learning process.

Q 12

Question number and descriptor	**Potential inferences (PIs) – Contained in the Appendix section**
12) How older adults preferred to learn using ICTs	
a) Preferring to learn independently and on own	PI 1: This suggests that instruction and facilitation is important during the learning process PI 2: It also gives validity to collaborative learning with others PI 3: There may also be other reasons pertaining to learning with others e.g. forming friendships PI 4: The response also indicates that learning independently still has validity PI 5: There is a difference between having learned independently and preferring to learn independently

b) Preferring to learn with a personal teacher	PI 1: The older adults may be able to form friendships and maintain social contact with alternative methods of learning such as collaboratively PI 2: The older adults' needs and requirements can be tailored accordingly. Specific questions are answered PI 3: It shows that there is need for facilitation and instruction as well as support and guidance PI 4: The flexibility might also be restricted with having a personal tutor as training and learning times should be convenient for both parties PI 5: There are also costs involved with using a personal trainer
bi) Location of being instructed by a personal trainer	PI 1: This may be attributed to the comfort that it affords PI 2: An older adult could learn effectively in a

	comfortable environment e.g. at home via virtual learning with the computer
c) Instructed via software (e.g. CD Rom or internet)	PI 1: The rest of the respondents might have preconceived notions of what learning via software entails PI 2: A wider participation could be made if clarifications were provided about what learning with software entails and any potential complexities eradicated
d) Learning together with friends and family in "real face to face" situations	PI 1: The older adults may prefer to learn with someone that is known to them, as they may be able to relate and learn better PI 2: Having said that, approximately half of respondents would prefer not to learn with friends and family. As such, learning with others that are not known to them may appeal. This may also result in the formation of friendships and to maintain social contact etc

	PI 3: The older adults may not consider themselves as being "qualified" enough to provide effective training. They may therefore seek alternative forms of learning in the context of ICTs
e) A course at an institution	PI 1: It suggests that structure, facilitation, formality is important, as well as friendship that could be gained by learning with peers
f) Learning with a moderated course on the web	PI 1: The other fraction could be explained by limited ICT training and access to ICTs PI 2: They may have misconceptions and misunderstandings of what it is about PI 3: They may not have learned how to use the web in the first place. This may lead to misconceptions
g) Learning together with friends in "virtual situations" such as on the web	PI 1: The responses suggest that older adults may prefer to collaborate with friends in a "real life" setting

	PI 2: There may be misconceptions and complexity misunderstandings about what learning in a “virtual” setting is about PI 3: The older adults may be unaware of the platforms with which to learn virtually from e.g. mobile devices, iPads and the computer. These platforms can be mobile and widely accessible. PI 4: They may not want to set the equipment up (if necessary). There may also be potential costs associated with it
<u>h) Other</u>	PI 1: The older adult participants may not be aware of what some learning and support mechanisms such as a virtual and collaborative approach have to offer

Q 13

Question number and descriptor	Potential inferences (PIs) – Contained in the Appendix section
When getting stuck using a technology or piece of software, who is sought after for help and what is done to try to resolve it	
a) Spouse or partner	PI 1: This suggests that they may prefer to use a different source of help and support e.g. a professionally trained teacher who knows the subject and may prefer to receive such training PI 2: Any previous experience with teaching and instruction may have an influence regarding an older adults' preference to the training choice
b) and c) Children and Grandchildren	PI 1: There may be preconceived notions about characteristics that are associated with them, for example that they "pick things up quickly" and are competent at using technology PI 2: They might prefer an informal and friendly approach and associate these attributes with children and grandchildren. Such approaches are often effective ways of learning

	PI 3: They might also consider allowing the children and grandchildren to develop e.g. communication skills from their teaching. This is also a constructive way of learning PI 4: The language is likely to be informal, simplified and therefore understood and interpreted better PI 5: They are likely to relate well and maintain appropriate learning rapport as they know each other already PI 6: Both parties can benefit from the teaching and learning process
d) Learning with friends	PI 1: It suggests that effective teaching and learning can be provided with such a method PI 2: It is likely to be an informal approach PI 3: There is usually no cost associated with

	being trained by friends PI 4: They are likely to be friendly, personable and good rapport can be maintained PI 5: Social contact will also be maintained which is an important process with learning
e) Learning with neighbours	PI 1: The neighbours may not be known on an informal level PI 2: It may also be restricted from a social context e.g. not associating neighbours with the learning and support of technology PI 3: The may also be restrictions regarding availability of neighbours and therefore flexibility
f) Reading a manual and guide	PI 1: As there is usually a formal element associated with such methods, it suggests that a formal structure of learning is important in learning how to use ICTs

	PI 2: As independent learning is often associated with such a method, it also suggests that older adults would like to learn on their own PI 3: It can improve literacy skills PI 4: It is a reliable source of learning as it is part of the product. However, there might often be complexities and assumptions (e.g. attributed to language jargon) with this method which may impede the learning process with such a method PI 5: Flexible learning can take place as the older adult can learn how to use ICTs when convenient for them
g) Learning with a training video or animated tutorial	PI 1: They may have misconceptions and misunderstandings about what this training method entails PI 2: It can provide effective instructions on a wide range of topics (e.g. the use of the web to

	deliver audio and video media). PI 3: Relating and switching to and from the task (e.g. with experiential learning) may be impractical and time consuming PI 4: There may be familiarity with the ICTs, so that they can be used in order to learn (e.g. other aspects of ICTs or entirely different ICTs)
h) Online help	PI 1: This does however assume prior knowledge of using ICTs PI 2: A number of methods can be used to help older adults learn to use ICTs e.g. online chat, discussion boards and email communication. The older adult can direct a specific enquiry and receive back a response directly related to this enquiry. PI 3: It consists of both formal and informal approaches

i) Technical support (telephone or online)	PI 1: There is also the option of seeking help over the telephone. The older adult can engage in the experience, carry out the tasks and learn from it while simultaneously talking over the phone PI 2: There are also likely to be explanations on things such as jargon that are not quite so well understood PI 3: They may also use an informal tone and approach which can generate appeal PI 4: There is an option of choosing the telephone or seeking help online to suit the older adults' learning preferences
J) Giving up learning how to use the ICTs	PI 1: This indicates that learning methods may not be effective PI 2: It also indicates that older adults may not be aware of already existing and effective learning methods in learning how to use ICTs

	PI 3: The reasons for this should be addressed PI 4: Alternative forms of learning may include a combination of already existing methods and should be considered
k) Other	PI 1: They might not be aware of potential methods in overcoming the potential difficulties and issues that may arise with ICTs

122 responses

Question number and descriptor	**Potential inferences (PIs) – Contained in the Appendix section**
12) How older adults learn to use ICTs	
a) Using a personal teacher to learn how to use ICTs	PI 1: That training, advice, guidance and support are important for the learning process PI 2: That encouragement should be required to help with confidence during the learning process

	PI 3: That an equal value could be placed on independent learning (e.g. without a tutor)
<u>b) Details of using a personal teacher in the learning of ICTs</u>	PI 1: That having a teacher had home is considered an effective way to learn, although may be resource intensive. This could be rectified by utilizing a virtual assistant or collaborative with the tutor virtually PI 2: That teachers being used at Age Concern courses highlights the importance of guidance, structure, support and assistance in the learning process PI 3: This may be related to receiving the appropriate encouragement which can help with confidence in learning
<u>c) Learning in informal situations</u>	PI 1: This suggests that learning in a structured and systematic way is considered important for learning, perhaps by incorporating defined aims and goals, with steps or stages in achieving the

	overall task PI 2: That a combination of informal and formal methods may provide the workings of an effective learning strategy (or strategies) with respect to ICTs PI 3: That the participants may associate informal learning with various sub components of learning such as learning in a group, therefore holding misconceptions of what it entails
<u>d) Formal face to face learning</u>	PI 1: This suggests that personal interaction and dialogue in a formal setting may not be considered an appropriate and effective method of learning PI 2: That virtual settings such as web based learning (e.g. a number of structured tasks delivered on a technology platform) or online learning may be considered as appropriate and preferred method of learning

	PI 3: The participants may prefer learning in a group via collaborative learning in an informal setting and environment
<u>e) Learning via the internet</u>	PI 1: There may be isolation in a non-structured way of learning associated with using the internet to learn to use a technology PI 2: The participants may not have used the internet before and are therefore not aware of what it entails from a learning perspective PI 3: There may be misconceptions about what learning via the internet is about, or would prefer to try out another method initially (rather than use a technology to learn how to use and generate awareness of a technology
<u>f) Other</u>	PI 1: However, this only takes into account the very broad learning categories within the questionnaire, and not sub components of these (e.g. learning together virtually in a structured and collaborative setting such as a virtual discussion)

Q 13

Question number and descriptor	**Potential inferences (PIs) – Contained in the Appendix section**
13) Preferred methods of learning	
<u>a) Preferring to learn independently and on own</u>	PI 1: This suggests that collaborative learning may well be considered a preferred way to learn, due to the benefits it offers e.g. forming friendships PI 2: That structure and systematic learning (e.g. such as via a course or instruction manual) may not be associated with such learning PI 3: That no direction, guidance or support is usually considered available with such a learning method
<u>b) Preferring to learn with a personal teacher</u>	PI 1: This could indirectly reinforce the previous learning mechanism that a teacher is required to

	provide guidance, structure in a systematic and effective manner PI 2: The effective facilitation (by incorporating aspects of preferred methods by the participants) of such a learning experience may be of considerable importance, and this can be supplemented and provided by the tutor PI 3: A 'virtual teacher' could be considered to be an effective aspect of the learning
<u>c) Preferring to learn with a moderated course on the web</u>	PI 1: The older adult research participants may not prefer to learn how to use and increase awareness of a particular ICT (or aspect of an ICT such as an application) by using technology to learn, and may prefer non-technological methods instead PI 2: Although interest is shown via such a learning mechanism, there may be misconceptions about what learning via web based courses entails, including the wide range of

	options available to older adult learners when learning about ICTs or aspects of them PI 3: That access to such technology may be limited
<u>d) Preferring to learn via software (e.g. applications</u>	PI 1: That there may be misconceptions about what 'software' entails, and the older adult learners are therefore be deterred by this PI 2: The older adult learners may not prefer to learn how to use an ICT with an aspect of an ICT (e.g. a software platform) PI 3: Access to having such technology may be limited, or experience of using ICTs in general may be lacking
<u>e) Preferring to learn via Face to Face situations</u>	PI 1: Informality may be associated with such an approach, which, has been found, is a popular and widely used way to learn PI 2: That collaborative learning (e.g. with other

	members of the group) may be considered effective, especially if the combination of a formal (e.g. which is structurally defined with goals) and informal (e.g. engaging in group discussions) approach is used. The learners may also take advantage of what collaborative community learning offers such as forming friendships PI 3: That aspects of such a learning approach that could improve its effectiveness should be identified and explored further, to optimize it
f) Course at an institution	PI 1: This suggests that structure (which is usually associated with a traditional learning course) is important for the learning process e.g. having defined sub goals to reach an overall goal PI 2: That a course is likely to be associated with class members. This may be a motivational influence in terms of learning together as a group, in which group dialogue is generated. Learning in a collaborative manner can bring many benefits such relating to the actual learning and personal

	and professional development PI 3: The modification of aspects of the course (such as incorporating a modular design approach) may be required in making it appropriate for the context

Journal publication:

Jones, A., and Shelbourn, M., 2011. The Learning and Support Preferences of Older Adults with Informations and Communications Technologies. International Journal of Technology, Knowledge and Society (7) 1, pp. 149-164.

Semi-structured in-depth interview questions

1

a)

What factors in your opinion make a successful learning experience in general?

b)

What factors in your opinion do not make a successful learning experience in general?

2

a)

What learning and support method(s) if applicable have you used previously to further your engagement with ICTs? Please state and describe them.

b)

What in your opinion specifically contributes to effective learning and support provision when learning how to use ICTs?

c)

What in your opinion specifically contributes to ineffective learning and support provision when learning how to use ICTs?

d)

What are the main reasons (if any) for you not wanting to learn to use ICTs?

3)

What learning and support methods (that may or may not already be available) do you think could improve your engagement with ICTs?

4)

Is there any learning and support methods that could make the learning process potentially entertaining?

5)

a)

Do you have any specific learning and support needs and requirements when learning how to use ICTs? If so, please state and describe them

b)

Have there been any additional needs and requirements when you first started to use ICTs? If so, please state and describe them c)

Is there anything in particular (whether learning related or beyond) that furthers your engagement with ICTs?

d)

Is there Is there anything in particular (whether learning related or beyond) that inhibits your engagement with ICTs?

6)

Would you consider learning virtually, such as with a computer or mobile phone? Examples may include learning with others via social networking platforms such as Facebook and video tutorials offered by YouTube.

7)

Are you in the 50 to 60, 60 to 69, 70 to 79, 80 to 89, 90 to 99 or 100 and over age group?

8)

What is your gender?

9)

Have you used ICTs in a previous or current work, study or leisure related setting?

Focus groups 1 and 2 questions

1) What is your name and where do you come from?
2) What are your opinions about Information and Communications Technologies (ICTs) in general?
3) What makes you want to learn to use ICTs?
4) How would you best like to learn to use ICTs?
5) How has ageing such as changing motivations, attitudes, preferences, requirements and 'learning capacities' influenced your use and learning of ICTs?
6) Do you have any specific or generic challenges in using ICTs?
7) Can you identify any specific aspects of ICTs that you have had difficulty in using previously?
8) Would there be any alternative learning methods, not considered previously to further your engagement with ICTs? If so please elaborate
9) Would learning virtually such as via social networking platforms such as online discussions or mobile devices such as the iPad influence your use of ICTs?

10) Is there anything you would like to say in relation to what has been talked about?

Focus group 3 questions

1) What is your name and where do you come from?
2) Have you ever learned to use virtual technologies before?
3) How easy or hard did you find learning to use such virtual technologies was?
4) What aspects of these virtual technologies made it (or them) easy to use? So what makes PCs, mobile phones uh any digital devices easy to use?
5) Have you had any kind of successes with technology?
6) What aspects of these virtual technologies made it (or them) hard to use?
7) How would you like such virtual technologies to be improved?
8) Is there anything you'd like to add about how technologies can be improved?

9) If you could invent one piece of virtual technology, what would it be?

10) What aspects would make it easy for you to use?

11) There are a number of virtual technologies on the market. What common problems (if any) in terms of their accessibility would you consider such virtual technologies to have?

12) If you could choose one or more ways of learning how to use virtual technologies on the market, how would you learn to use them?

13) If you could choose one or more ways of learning how to use virtual technologies on the market, how would you learn to use them?

14) Is there anything you would like to add in terms of learning and virtual technologies, anything at all?

Research diary (cultural probe workshop) questions

1) How did you learn to use the technology?

2) What did you like about the technology?

3) What didn't you like about the technology?

4) Did you come across any difficulties when learning to use the technology? If so what were they?

5) Have changing circumstances such as personal needs, requirements, aspirations and 'learning capacities' affected your learning of this particular technology?

6) How could this piece of technology be improved?

Learning questions from 'digital engagement' themed questionnaire

1) How older adults learned to use ICTs (specific types of learning)

2) How older adults would use ICTs (specific types of learning)

3) How older adults resolved difficulties when coming across a problem with an application or technology

Non IT Users' Survey

Hello! Thank you for taking time to read this. I am carrying out PhD research in the learning and support of older adults (which the research project defines as those aged 50 and over) with ICTs. This will be used to further technology engagement and promote autonomy and independence. Appropriate learning strategies will be formulated to further older adult engagement with ICTs, with respect to the dynamics of ageing, as well as to increase awareness of them such as the benefits they have to offer.

ICTs are defined as 'digital technologies' and can be wide ranging. Examples may include the Personal Computer (PC), TVs, mobile phones, information kiosks, laptops, and household appliances.

By filling in this questionnaire, your responses would be highly valued and very much appreciated. Your input would be pivotal in helping to achieve the research outcomes, including the promotion of autonomy and independence of older adults by using ICTs.

Please note that you do not have to answer any questions that you would prefer not to.

About you

It would really help me in my research to know a bit more about you. Of course, just leave out any questions you prefer not to answer

1) What is your gender? (please circle)

- **Male**
- **Female**
- **Not answered**

2) What is your age?

Please state:

- **Not answered**

3) Do you consider yourself to have any particular needs or requirements in relation to ICTs? (please circle the appropriate option) An example may include requiring a particular accessibility feature if using a computer

- **Yes**
- **No**
- **Not answered**

About your non-use of ICTs

Part of my research is trying to find out why some people don't use ICTs, and how they could be helped to learn

4) To what extent do the following factors apply to you?

Please circle the appropriate statement (strongly agree, agree, neither agree nor disagree, disagree and strongly disagree) that corresponds to each factor

I wouldn't be sure where to start

- *Strongly agree*
- *Agree*
- *Neither agree nor disagree*
- *Disagree*
- *Strongly disagree*

I don't have any use for them

- *Strongly agree*
- *Agree*
- *Neither agree nor disagree*
- *Disagree*
- *Strongly disagree*

I think ICTs are complicated to use

- *Strongly agree*
- *Agree*
- *Neither agree nor disagree*
- *Disagree*
- *Strongly disagree*

I can lack confidence in using them

- *Strongly agree*
- *Agree*
- *Neither agree nor disagree*
- *Disagree*
- *Strongly disagree*

I'm not sure what the benefits of ICTs can bring to me

- *Strongly agree*
- *Agree*
- *Neither agree nor disagree*
- *Disagree*
- *Strongly disagree*

I am concerned that material on the internet might be unsuitable or offensive

- *Strongly agree*
- *Agree*
- *Neither agree nor disagree*
- *Disagree*
- *Strongly disagree*

I am concerned that there are security issues of using ICTs

- *Strongly agree*
- *Agree*
- *Neither agree nor disagree*
- *Disagree*
- *Strongly disagree*

I am concerned that there are privacy issues

- *Strongly agree*
- *Agree*
- *Neither agree nor disagree*
- *Disagree*
- *Strongly disagree*

Others have put me off from using ICTs

- *Strongly agree*
- *Agree*
- *Neither agree nor disagree*
- *Disagree*
- *Strongly disagree*

If there are any other reasons why you don't use ICTs, please state them and how far you agree or disagree with the reason(s) (e.g. strongly agree, agree, neither agree nor disagree, disagree and strongly disagree) in the box below:

External and environmental factors that have influenced your non-use of ICTs

I would like to know whether certain environmental and external factors have put you off from using ICTs.

5) To what extent do the following factors apply to you?

Please circle the appropriate statement (strongly agree, agree, neither agree nor disagree, disagree and strongly disagree) that corresponds to each factor

I don't have access to ICTs

- *Strongly agree*
- *Agree*
- *Neither agree nor disagree*
- *Disagree*
- *Strongly disagree*

The cost of the equipment is expensive

- *Strongly agree*
- *Agree*
- *Neither agree nor disagree*
- *Disagree*
- *Strongly disagree*

The cost of the training courses is expensive

- *Strongly agree*

- *Agree*
- *Neither agree nor disagree*
- *Disagree*
- *Strongly disagree*

I don't know about any learning or training courses that are available

- *Strongly agree*
- *Agree*
- *Neither agree nor disagree*
- *Disagree*
- *Strongly disagree*

I'm based away from towns and cities where there is no internet

- *Strongly agree*
- *Agree*
- *Neither agree nor disagree*
- *Disagree*
- *Strongly disagree*

I don't have much access to transport to go to shops and buy the technology

- *Strongly agree*
- *Agree*
- *Neither agree nor disagree*
- *Disagree*
- *Strongly disagree*

I rarely venture out to computer shops and stores

- *Strongly agree*
- *Agree*
- *Neither agree nor disagree*

- *Disagree*
- *Strongly disagree*

If there are any other external and environmental reasons why you don't use ICTs, please state them and how far you agree or disagree with the reason(s) (e.g. strongly agree, agree, neither agree nor disagree, disagree and strongly disagree) in the box below:

Personal aims or aspirations that could be potentially fulfilled or enhanced via the use of ICTs

I would like to know whether ICTs could support any of your personal aims or requirements

6) **To what extent do the following factors apply to you?**

Please circle your level of interest in using ICTs for each purpose (interested, might be interested, not interested) that corresponds to each factor

The internet would help me communicate with other people

- *Interested*
- *Might be interested*
- *Not interested*

I can do things on the computer that would help with my job

- *Interested*
- *Might be interested*
- *Not interested*

I can do shopping on the internet

- *Interested*
- *Might be interested*
- *Not interested*

I can check the news and weather

- *Interested*
- *Might be interested*
- *Not interested*

I can do online banking and organise my finances

- *Interested*
- *Might be interested*
- *Not interested*

I can make travel bookings

- *Interested*
- *Might be interested*
- *Not interested*

If there are any other things you would like to mention, please state them and how far you agree or disagree with the reason(s) (e.g. strongly agree, agree, neither agree nor disagree, disagree and strongly disagree) in the box below:

7) Finally, if there is anything else you would like to mention that has put you off from using ICTs, please state them and describe them in the box below:

Thank you very much for completing this questionnaire

IT Users' Survey

About you

It would help me in my research to identify any potential patterns between learning and age, gender and any potential learning requirements. Please *remember that if you would prefer not to answer certain questions (as with any of the questions in this questionnaire) then feel free to leave them out*

7) **What is your gender? (please circle)**

- **Male**
- **Female**
- **Not answered**

8) **What is your age?**

Please state: ___ Years

- **Not answered**

9) **Do you consider yourself to have any particular needs or requirements when using ICTs? An example may include requiring a particular accessibility feature when using a computer (please circle)**

- **Yes**
- **No**
- **Not answered**

About your learning and support of ICTs

I would like to know how effective any learning and support method(s) you have used before were

10) **Please circle the appropriate number on the scale of 1 to 10 below (where 1 is ineffective and 10 is effective) which corresponds to how effective a particular learning method is you may have used is. If there is any you have not used, please circle the 'not answered' option.**

A course at an institution Ineffective 1 2 3 4 5 6 7 8 9 10 Effective

Not answered

A 1 to 1 personal helper *Ineffective 1 2 3 4 5 6 7 8 9 10 Effective*

Not answered

Video tutorials *Ineffective 1 2 3 4 5 6 7 8 9 10 Effective*

Not answered

Instruction manual *Ineffective 1 2 3 4 5 6 7 8 9 10 Effective*

Not answered

In groups *Ineffective 1 2 3 4 5 6 7 8 9 10 Effective*

Not answered

The internet *Ineffective 1 2 3 4 5 6 7 8 9 10 Effective*

Not answered

Telephone instructions *Ineffective 1 2 3 4 5 6 7 8 9 10 Effective*

Not answered

On own *Ineffective 1 2 3 4 5 6 7 8 9 10 Effective*

Not answered

TV and Radio *Ineffective 1 2 3 4 5 6 7 8 9 10 Effective*

Not answered

Audio books *Ineffective 1 2 3 4 5 6 7 8 9 10* *Effective*

Not answered

Were there any other additional learning and support methods you have previously used that were not listed? If so, please state them and provide their scale number of how effective they were (from 1 to 10) in the box below

---

11) **How important do you consider the following aspects of such learning methods? Please circle the appropriate number (1 being not important to 10 being important)**

Being structured (e.g. defining sub goals) *Not important 1 2 3 4 5 6 7 8 9 10* *Important*

Not answered

Having a teacher or facilitator *Not important 1 2 3 4 5 6 7 8 9 10* *Effective*

Not answered

Language terminology *Not important 1 2 3 4 5 6 7 8 9 10* *Effective*

Not answered

Having an appropriate learning duration Not important 1 2 3 4 5 6 7 8 9 10 Important

Not answered

Establishing dialogue with others Not important 1 2 3 4 5 6 7 8 9 10 Important

Not answered

Learning in modules Not important 1 2 3 4 5 6 7 8 9 10 Important

Not answered

Use of other technology Not important 1 2 3 4 5 6 7 8 9 10 Important

Not answered

Appropriately paced Not important 1 2 3 4 5 6 7 8 9 10 Important

Not answered

A formal approach Not important 1 2 3 4 5 6 7 8 9 10 Important

Not answered

An informal approach Not important 1 2 3 4 5 6 7 8 9 10 Important

Not answered

The environment   *Not important*   *1 2 3 4 5 6 7 8 9 10*   *Important*

Not answered

Are there any other important or unimportant aspects of a learning process you would consider? Please state them and their scale number of how important or unimportant you consider them to be in the box below:

12) **Virtual learning – Part of this research considers emerging technologies that can be used for learning other ICTs, and ways in which they can be improved. Examples include the internet and mobile phone devices.**

Please indicate whether you have used the following virtual learning methods to learn how to use ICTs. An example may be learning how to set up and configure a digital TV via virtual communities e.g. discussion boards

Community discussion boards   *Ineffective*   *1 2 3 4 5 6 7 8 9 10*   *Effective*

Not answered

Community chat rooms   *Ineffective*   *1 2 3 4 5 6 7 8 9 10*   *Effective*

Not answered

Web based steps and instructions   *Ineffective*   *1 2 3 4 5 6 7 8 9 10*   *Effective*

Not answered

Social networking applications (e.g. Facebook) Ineffective 1 2 3 4 5 6 7 8 9 10 Effective

Not answered

Online searches (e.g. Google) Ineffective 1 2 3 4 5 6 7 8 9 10 Effective

Not answered

Video conferencing (e.g. Skype) Ineffective 1 2 3 4 5 6 7 8 9 10 Effective

Not answered

Audio dialogue (e.g. voice enabled chat rooms) Ineffective 1 2 3 4 5 6 7 8 9 10 Effective

Not answered

Mobile device communication Ineffective 1 2 3 4 5 6 7 8 9 10 Effective

Not answered

Online help manual that may come with application Ineffective 1 2 3 4 5 6 7 8 9 10 Effective

Not answered

If there are any other learning aspects listed, please state them and their scale number of how effective or ineffective you consider them to be in the box below:

13) **How far do you agree or disagree with the following statements of learning to use ICTs via virtual methods?**

There are complexities with them Strongly disagree 1 2 3 4 5 6 7 8 9 10 Strongly agree

Not answered

I'm not sure where to start Strongly disagree 1 2 3 4 5 6 7 8 9 10 Strongly agree

Not answered

I have limited access with such technology Strongly disagree 1 2 3 4 5 6 7 8 9 10 Strongly agree

Not answered

There can be a lack of confidence Strongly disagree 1 2 3 4 5 6 7 8 9 10 Strongly agree

Not answered

I learn by other methods instead Strongly disagree 1 2 3 4 5 6 7 8 9 10 Strongly agree

Not answered

There can be a lack of awareness of such opportunities Strongly disagree 1 2 3 4 5 6 7 8 9 10 Strongly agree

Not answered

There can be a lack of interest *Strongly disagree* *1 2 3 4 5 6 7 8 9 10* *Strongly agree*

Not answered

There is concern over content *Strongly disagree* *1 2 3 4 5 6 7 8 9 10* *Strongly agree*

Not answered

There is concern over security issues *Strongly disagree* *1 2 3 4 5 6 7 8 9 10* *Strongly agree*

Not answered

If there are any other reasons not listed, please state them in the box below:

8) **Finally, if there is anything you would recommend to policy makers and product designers to make ICTs easy to use, please state and elaborate on them in the box below:**

Thank you very much for completing this questionnaire

Interviews and focus groups' introduction and explanation of research

Hello. My name is Adam Jones and I am doing PhD research in the learning and support of older adults in relation to ICTs to improve their quality of life via the promotion of autonomy and independence.

In particular I seek to generate knowledge and understand how older adults learn to use ICTs effectively. The aim is to generate knowledge on how older adults learn effectively with respect to the dynamics of ageing (e.g. changing requirements) in the context of ICTs by identifying their needs and requirements. This will explore how older adults are engaged with ICTs, as well as new and potential learning and support mechanisms to consider. This can then be used to formulate effective strategies to allow them to further their engagement with ICTs which provide many opportunities.

Part of the research will consist of a series of in-depth interviews and focus groups. Thank you very much for agreeing to take part in this interview (or focus group). Your responses will be highly valued and will contribute to leading research in this field, to improve the lives of older adults by promoting autonomy and independence with ICTs. The research will inform organisations such as Age UK, social policy, design and practice. As part of this I am to gather data and information on a number of areas relating to the learning and support provision of older adults when learning how to use ICTs

I will ask you six open ended questions (some of which have up to four parts) (or 10 for the focus groups and workshops) about learning and support practices in relation to ICTs. Please answer them as fully as you can. There is no correct answer. Please, if necessary, allow yourself some time to think before answering the questions. If you would like the question repeated please ask. If you would like a question or part of a question clarified or explained further then please ask. The interview (of focus group) will be tape recorded and transcribed for scholarly research. The results will be contained within the thesis, as well as disseminated at research conferences and events.

Please remember that you can withdraw at any time during the study unconditionally. The data and information collected from the interviews will be kept anonymous and will be discarded whenever you would like.

Finally I also ask that you sign a consent form which formally gives your consent about taking part in the study.

Before we start I would like to remind you that ICTs are defined as digital technologies and can be wide ranging. Examples may include PCs, mobile phones and devices as well as digital TVs.

Closure

Thank you very much for taking part in the interview. Your responses will be highly valued and will contribute to world leading research in this field. If you have any further questions please ask.