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Older Australians' information literacy experiences using mobile devices

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Abstract

This article presents the findings of a constructivist grounded theory study that explored older Australians' information literacy (IL) experience using mobile devices in their daily lives. Australians aged 65 years of age or older who use mobile devices took part in an in-depth semi-structured interview. Analysis of data from twelve interviews gave as result a substantive theory consisting of six interconnected categories: ageing; learning to use and manage mobile devices; being entertained; enacting everyday life; learning; and managing relationships. Examination of these categories revealed the different ways in which older adults experience IL using mobile devices through their engagement with information in their daily life. Furthermore, these categories supported that the degree of older adults' IL exerts a significant impact on the level, and way of use and adoption of mobile devices.

This study provides new knowledge and understanding about how older adults experience IL and how their IL experiences are socially and culturally influenced by their interactions within that community.

Keywords

Australia; Constructivist Grounded Theory; experiences of information literacy; information literacy; mobile devices; older adults; pensioners; smartphones; tablet computers

1. Introduction

The most recent population projects for Australia indicate that the Australian population is ageing, and it is expected that the percentage of Australians over 65 increase significantly by 2066 (Australian Bureau of Statistics [ABS], 2018). This population ageing raises major challenges for Australia's economy and infrastructure, and it impacts on social, political and health care institutions (Ofori-Asenso, Zomer, Curtis, Zoungas, & Gambhir, 2018).

Simultaneously, the omnipresence of new technologies in everyday life, such as smartphones and tablets, has transformed the way older adults live and deal with their daily tasks (Plaza, Martín, Martín & Medrano, 2011). It has been reported that those aged 65 and over – more than 700,000 people (18% of older adults) – went online using a tablet in 2015, an increase of eight percentage points on the previous reporting period (Australian Communications and Media Authority [ACMA], 2016). Mobile devices offer benefits that may be especially valuable to older adults. The simplicity, portability, and multi-functionality of mobile devices provide a viable alternative to desktop computers for older adults. Mobile devices can provide tools for older adults such as applications for connecting with loved ones, accessing contact information,

browsing internet content, and playing games. In addition, mobile devices may help older adults remain independent and maintain their quality of life (Leung et al., 2012).

Therefore, mobile devices have become new tools through which older adults experience information literacy (IL), as they engage with information as part of the enactment of their everyday lives. A growing number of studies have revealed that the active use of information has been associated with successful ageing, making IL an important concept for older adults (Asla, Williamson & Mills, 2006; Niemelä, Huotari & Kortelainen, 2012; Asla & Williamson, 2013).

However, to date little research has explored how older adults experience IL through the use of mobile devices. Most studies have examined how older adults use mobile devices, with a focus on investigating accessibility barriers or their needs, uses and dispositional attributes. Although these studies reveal the lack of IL competencies of older adults, and the importance of considering IL in the context of new technologies, they do not explore the experience of IL through use of mobile devices.

The article begins with a review of relevant literature, pointing out the significance of this research and identifying the research gap to be addressed. Following this, the article describes the constructivist grounded theory research approach and design that was used to develop the substantive theory. Next, the research findings are presented, followed by the discussion of the findings, how these outcomes contribute to theory related to IL, and practice implications.

2. Literature review

Older adults live in a society where information is abundant, and the use of new technologies is increasing considerably (Webster, 2014). They are faced with diverse information choices available through different sources and media. According to Leung (2010) this abundance of information and new technologies poses challenges for society, and citizens need to acquire skills and competences in order to understand, evaluate, use and access the information effectively. The importance of IL is succinctly expressed in the Australian Library and Information Association's (2001) Statement on IL for all Australians, where IL is considered a prerequisite for participative citizenship, social inclusion, the creation of new knowledge, personal, vocational, corporate and organizational empowerment, and learning for life. It is therefore important that older adults have the opportunity to develop their IL abilities, especially within the context of new and emerging technology (Australian Government, Department of Health and Ageing, 2001). Thus, IL is the key tool to acquire the necessary competences to access to the information through new and emerging technologies.

2.1 Conceptualising IL

IL has been defined and understood from three different theoretical perspectives: behavioural, relational and socio-cultural. From the behavioural perspective, IL is defined as 'an understanding and set of abilities enabling individuals to recognise when information is needed and have the ability to define, locate, evaluate and use effectively the needed information' (Bundy, 2004). However, this perspective of IL provides some limitations. Bruce (1997a, 2008), Yates (2013) and Webber and Johnston (2000) maintain that standards and models for IL need to be adaptable to the changes that will take place throughout the course of life. Recognising the limitation of the behavioural perspective, other lines of research have been developed in this field: the relational and sociocultural perspectives.

The relational perspective of IL was established by Bruce (1997b) and based on a phenomenographic study of IL. This perspective describes IL as a complex way of experiencing information use. The main feature of the relational perspective is that it describes IL from the

user's point of view. It is not focused on measuring IL and instead emphasises the relationship between users and information, and the way they experience the world.

The third perspective, the socio-cultural one, is the most recent approach in IL research. From this perspective the concept of IL is interpreted as a social and cultural practice that is socially constructed by those participating in the everyday life of the community (Lloyd, 2006). This perspective aims to research and understand how people experience IL within their socio-cultural environment. IL research from the socio-cultural approach is concerned with engagement with information when learning in different contexts in order to participate in activities in everyday life, such as communicating with others, seeking for information to solve everyday problems, accessing e-health, e-banking or e-shopping services. Everyday life involves the ways in which people act, think and feel while they develop daily tasks. Limberg, Sundin and Talja (2012) state that 'within a socio-cultural perspective, people's activities should be studied in relation to the tools through which the activities take place and based in the social practices where the activities are carried out' (Limberg, Sundin & Talja, 2012, p.107). This perspective aims to research and understand how people experience IL within their socio-cultural environment using mobile devices.

IL has also been researched within different contexts: educational, workplace and community. Much of the research on IL has focused on its application in academic and educational contexts (Edwards, 2006; Maybee, 2006; Lupton, 2008), where IL is investigated in a specific discipline or how university students experience IL. However, little research in IL focuses on exploring how other groups of the population experience IL within other contexts. Through the years, IL in the workplace context has continued to be a significant and interesting topic of research. Recent research on IL in the workplace focuses on four areas: the need for IT skills in the workplace, the transfer of IL and IT skills from formal education to the workplace, the development of effective IL workplace programs, and workplace information use and behaviour (Edwards, Bruce & McAllister, 2004; Conley & Gil, 2011; Eckerdal, 2011; Kmiec, 2014). However, little research has explored IL in the community context. The major interest of community IL is focused on those who are disempowered in the global technological society, including disabled people, women or older adults (Partridge, Bruce & Tilley, 2008). Of the studies that have begun to investigate IL in this new context, very few have focused on IL, older adults and mobile devices.

Thus, in this research study IL is seen as the critical understanding of how to use and engage with information within contexts (Tuominen, Savolainen & Talja, 2005; Lloyd, 2006). IL is explored within community context, by focusing on understanding the IL experience of older adults engaged in their everyday life as community. Thus, IL is understood as 'the ability to know what there is in a context and to draw meaning from this through engagement and experience with information' (Lloyd, 2006). IL is seen as the critical understanding of how older adults use and engage with information within community context.

The research this article describes has explored older adults' IL experiences using mobile devices through the adoption of the social constructivist grounded theory method (Charmaz, 2006), whose outcome was a substantive theory. The development of this theory was grounded in the views of participants and it also allowed the explaining of feelings of individuals as they experience a phenomenon or process providing understanding of the experiences of older adults using and engaging with information using mobile devices and how their IL experiences are socially and culturally influenced by their interactions within that community.

2.2 Mobile devices and older adults

Mobile devices provide benefits to users throughout society (Xu et al., 2011; Leung et al., 2012; Sarwar & Soomro, 2013; Choudrie, Pheeraphuttharangkoon, Zamani, & Giaglis, 2014). However, not all people in society are adopting and using them. This is especially true for older

adults. Currently, there is very little research on the reasons why older adults do not adopt and use mobile devices (Choudrie et al., 2014; Fondevila, Carreras, Seebach, & Pesqueira, 2015). Choudrie et al. (2014) investigated the adoption and usage behaviours of older adults (50+). The researchers found that observability, compatibility, social influence, facilitating conditions, effort expectancy and enjoyment are important to the adoption and use of smartphones by 'silver surfers', older adults who are 'confident and competent' ICT users (Selwyn, 2004, p.370). On the other hand, Fondevila et al. (2015) investigated older adults and their ability to use and interest in ICT. Their research examined critically whether and how differences in age influences elder users' experience and ability to use apps, and what other factors like background knowledge or past experience, have a strong influence on elders' use, experience and perception of apps. This research concluded that older adults can be fascinated by new ICT if they understand it and are able to connect with its purpose. Also, rather than age, experience levels might have a stronger influence on ICT interest and skills when experimenting and exploring technological devices that have never been used.

Therefore, most studies of older adults and mobile devices have examined their accessibility barriers (Leung et al., 2012; Jayroe & Wolfram, 2012), their needs, uses and dispositional attributes (Vroman, Arthanat & Lysack, 2015; Fondevila et al., 2015) or how they use mobile devices and what barriers exist preventing use (Leung et al., 2012; Jayroe & Wolfram, 2012). Although these studies reveal the lack of IL competencies of older adults (lack of skills to access, search and share information; difficulties to understand complicated tutorials about how to use apps; lack of basic Internet skills) and the importance of considering IL in the context of new technologies, they do not explore older adults' experience of IL in their research.

To date, little research has explored how older Australians experience IL in the context of new and emerging technology. Although the studies of Yates et al. (2012), Asla, Williamson and Mills (2006), and Asla and Willimanson (2009) sought to explore IL of ageing Australians, they did not focus specifically on the context of new and emerging technology. We live in not just an information age but also a technological age. Technology such as mobile devices and the Internet are becoming inextricably linked to the ways in which people seek and use information.

This article presents the findings of research exploring how older Australians experience IL through the use of mobile devices in the context of everyday life by contributing with a new theoretical understanding about how older adults use and engage with information using smartphones and/or tablets by supporting the IL needs of older Australians. The article also discusses how these outcomes may contribute to IL community education and consumer information research, to mobile devices research and also, to library and information science practice.

3. Research design

3.1 Research methodology

The aim of this study was to research how older adults experience IL using mobile devices and it addressed the following research question: How do older adults experience IL using mobile devices?

Emanating from this research question, the two main objectives were identified as:

- To contribute new knowledge with a new theoretical understanding about how older adults experience IL using mobile devices.
- To explore, grounded in this new knowledge, what it may provide to IL education and consumer information research using mobile devices, supporting the information needs of older adults.

Thus, the chosen methodology for this research was Constructivist Grounded Theory. This

methodology is appropriate to explore human experiences (Charmaz, 2003) of a previously unexplored phenomenon. Constructivist Grounded Theory methodology allows the researcher to construct theories through their 'past and present involvements, and interactions with people's perspectives' (Charmaz, 2006, p.10), and it emphasises the views and feelings of the people taking part in the study, rather than just gathering facts and describing acts (Charmaz, 2006, p.10). Thus, Constructivist Grounded Theory fits well with the nature and context of the study, which is to gain a better understanding of the phenomenon, older adults' experience of IL and mobile devices.

Constructivist Grounded Theory suggests that a theory is constructed rather than found in the data (Charmaz, 2006). This position acknowledges the subjectivity of the researcher in analysing data (Charmaz 2006). Thus, this method allows us to value older adults' voices in describing their experiences, as it positions the development of theory as a 'co-construction between researcher and participants' (Charmaz, 2006, p.130).

This research methodology has been used in previous IL research, including doctoral studies (Harlan, 2012; Lipu, Willimason & Lloyd, 2007; Miller, 2014). These studies demonstrated that Constructivist Grounded Theory is a suitable, credible and trustworthy method to explore and understand IL. Lipu, Williamson and Lloyd (2007, p.84) observed: 'Grounded Theory provides a suitable platform for research into what it means to be information literate and how IL is made manifest in a community of practice'.

3.2 Participants

Participants in the study reported here included twelve males and females aged 65 years or over who took part in an in-depth, semi-structured, face-to-face interview. Four participants took part in a pilot study to test the instrument and eight participants took part in the main study. All participants were residents from a regional town of Queensland, Australia, and regular users of tablets and/or smartphones in their everyday lives.

Participants were asked for their social and demographic information such as their marital status, employment status and professional qualification to get and provide a broader view of each research participant. Table 1 presents an overview of each research participant's profile.

Participants were recruited via e-mail messages and using flyers, which were displayed in public spaces such as public libraries, retirement villages, community health centres, fitness centres and shopping malls.

In addition, advertisements to participate in this research were placed in relevant newspapers (e.g., Seniors newspaper), websites (e.g., About Seniors, Brisbane Seniors Online) and newsletters (e.g., Rotary Clubs, Probus Club, Senior Citizens Associations). An electronic version of the recruitment flyer was posted on social media (e.g., Twitter, Facebook, LinkedIn) from the researcher's social media accounts and also from University of Southern Queensland (USQ) social media accounts, the institution through this doctoral research was conducted.

Table 1: Research participant profiles

Research participant	Age	Mobile devices used by the participant	Marital status	Started using mobile devices	Professional qualification	Employed or unemployed
Anne	65	Tablet	Married	9 months ago	No qualification	Employed
Louise	70	Smartphone	Unknown	4 years ago	Master's Degree in Social Work	Retired (She is still working as social worker)
Ben	65	Smartphone & Tablet	Married	4 years ago	Degree in Christian ministry	Employed
Rose	65	Smartphone & Tablet	Married	Smartphone 4 years ago / Tablet 2 years ago	No qualification	Unemployed
Betty	66	Smartphone	Divorced	2 years ago	Certificate in aged care	Employed
Peter	74	Tablet	Married	6 years ago	PhD Education	Retired (He is still working as academic)
Emma	66	Smartphone & Tablet	Widow	4 years ago	Photography studies	Retired
Ray	70	Smartphone & Tablet	Married	5 years ago	B. A. Education	Retired (He is working as Pastor)
Marc	86	Smartphone	Married	3 years ago	No qualification	Retired
Michael	65	Smartphone & Tablet	Separated	3 years ago	Master's Degree in Engineering Science	Retired
Sue	68	Smartphone & Tablet	Married	Smartphone 4 years ago / Tablet 5 years ago	Professional hairdresser	Employed
Claire	66	Smartphone & Tablet	Married	8 years ago	Diploma in Business	Employed

3.3 Data collection and analysis

After obtaining ethical clearance of the research instrument and data collection from the USQ Human Research Ethics Committee (USQ Human Research Ethics Approval Number H15REA250), the recruitment of participants began. Participants were assigned pseudonyms to protect their privacy and confidentiality.

The study included a pilot study to test the instrument, in which four participants took part, and eight participants in the main study. The data gathered from participants of the pilot study were

included because the phenomenon under investigation was the same as for the main study, and the participants provided rich data (Charmaz, 2014).

Semi-structured in-depth interviews were used for data collection. This is the most widely adopted technique by grounded theorists (Charmaz, 2006). The interview was designed according to the emergent nature of Grounded Theory which means a single interview question and probing, or follow-up questions may be enough to elicit relevant stories from the interviewee (Charmaz, 2006).

Thus, participants were asked the following open-ended question at the beginning of the interview:

Can you tell me how you use your smartphone and/or tablet?

This question was designed to orient participants toward their IL experience using mobile devices as part of everyday life. The term 'IL' was not included in the interview question because it is not well known outside university and research circles and can be confusing for participants (Maybee, 2006).

Where necessary, probing questions were used to prompt participants to elaborate their responses:

- Can you explain that further?
- Could you tell me more about that?
- What do you mean by that?
- Why is that important?
- Could you give me an example?

Each interview was recorded with the consent of the participants. Interview duration ranged from 20 to 60 minutes. Audio recordings were transcribed, and transcripts used as only data source for analysis.

Following Constructivist Grounded Theory method (Charmaz, 2014), data collection and data analysis were carried out simultaneously. NVivo, a qualitative research software, was used for classifying, analysing and synthesizing the data collected. It was used mainly as a research document organisation tool to visualise relationships between data. Further, this program helped to: develop themes (nodes) from initial coding, memos and research literature; identify and visualise links between nodes; discover new concepts; write documents based on concepts and findings from the analysis.

This study followed the four grounded strategies that define Constructivist Grounded Theory method: coding; memo writing; theoretical sampling; and theoretical saturation (Charmaz, 2008, p.167). Furthermore, this study applied constant comparative method, which involved making comparisons during each stage of the analysis and constitutes the core of the grounded theory methodology (Charmaz 2006, p.5). Thus, the analysis process involved comparing data with data, data with codes, codes with codes, codes with memos, codes with categories, categories with categories, and categories with concepts. Thus, comparisons were made across each stage of analytic development of the research study. All interview transcripts were thoroughly coded and checked against the categories formed from the constant comparison technique.

Throughout the data collection and analysis process, memoing was used to explore interpretations of the meanings underlying the codes and categories. Also, memos were written after each interview, during coding and theory construction. Memo writing constitutes 'a crucial method in Grounded Theory because it prompts you to analyse your data and codes early in the

research process' (Charmaz, 2006, p.72).

Theoretical saturation was reached through the eleventh and twelfth interview. Theoretical saturation is described by Charmaz (2006, p.189) as 'the point at which gathering more data about a theoretical category reveals no new properties nor yields any further theoretical insights about the emerging Grounded Theory'. So, this study reached theoretical saturation when new data did not generate new properties or theoretical insights of categories.

The aim of data analysis in Constructivist Grounded Theory studies is to produce new theory that addresses the research question, in this case the ways older adults experience IL using mobile devices. This theory is grounded in data collected directly from participants on the basis of their lived experiences (Fassinger, 2005). Thus, as result of this process it was created a substantive theory that works and reflects older adults' IL experience using mobile devices.

3.4 Strategies used to ensure quality data

According to Constructivist Grounded Theory, memos were used in order to give evidence and maintain the quality and credibility of the data collected from research participants (Charmaz, 2006). Data were checked through a process of constant comparative analysis by providing reliability to the research.

Also, the following four criteria were applied as the basis for reflection and note taking during all key phases of the study, such as data generation, data analysis and theory development: credibility, which reflects logic and conceptual grounding; originality, including reference to the significance of the study; resonance; which considers the need for the theory to have meaning and scope for all those whom it may be relevant; and usefulness in relation to knowledge development and practical application.

In addition, this research incorporated reflexivity as a strategy in the research design in order to ensure the quality of research. This study applied the process of reflexivity in order to understand how both the contextual history of researcher and the contextual history of the data used affected any knowledge claims made. Memos provided written records of reflexivity, as the actions, feelings and influences on thinking of the researcher (Birks & Mills, 2011, p.53). Applying reflexivity involved rereading the coded interviews to analyse parts, contradictions or conflicting codes. Furthermore, memos were read to recall the immediate reactions during and after the interviews, and also the discussions which were compared with the coding.

4. Older Australians' mobile IL: a constructivist grounded theory

Consistent with the research objective and the aim of data analysis in Constructivist Grounded Theory, the product of this research is a Grounded Theory of older Australians' IL experience using mobile devices, which was called *Older Australians' Mobile IL: A Grounded Theory*. This new theory reveals that older adults' IL experience using mobile devices is a complex phenomenon whose main aspects and characteristics have three components (older adults, IL and mobile devices) across six categories. These three components – older adults (people who experience the phenomenon), mobile devices (tools in which take place the phenomenon) and IL (phenomenon that is experienced by older adults throughout their information practices using mobile devices) – cannot be separated since they always remain interconnected, occurring together across the six categories.

Older adults' IL experience using mobile devices is a complex phenomenon which takes place in a particular context: everyday life. Within the course of their everyday lives, older adults experience IL by interacting with information using mobile devices in a variety of ways. The findings reveal a wide range of different types of individual practices using mobile devices,

which comprise their IL experience.

The findings presented here include an analytical description of the diverse ways in which older adults experience IL using mobile devices through these six categories:

- Ageing
- Learning to use and manage mobile devices
- Being entertained
- Enacting everyday life
- Learning
- Managing relationships

4.1 Ageing

In this category, older adults experience IL as a way of helping them to overcome, improve and manage their health concerns during the ageing process, through their engagement with information. Participants revealed how the changes related to the ageing process impact on their lives and the significant role that mobile devices play in this process, where their engagement with information using mobile devices can help them to maintain, improve and manage their age-related health conditions. For instance, Sue stated that mobile devices improve her quality of life through the use of apps:

I think it improves your quality of life because these days you can use medical apps... Through the use of the iPad you can actually improve your thinking. (Sue)

In addition, in this category, IL is a process that enables older adults to train their brain using their mobile devices to engage with information as a way of staying mentally active, and even avoiding dementia. Participants clearly expressed their concerns and fears related to their cognitive health. They work to keep their brains active through their experiences with information, such as searching for information, playing games or learning:

When I search for information, that activates my memory and then it helps me to train my brain. (Marc)

IL is experienced within individual practices where participants train and keep their brain active by themselves, independent of others, through their interaction with mobile devices and apps where information emerges as a product of their individual and personal decision to stay mentally active.

Further, the findings revealed that older adults desire to remain socially and professionally active, and their engagement with information using mobile devices plays a role in that. Mobile devices help older adults to be and feel active through their IL experience, where they engage with information as they interact socially and participate in society. They are able to enact and keep social relationships, as Marc revealed, through his participation on the radio using his smartphone:

I feel very good because I get a lot of friends and I meet a lot of friends but also many friends that I have never met before from other countries, other cities. I have many friends. Sometimes I speak on the radio, Persian radio. (Marc)

Participants also stated that it is important to have common points with younger generations in order to be able to establish and keep relationships with them and stay connected to the present. The use of mobile devices is considered by older adults as an important way to keep

up with younger generations.

I have my grandchildren and I love keeping in touch with them with my mobile phone. And it is a good way to keep in contact with them. And I feel it is helping me to stay in the present generation. (Emma)

Older adults consider the use and management of their mobile devices as a significant connection point between generations, and a helpful tool for moving with the times and overcoming their fear of getting left behind. In this case, the main motivation for engaging with information is to learn how to use mobile devices for keeping up with younger generations and to feel included into the today's society.

Thus, in this category, older adults experience IL through the following information practices: analysing; becoming better informed; searching; finding; learning; and using information.

4.2 Learning to use and manage mobile devices

Although all participants acknowledge the importance of making use of mobile devices in today's society, their centrality in their lives, and their interest in learning how to use them, they also have a lack of digital skills and experience, and at the beginning of their learning process and adoption, they experience negative emotions. Most participants fear making mistakes, as well as the unknown. Many of them feel alone: 'I just do it, I am alone. I learn alone, and I go on learning alone' (Sue). They may feel 'forced' to learn and use mobile devices as Emma manifested:

We have to know how it is, if we don't, if I don't use my phone, or I don't use my computer I'll be lost because this is the way, it is used more and more and more. (Emma)

The affective dimension of the learning experience impacts considerably on participants' adoption and use of mobile devices, and in turn, on their IL experience. Hence, *learning to use and manage mobile devices* is the foundation category for all other categories in this study. This category enables the experiences of all other categories to occur. If older adults learn to use and manage their mobile devices, they are able to use their mobile devices to be entertained, enact their everyday lives, learn, manage their relationships, and help them overcome their needs, concerns and diseases related to the ageing process.

Participants in this study started using mobile devices for a variety of reasons. These include: being exposed by family; to interact with others, by seeing them and talking to them at the same time from anywhere in the world; to be contactable and in constant communication at anytime and anywhere; and to keep up with younger generations, mainly with their grandchildren. Thus, the engagement with information is derived from external factors where people who are part of their social context are a crucial source of information. This engagement with information occurs as a passive process where information is received or encountered instead of pursued.

IL, in this case, is a process that enables older adults to discover and find information about mobile devices through their engagement with information. IL is experienced within informal social practices, including through conversations with friends, relatives or work colleagues, where information emerges as a product of social relations with others within different contexts. IL is also experienced within individual practices where participants discover mobile devices by themselves through their interaction with them, where information emerges as a product of their individual and personal decision to discover these devices.

In this category, participants experience IL not only related to their own learning, but also, they engage with information to help others to learn to use mobile devices, by sharing their own

knowledge and experience. For instance, Anne, during her interview, stated that she showed and taught her husband how to learn and use his iPad:

Yes, very easy to use the tablet now. And I've bought my husband one in September and I've showed him what to do with his. (Anne)

Therefore, older adults experience IL through recognising others' skills gaps and need for help and providing them with the help they need. In this case, IL is experienced within informal social practices such as conversations where information is shared as a product of a social relationship established with others within different contexts. Throughout this social interaction, information is shared to help others to learn how to use mobile devices. IL is a process through which older adults share their own knowledge by engaging with information as a way of helping others to learn and make use of their mobile devices.

The stimulus for engaging with information is triggered by internal factors; it is derived from the individual's social awareness and desire to help others to learn and use their mobile devices. Interviews suggest that this is related to being aware of the importance of learning and using mobile devices in today's society. There is conscious awareness of engaging in practices or behaviours which will help others to learn how to use their mobile devices in order to improve their lives.

Although most older adults revealed that they experience positive feelings when they learn to manage and use their mobile devices, they also experience negative feelings due to a lack of digital literacy skills mainly, which impact on the adoption and way of using these devices:

I am not very good. So, I can say I don't like using the smartphone or tablet too much. I am getting a little scared of them. (Rose)

Findings in this study showed that although older adults have strategies to learn and manage the use of their mobile devices by themselves, they require and receive support from others, mainly from relatives and friends, in order to learn to use and manage them. For instance Claire asks her son for support: 'When you get stuck or you have any difficulty, what do you do? ... I go to my son'. While Rose asks her husband. Sometimes, they might need help with the same thing more than once: 'Ah, my husband shows me, again, how to do that, how to get on, he always shows me'.

In this category older adults experience IL through the following information practices: analysing; finding; sharing and using information within individual and social practices, and in different contexts (family, friends, in their work and community).

4.3 Being entertained

In this category, the motivation for engaging with information is triggered by the need to be entertained and pass the time. They use the information obtained to keep themselves entertained.

Participants revealed that they experience entertainment through diverse types of content (music, games, movies, news, articles, books and videos) in a variety of formats (audio, visual and text).

All older adults in this study experienced being entertained through mobile devices. For instance Rose stated:

I probably use it the most for games, I use them for one, maybe two hours if I have time, it is a form of relaxation... I sit down, and I do puzzles.

That's mainly for what I use it. That's it. (Rose)

The findings revealed that they experience IL within individual practices – listening, reading, watching, or playing individually – where information emerges as product of their individual need of being and keeping entertained using mainly mobile apps. They make use of a diverse array of mobile apps for entertainment and leisure activities such as iBooks, iTunes, Kindle or YouTube, where they engage with information through a very rich and diverse array of resources (videos, games, music, movies, and books). Thus, mobile apps constitute an important source of information used by older adults for being entertained or for relaxing.

Older adults in this study revealed that they have specific personal interests and needs, which exert an influence on the way they use their mobile devices, through their experiences with information. Some participants revealed that they do not share the same interests with other generations. In this sense, they select different types of games to play than younger generations. Peter stated: 'I think younger people love games and play a lot. I'd probably play cards, but I am not terribly interested in games'.

In this category the IL is experienced when older adults discover and learn how to make use of mobile device applications, and when they access, understand and use these apps as a way of being entertained through their engagement with information analysing, finding, managing and using information.

4.4 Enacting everyday life

All older adults revealed that they manage, develop and complete the tasks of their daily lives through engaging with within different contexts (family, work or community). The tasks of daily life include communicating with others, banking, shopping, travel planning, seeking information to help with health conditions, solving problems, or learning how to cook.

Once older adults start using mobile devices and become familiar with their use, these devices become an integral part of their lives. The mobile devices' properties and features, such as their accessibility and ease of use, contribute to these devices becoming essential tools in their daily lives. Most participants in this study indicated they would find it difficult to live without them, as Ray and Michael stated in their interviews: 'It's my life, without this I couldn't live' (Ray); 'Yes, I think it's... they become essential, so that's more important because it's now a way of life' (Michael). Participants suggest that it is necessary to have mobile devices in today's society.

Participants in this category share and receive information through the use of a rich and diverse array of resources. This includes articles, papers from researchers or experts who share them on websites, as well as more informal information sources such as conversations through the use of communication apps such as FaceTime, Skype, Zoom or by email. Thus, IL is experienced not just within formal social and individual practices (articles, papers and conversations with researchers and experts), but also within informal social practices (conversations and exchange of information with work colleagues).

Therefore, IL would be experienced through the following information practices: analysing; becoming better informed; creating; finding; managing; sharing and using.

4.5 Learning

Findings in this study revealed that older adults experience IL while they learn and acquire new knowledge. Participants in this study use their mobile devices to learn and acquire new knowledge about a range of subjects. Ongoing learning and knowledge acquisition is important to participants. When they search for or access information, look at and compare different sites, or exchange information to find out about something, they understand this to be a process of

learning and acquiring new knowledge. In this way, IL is experienced as learning. They make use of their mobile devices as learning tools for learning languages, studying the Bible, and exploring other topics of their personal interest.

Older adults, in this study, revealed their desire to learn and how they are aware of the benefits of using mobile devices to improve their skills, knowledge and capabilities, and thus improve their lives. For instance, when Mark was asked why it is important for him to learn, he explained how it is important to acquire new knowledge about his health condition in order to improve it:

Because, for example I have problems with my fingers and I went to YouTube or Google and I found medicine, for example, Turmeric. Turmeric is good for arthritis or tahini with sesame or honey, you mix them, and they are good for arthritis. (Marc)

A desire to learn is also attributable to participants' backgrounds. For Peter, learning played a key role in his work context. When asked why finding information is important, he said 'it's just probably my background, I am an academic, your work is always learning. You never stop learning'. Therefore, the social context where older adults develop their work is going to exert an influence on their level of motivation to learn.

When it comes to learning, older adults seek information purposefully. They seek information in order to know. The stimulus for engaging with information is their individual desire and need of learning and acquiring knowledge. The overall information practice in this category is very active in nature, as there is conscious awareness of a learning need and an identified purpose for finding information. Once obtained, this information is used in an immediate manner in order to improve their health, develop a work task, or solve an issue derived from their daily tasks. Information is seen as a crucial instrument to learn and acquire new knowledge.

Therefore, in this category, the focus of older adults' IL experience is to learn and acquire new knowledge. Their engagement with information is purposeful, which emerges not just from their individual need and interest in learning, but also from their social relationships with others where they learn through the exchange of information using their mobile devices. Thus, IL is experienced through the following individual information practices: analysing; finding; sharing; and using information.

4.6 Managing relationships

In this category, communication plays an important role in establishing and maintaining social relationships. Communication is not just an exchange of information; it also helps to maintain a sense of identity, and relieve loneliness, depression, or anxiety (Yorkston, Bourgeois & Baylor, 2010; Cotten, Anderson & McCullough, 2013). Communication also allows older adults to exert an influence and to help others by listening, reflecting, and offering advice. Participants experience positive feelings when they are able to establish and maintain social relationships by communicating with other people through the use of their mobile devices. They feel safer and more secure, more comfortable, and also better than in the past without the existence of mobile devices, when they are able to contact and communicate with others using these devices: 'I don't feel cut off or fear, and I feel that I am not cut off from anybody else and it makes me feel better' (Sue).

For participants in this study, maintaining ties with other people is an important element of successful ageing, thereby avoiding social problems such as isolation and loss of self-esteem. Thus, mobile devices play a significant positive role in the ageing process for participants in this study by helping them to stay connected.

According to the older adults who participated in this study, mobile devices are helpful tools to manage their social relationships, due to the mobile devices' properties, characteristics and the

wide range of communication apps that these devices provide. These devices help them connect with their family and friends at any time, from anywhere, and thus help them to manage and expand their relationships. The data showed that older adults in this study used mobile devices to keep in touch, up-to-date, meet and bring people together with the purpose of satisfying their individual need of establishing and strengthening their social relationships in different contexts. Facebook was the main app through which this took place.

Therefore, IL is experienced as keeping in touch with family and friends, using their mobile devices. The primary focus is on how to meet the need to retain close family and friend ties. They use information because of their desire, need or concern to know about how their family and friends are, and also to keep in touch with them. IL in this category is experienced within informal social practices. These practices include conversations with relatives and friends through the use of communication apps such as Messenger or Facetime, exchanging messages via email, and sharing pictures, posting comments and accessing information shared by others on Facebook.

Most of participants revealed that they manage their relationships by interacting with each other, exchanging and sharing information within a group or community. Older adults make use of mobile devices and apps in formal communities (for example, academic or ecclesiastical communities) where they exchange and share information (ideas, opinions, comments, photos or new knowledge). The use of mobile devices offers the possibility to interact with more than one person at the same time, from different places.

IL experience involves creating, filtering and sharing information, and it is experienced within informal and formal communities through informal social practices, such as conversations and ecclesiastical or academic discussions, where information emerges as a product of social relationships with others within different contexts. Through their social interaction, information is used as a tool to manage, strengthen and expand their relationships within different communities. The possibility of participating in groups or communities allows older adults to expand their social relationships. This factor is important, considering the process of ageing, as communication apps, using mobile devices, help them to combat loneliness and keep them socially active. Mobile devices allow them to participate in today's society by sharing their opinions, comments and views through the use of communication apps and social networks.

Participants, in this case, experience IL as a way of managing and strengthening interpersonal relationships by interacting and participating, in different social contexts, using their mobile devices and apps. This occurs through their experiences with information, where information about a common area of interest is the meeting point between participants who take part in a group or community.

Social interaction with others and participation within different groups or communities, involves using information to achieve a wide range of purposes, such as to keeping up-to-date, staying in touch with others, sharing opinions and views, or becoming informed about the events that are happening in the world around them. This information practice is active. There is an exchange of information with others. Participants share information with others and at the same time they acquire new information from others. Therefore, IL is related to creating, sharing and acquiring information.

Therefore, in this category older adults experience IL when they engage with information creating, finding, filtering, sharing and exchanging information to manage and strengthen their interpersonal relationships using mobile devices.

5. Discussion

The Grounded Theory methodology states that through the process of coding and memo writing researchers can identify and describe relationships between categories (Charmaz, 2008). This research identified a diverse range of types of relationships between categories. The definition and description of these types of relationships take the approach and descriptors adopted by Davis (2015) in her research study. The similarities between both studies provide insights that made consider that the approach adopted by Davis was the most appropriate to explain and describe the relationships between the categories of this study. Table 2 shows an overview of relationships between the categories and the type of relationships it has with the rest of the categories.

The category *Ageing* impacts the rest of categories since the changes produced by the ageing process are present and exert an influence on all actions in their everyday lives. Therefore, the experiences of all categories occur through *Ageing*. For instance, *Being entertained* may occur through *Ageing* because older adults play games using mobile devices, not just as a way of *Being entertained*, but also as a way of training their minds, thus avoiding mental diseases related to the ageing process. Also, all other categories may be hindered by the category *Ageing*, due to the changes and issues related to the process of ageing such as cognitive, mobility and sight issues. These changes may hinder the experiences of the rest of the categories. For instance, if they have memory issues, they may have difficulty remembering instructions to be able to use mobile devices to manage their relationships, enact tasks of their everyday lives, learn, or simply to be entertained.

The category *Learning to use and manage mobile devices* is the foundation for all other categories. This category enables the experiences of the rest of categories to occur. Thus, it facilitates experiences in all other categories. For instance, *Learning to use and manage mobile devices* facilitates *Being entertained*, *Enacting everyday life*, and *Learning and Managing relationships* because the experiences of learning to use their mobile devices make older adults able to integrate the use of mobile devices in order to experience the other categories. To be entertained and pass the time, enact their everyday tasks, learn, and establish and maintain social relationships with others using their mobile devices, older adults need to know how to use mobile devices, or have the desire and capability to learn. At the same time *Learning to use and manage mobile devices* hinders the experiences of these categories because older adults in this study revealed that they experience a lack of digital literacy skills, which impacts their adoption and way of using mobile devices to be entertained, enact their everyday life, learn, and manage their relationships. In addition, *Learning to use and manage mobile devices* may be hindered by *Ageing*, because some diseases related to the process of ageing such as sight issues make it difficult for older adults to learn and manage the use of their mobile devices, due to the small size of mobile device screens.

Some of the categories of experience overlap with other categories. For instance, *Being entertained*, *Managing relationships* and *Learning* overlap with *Enacting everyday life* because each experience of IL related to being entertained, managing and strengthening their relationships, and learning are part of the enactment of their daily lives.

Finally, some categories occur through experiences in other categories. For instance, sometimes *Learning* happens through *Managing relationships*, since older adults in this study revealed that they learn from the exchange of information with others while they manage their social relationships.

Table 2: Mapping the categories of older Australians' mobile IL: a Grounded Theory

Category	Relationships to other categories
Category 1. Ageing	The process of ageing is present and exerts an influence over all categories.
Category 2. Learning to use and manage mobile devices	<p>Learning to use and manage mobile devices is the foundation category which, simultaneously, underpins and hinders all other categories.</p> <p>Occurs through:</p> <ul style="list-style-type: none"> • Ageing • Being entertained • Enacting everyday life • Learning • Managing relationships <p>Facilitates:</p> <ul style="list-style-type: none"> • Ageing • Being entertained • Enacting everyday life • Learning • Managing relationships <p>Hinders:</p> <ul style="list-style-type: none"> • Being entertained • Enacting everyday life • Learning • Managing relationships <p>May be hindered by:</p> <ul style="list-style-type: none"> • Ageing
Category 3. Being entertained	<p>Occurs through:</p> <ul style="list-style-type: none"> • Ageing <p>Overlaps with:</p> <ul style="list-style-type: none"> • Enacting everyday life <p>May be hindered by:</p> <ul style="list-style-type: none"> • Ageing • Learning to use and manage mobile devices
Category 4. Enacting everyday life	<p>Occurs through:</p> <ul style="list-style-type: none"> • Ageing <p>Facilitates:</p> <ul style="list-style-type: none"> • Ageing <p>Overlaps with:</p> <ul style="list-style-type: none"> • Being entertained • Managing relationships • Learning <p>May be hindered by:</p> <ul style="list-style-type: none"> • Ageing • Learning to use and manage mobile device

Category	Relationships to other categories
Category 5. Learning	<p>Occurs through:</p> <ul style="list-style-type: none"> • Ageing • Managing relationships <p>Facilitates:</p> <ul style="list-style-type: none"> • Ageing • Enacting everyday life <p>Overlaps with:</p> <ul style="list-style-type: none"> • Enacting everyday life • Learning to use and manage mobile devices <p>May be hindered by:</p> <ul style="list-style-type: none"> • Ageing • Learning to use and manage mobile devices
Category 6. Managing relationships	<p>Occurs through:</p> <ul style="list-style-type: none"> • Ageing <p>Overlaps with:</p> <ul style="list-style-type: none"> • Enacting everyday life <p>Facilitates:</p> <ul style="list-style-type: none"> • Ageing • Learning • Learning to use and manage mobile devices <p>May be hindered by:</p> <ul style="list-style-type: none"> • Ageing • Learning to use and manage mobile devices

6. Theoretical and practice implications

This research provides an original contribution to both the practice and theory of IL research, by providing new knowledge and understanding about older adults' engagement with information using mobile devices in their everyday lives.

The most important contribution to knowledge from this research is the construction of a new theory about the experience of IL by older adults using mobile devices, named *Older Australians' mobile IL: a Grounded Theory*. This study explores the phenomenon of older adults' IL experience using mobile devices, contributing to the understanding of the phenomenon of IL experience using mobile devices. Therefore, this study contributes by adding new theoretical knowledge about how older adults experience IL using mobile devices which has not been explored in depth previously. This new knowledge may help to guide the development of IL education, as well as information services and products using mobile devices, to support the IL needs of older Australians.

In addition, this research contributes to the expansion of IL research, as to date there have been few research studies in which IL is explored from a socio-cultural perspective and in a community context. This study provides not just a better understanding of the IL of older adults, as a community, but also how their IL is socially and culturally influenced by their interactions within that community.

This research is contextualised in the Library and Information Science field. Therefore, this research makes an original contribution to library and information studies. It adds new understanding about older adults' engagement with information using mobile devices in their everyday life. The findings may be used to inform the way information services and products aimed at supporting the information needs of older Australians are developed and delivered in library and information services, including training and education programs.

The findings of this research can also be used to guide the development of IL education services and products using mobile devices, to support the IL needs of older Australians. An improved understanding of older adults' contexts enables the creation of customised and personalised instruction and support services.

Finally, this research contributes with new knowledge about how older adults engage with information using mobile devices in their daily lives by exploring their concerns, difficulties and needs. Hence, the results of this research can help professionals and designers of mobile devices to create and design mobile apps and services which facilitate older adults' adoption, adaptation and usage of mobile devices in their everyday lives.

7. Limitations

This research is limited geographically. Specifically, this study focuses on exploring how older adults aged 65 years and over, who live in a regional town in Queensland, Australia, use and engage with information using mobile devices. Hence, the results may not be applicable outside the Australian regional context. Older adults with different socioeconomic status, age, race, education and geographical place could have a different IL experience using mobile devices. The intent of this study was not to generalise on transfer findings beyond the original group, but rather to provide an exhaustive description of the phenomenon: How older adults in the context of this study experience IL using mobile devices.

In addition, the sample size for this research is an identified limitation. This study uses purposive sampling, in keeping with the sampling approach in Constructivist Grounded Theory. Thus, it investigates a small group of older adults. It is narrow in scope as it focuses on older adults' experience of their use and engagement with information through using mobile devices in their everyday lives. The selection of participants was focused for an in depth examination of the experience of the participants, not to be representative of the user population.

8. Future directions

This research has explored the IL experience using mobile devices among persons aged 65 years and over. Future research studies could provide more findings by examining how the phenomenon is experienced by other age groups. This would enable an exploration and analysis of the similarities and differences between diverse age groups. In addition, these future studies of how the phenomenon is experienced by other age cohorts would provide insight into whether the current study's findings are generalizable to other age groups.

In addition, this study has explored how older adults experience IL through their IL using mobile devices in their everyday lives. The findings of this research have revealed that the phenomenon of older adults' IL using mobile devices is an individual as well as a social practice. Future research studies could build on these findings by extending this study to examine how older adults experience the phenomenon through their social practices using mobile devices in other settings, such as in their workplace, and community environments such as their academic or ecclesiastical communities. These findings would provide significant further insight into older adults' IL using mobile devices as a social practice in other settings. In addition, these findings would help explain the nature and scope of IL as a social practice.

How older Australians experience IL using mobile devices has been explored in this study. Future research studies could build on these findings by extending this study to investigate how the phenomenon is experienced among older adults in another country.

Further, the findings of this research have revealed that older adults make use of social media and particular apps regularly using their mobile devices. Hence, further research could investigate how the phenomenon is experienced in different social media (e.g., Facebook, Yahoo) or particular apps (e.g., web browsers like Google Chrome; instant messaging apps like Facebook Messenger and WhatsApp; email; entertainment apps like iTunes, Netflix, games).

In conclusion, this article provides evidence of the relevance of IL for older adults in the context of mobile devices. It uncovers a rich and contextualised understanding of how older adults experience IL using mobile devices in a holistic sense and makes an important contribution to both theory and practice, adhering to Constructivist Grounded Theory principles. This study provides a firm foundation for future research by examining and reflecting upon older adults' IL experience and particularly on ways for engaging with information using mobile devices.

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