A Model Of The Internet Information Seeking Behaviour Of Older New Zealanders

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ISBN: [978-1-86435-644-1]; Full paper

Recommended Citation
http://aisel.aisnet.org/pacis2011/127

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A MODEL OF THE INTERNET INFORMATION SEEKING BEHAVIOUR OF OLDER NEW ZEALANDERS

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Abstract

This research set out to investigate the internet information seeking behavior of older users in New Zealand. The findings show that older internet users are diverse group with a wide range of skills and attitudes but that they do exhibit specific internet behaviors based on their information seeking behavior. A classification of how older New Zealanders use the Internet is presented based on a quantitative survey. A classification of types of internet behaviour of older users is presented based on an analysis of open-end survey questions and face to face interviews. The results extend what is known about this important group, confirms some earlier work in this area and refutes others.
1 INTRODUCTION

The ageing of populations worldwide means that more and more older people are using the Internet, but there are varied reports of exactly how they are using it, and for what purposes (Richardson, Weaver & Zorn, 2005; Peacock and Kunemund, 2007; Centre for the Digital Future, 2009; Gunther, Rowlands, & Nicholas, 2009; Smith et al, 2010). Identifying and codifying internet behaviour is important in order to get an insight into the use and acceptance of internet technology in this growing age group (Selwyn, 2003; Vuori & Holmund-Rytkonen, 2005).

While some aspects of the internet search behaviour of older users have been researched extensively (See Sum, Mathews & Hughes, 2009; Wagner, Hassanein & Head, 2010 for an overview), there has been little empirical analysis of actual internet behaviour among older people. Much of the previous research focused on establishing why older people were not using the Internet, rather than how they were using it (Czaja et al, 2006; Knight and Pearson, There have been many previous studies focusing on older people and IT. In 2005, Fugalsang (2005) found that people over 60 years of age were the social group with the lowest participation in the information society. Others investigated specific age related issues and found evidence of exclusion: lack of training and support, anxiety about technology, lack of awareness, and health issues (sight, short term memory, arthritis) that prevented older people from utilizing the technology fully (Cameron, Marquis and Webster, 2001; Roberts,2001; Tay, 2001). The general theme of this earlier work has been that older people are a special
needs group distinct from the population at large. For example, several early studies were concerned with the „digital divide“ (Selwyn, 2003) and „exclusion“ (Selwyn, Gorard, Furlong and Madden, 2003) highlighted barriers specific to older people adopting ICTs.

For New Zealand in particular, some previous research suggested that older NZers are lagging in the uptake of internet technology. Smith et al (2010) portrayed older New Zealanders as being less „involved digitally“ (p.26) That report describes an inverse relationship between age and internet use, and with digital involvement generally such as owning a webcam, ipod or a digital camera.

Another study of older New Zealanders, (Richardson, Weaver & Zorn, 2005) used focus groups to identify barriers to older people using computers. The study identified connectedness and mental stimulation as two main benefits of using computers, and highlighted several barriers to computer use, but while it was noted that New Zealanders were overcoming these barriers, it was not reported how they were doing that.

More recently in NZ, Senior Net reported an increased uptake of their classes since 2007. This increase is both in number of people who register for their classes and the number of people who take more than one computer course. This evidence suggests that older people are interested in computers and the internet, and are willing to update their skills. Further support comes from grownups.co.nz, a New Zealand website dedicated to older people, which reported getting 70,000 unique visits per month from New Zealand and enrolling over 21,000 members in two years (SeniorNet, 2010). Similar high use is also reported by other sites dedicated to older people such as eldernet.co.nz and seniornet.co.nz sites. Overall, 39% of older New Zealanders are currently online. Although this is low in comparison to the 20 to 50 age group in NZ (80% and above), it is similar to the percentage of use by older people reported for other countries: Australia (29%), UK (32%), Canada (45%) and US (42%) (Centre for the Digital Future, 2009).

These findings suggested that is considerable uncertainty about exactly how older New Zealander are using the Internet. This research therefore aimed to establish the Internet information seeking behaviour of the over 60s in New Zealand.

2 METHODOLOGY

In order to investigate the internet behaviour of older people in NZ a two part design was developed. The first part used responses gathered from an online survey; the second part consisted of twenty interviews with older people, some of whom did use the Internet, and some who did not. The survey asked directly about the applications being used, and asked open ended questions about their internet use. Using one quantitative and two qualitative methods allowed the research to triangulate the responses of these two samples (Maxwell, 2005, p93).

Participants for the survey were recruited from three popular NZ web portals serving people of retirement age: Growups.co.nz, ElderNet.co.nz and SeniorNet.co.nz. A link on the home page of each site directed them to an online questionnaire. Completion was purely voluntary, with no incentive or reward for completing the survey. All responses were totally anonymous. A total of 410 people completed the survey (Eldernet 23%, Grownups 60%, SeniorNet 17%).
After removing people below the age range there was a net usable sample of 380 with a median age of between 66 and 70. The direct questions asked the respondents to identify which applications such email or online banking that they regularly used and then eight open ended questions on how they used internet.

For the second part, twenty semi-structured interviews were conducted with older people with diverse backgrounds, ages and experience. Recruitment was done by a snowballing technique, starting with a single older person who provided introductions to other participants and each of these participants was in turn asked to suggest further contacts. Of the twenty participants, sixteen used the internet regularly and four did not use the internet at all; two were above 80 years of age, fifteen were between 75 and 65 years and three were less than 65 years of age. Four had university level education and thirteen had high school qualifications. Three declined to answer this question. All participants except two had over 40 years of work experience. All were retired or semi-retired doing part time paid work. All participants except one spent at least five hours per month volunteering for non-profit organizations.

The direct questions simply asked whether they had used the particular application or not, and the answers were collated and expressed as percentages. The open end question survey responses and interview transcripts were analysed using content analysis techniques. This approach was selected because there was no a priori model to follow and this method allowed issues to emerge naturally from the data. For the survey, the responses were first inspected to identify the major theme. These major themes were provisionally classified, and as more responses were inspected, the initial classifications were renamed, expanded, combined or split so as to include and summarize the responses. After many iterations, a classification was established that accommodated all the material from the responses. This was done for the first question, and then the classification was checked again by an external academic to ensure consistency, reasonableness and reliability. Then the analysis proceeded on the second open ended question, and from this the initial classification was again refined and reorganised to incorporate the new material and any additional issues that emerged. A similar procedure was followed in analyzing the interview data.

Each part produced a model of internet usage. The next section describes the two models.

3 THE FINDINGS

Recent research shows that the most popular online activities among all users are email, search, surfing, shopping, booking travel, messaging, listening to and downloading music, and playing games (Gunther, Rowlands, & Nicholas, 2009, p.16).

3.1 Instrumental Use

Analysis of the types of applications used by these older New Zealanders showed that they also did all of these things, but were focused on what is known as the instrumental use of the internet as opposed to the social use of the internet (Table 1).

<table>
<thead>
<tr>
<th>Level</th>
<th>Instrumental</th>
<th>Information</th>
<th>Entertainment</th>
<th>Social</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intense</td>
<td>Email (100%), Banking (72%)</td>
<td>Search (78%)</td>
<td></td>
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</tr>
</tbody>
</table>
The instrumental use of the internet refers to using the internet to assist people in doing practical day to day living as opposed to using it as a hobby or as a method of social connectedness (Chen, Boase & Wellman, 2002). These users primarily used the internet to do things online that they would normally have to do in person, like banking or consulting a travel agent, or finding out what was available from the library. They also used the internet for finding and purchasing things more easily.

Madden (2005) and Madden and Fox (2006) found that while the over-60’s were eagerly using email and were catching up with younger users in some areas, they were not utilizing file sharing, personal transactions or content creation on social interaction sites. Other surveys have looked at how younger groups use the Internet. For example, Pew (2008) found that in a sample of US workers 76% had shopped online, 53% had watched a streaming video, 41% had used instant messaging, 35% had been on a social networking site, 28% had played an online game. UK statistics showed that there were clear differences in the use of the Internet by age group, with younger users approaching 100% use, but only 15% of over-65s owning a personal computer (Avery, Chamberlain, Summerfield & Zealey, 2007).

### 3.2 Information Seeking

Analysis of the activities of this sample confirms the findings of Madden and Fox (2006). Table 1 shows that while NZ seniors are not avoiding any particular types of applications, they are clearly favoring one type over others. Few users embraced the whole range of technologies. This group were using the internet to get information, but mostly in the form of news and weather. Most but not all said they used the internet to search for information. They are using email, internet banking and online shopping in a way similar to older Australians (Russell, Campbell & Hughes, 2008), but other uses differed significantly. In particular, the Australian study showed that 70% of older Australians had sought medical and health information online: this use was not even mentioned in this sample. (In the category “other uses” the most commonly mentioned use was „genealogy”).

It is notable that these older users were not accessing what are known as social websites. Only 20% of participants said they used anything that could be classed as a social website, such as Facebook or Twitter. The low figures for video streaming, file downloads and the non-use of

<table>
<thead>
<tr>
<th>High</th>
<th>Auctions (66%)</th>
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<tbody>
<tr>
<td></td>
<td>Travel (64%)</td>
</tr>
<tr>
<td></td>
<td>Shopping (42%)</td>
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<tr>
<td></td>
<td>News (62%),</td>
</tr>
<tr>
<td></td>
<td>Weather (54%)</td>
</tr>
<tr>
<td></td>
<td>Online news papers (51%)</td>
</tr>
<tr>
<td></td>
<td>Official information (46%)</td>
</tr>
<tr>
<td>Medium</td>
<td>Library search (33%)</td>
</tr>
<tr>
<td></td>
<td>Skype (34%)</td>
</tr>
<tr>
<td></td>
<td>Instant messaging (28%)</td>
</tr>
<tr>
<td></td>
<td>Games (42%)</td>
</tr>
<tr>
<td>Low</td>
<td>Video streaming (22%)</td>
</tr>
<tr>
<td></td>
<td>downloading (21%)</td>
</tr>
<tr>
<td></td>
<td>Internet Radio (16%)</td>
</tr>
<tr>
<td></td>
<td>Social sites (20%)</td>
</tr>
<tr>
<td>Minimal</td>
<td>Obituaries (10%)</td>
</tr>
<tr>
<td></td>
<td>Chat rooms (7%)</td>
</tr>
<tr>
<td></td>
<td>Dating/ Friendship (5%)</td>
</tr>
</tbody>
</table>

*Table 1. Percentage of respondents who said they had used these internet services.*
social websites agree with the findings of Madden and Fox (2006) that older people are not utilizing social interaction sites. Skype (34%) is interpersonal, but is most likely to be used for long distance telephone calls to family and friends, as is Instant Messaging.

The information from the direct questions was confirmed by a content analysis of the survey responses. There were four open-ended questions: a) Is there anything that prevents you from using the internet as much as you would like? b) What information would you like to have available on the Internet that you can’t get now? c) What changes would most improve websites for senior users? and d) What was your main reason for first getting on to the internet? The content analysis identified a number of common information seeking strategies used by the older people in these samples. The picture that emerged was of a community with diverse attitudes to the Internet and many different information seeking strategies.

The primary reasons given for using the Internet confirmed was to help get non-Internet things done cheaper or more easily. For example information seeking was aimed at comparing prices at supermarkets, booking travel, checking property for sale, internet banking, searching for books in the library and paying bills.

It was clear from the responses that the internet was not regarded as an attractive thing in its own right. For older New Zealanders it was not seen as a place to make friends or socialize: for most it was strictly for utilitarian purposes. Some people did mention that the internet could be a way to avoid isolation as they got older but the social use of internet was limited to use of email to maintain contact with friends, family and children, especially those living overseas, in much the same way a letter or card did. They did not perceive the internet as a medium of making new friends but as a medium of keeping in touch with people they already knew.

Many revealed their lack of confidence in the authority, validity and credibility of the information available online. They usually preferred to cross check with traditional information sources such as radio, newspapers and magazines. These were regarded as trusted sources and their primary sources of information. Internet content was trusted only when it was an online version of traditional media.

In order to test whether these users were sophisticated or naïve about the quality of the information they were getting they were asked about whether information on the Internet can be trusted. 51% were neutral, 26% said Mostly, and 14% said Mostly Not. Only 7% said Definitely and 3% said Definitely Not. This suggests they have informed attitudes about what is presented to them. They were then asked about whether Government sites in particular were trustworthy. Overall, government websites were seen as being more trustworthy than other websites: 12% said Government websites Definitely could be trusted, 43% said Mostly, 27% were neutral, 14% had reservations, and 5% Definitely Not.

Two check questions were included that asked if they verified what they read on the Internet. Again they proved to be quite sophisticated users: about web pages in general, 19% always verified, 30% usually, 25% were neutral, 16% said Sometimes, and 9% Never verified. So it would seem that older internet users are aware of the breadth of information available on the internet but have well developed ideas as to what can and cannot be trusted.
3.3 A classification of older Internet users

Analysis of the interviews confirmed the survey content analysis and expanded on the information seeking strategies revealed there. It appeared that like the respondents in the survey the interviewees were information consumers, not contributors.

The analysis of the interview data showed that the interviewees mostly used the internet to browse information provided by other people. Many of these older users recognised that they had extensive knowledge in some areas, but did not think that it was right for them to try to change the information on the Internet, any more that they would write in a library book. Some stated that they did use the internet to update their own private notes. Some of them contributed to traditional media, such as book reviews or articles, but would not put their work online.

Combining the results of the survey analysis and the interview analysis revealed a consistent set of characteristics that could be used to classify the information seeking behaviour of these older people into four types: Rejecters, Utilizers, Browsers and Augmenters. The types are not exclusive, but represent exemplars along a continuum of increasing engagement with the Internet (fig 1).

![Figure 1. Types of older internet users](image)

3.3.1 Rejecters

Rejecters are people who have deliberately decided to minimise their use of technology. They have no inclination or desire to learn how to use the internet.
Many Rejecters display similar dismissive behaviours to other technologies such as cellphones. If they use a computer at all, it is restricted to word processing or email. They are not motivated by purchasing online or by social networking, and are not interested in what might be available online.

**Frequency:** Use of the internet may is very limited, maybe once every couple of months. They use email in an irregular manner often not checking their emails for several weeks.

**Information:** They know about the internet but choose to let someone else get the information for them. The Rejecters’ main information sources remain books, newspapers and magazines. Even within those they are very selective and Rejecters are typically critical of the authority of all authors. They consider the internet as another form of media, just a bit less trustworthy. Any information seeking on the internet is very limited.

**Age Group:** The Rejecters tended to be the older people in the group. However there were also a few Rejecters in the „young-old“ category of 65-70.

**Skill:** Rejecters are happy with their current situation and have no desire to upgrade their skills or take part in any kind of training. In this sample there were several older people with good IT skills who displayed Rejecter behaviour.

**Characteristic:** Rejecters made it clear that their minimal use is a deliberate choice, and not related to lack of skills or to any fear of technology. Their choice was due to issues such as lack of trust, disdain for the technology and issues about control. But mostly, time was the issue. Rejecters were just not willing to invest their precious time to learn the technology.

### 3.3.2 Utilizers

Utilizers do use the internet, but only to get things done more easily, to save time or to save money. They may use the Internet to check their bank balances or their library books or to buy goods online. They are comfortable with using a credit card online and with simple internet commerce such as travel or holiday bookings. They purchase goods or services online if it provides them with a cost saving and if they think the transaction is safe.

**Information:** The internet is a supplementary source of information. This group uses prior established sources and returns to them frequently. For example, some users in this group said they always read the artsandletters.com. They tend to remain within established brands for online content. They will read newspapers online and will also read magazines they used to read offline. They will not subscribe to online content unless it is available free of charge. They perceive multimedia content more as entertainment than information.

**Frequency:** People in this group use the internet frequently. Whilst majority of the users in this group use it daily others may use it no more than 3-4 times per week.

**Age Group:** People of all ages were in this group.

**Skill:** They are willing to upgrade their skills. They are more comfortable with text than with multimedia content.

**Characteristic:** Utilizers display flexible online information seeking behaviours and are comfortable with working with incomplete information. They are less concerned about the authority or the source of information than Rejecters and feel they are able successfully ascertain the validity of online content themselves. They feel confident in their abilities to compare content from multiple sources but stick to what they know.
3.3.3 **Browsers**

Browsers are open to using multiple sources and exploring different media such as skype, chat, email unlike Utilizers who primarily stick to email and search engines. Browsers know how to use the full range of applications to stay connected with people they already know.

*Frequency:* Browsers use the internet every day, staying online for long periods.

*Age group:* Browsers were mostly in the younger part of the sample.

*Information:* For this group, the internet is their primary source of information and social contact and they regard the internet as a source of entertainment as well as of information and utility. This group likes to begin with sources they are familiar with and gradually extend their range over time.

*Skills:* Despite their good IT skills they tend not contribute content but remain passive consumers.

*Characteristics:* Their information seeking behaviour is far more adventurous than the Utilizers who tend to stay with a single source. Browsers are happy to consolidate information from multiple sources and multiple types of media.

3.3.4 **Augmenters**

Augmenters display Internet behaviours almost identical to „digital natives”, people who have grown up with technology and consider technology as part of their lives (Tapscott, 1998). Digital natives regard the Internet as almost an extension of themselves, they prefer Internet mediated social interactions and are active contributors to online content.

Augmenters have multiple access methods to the internet. Information from the internet dominates many aspects of their lives and strongly influences things such as travel, shopping and social relations. In addition to using a personal computer they will also use mobile technologies.

*Frequency:* Augmenters use the internet constantly, it is an integral part of their lives. They are not afraid to expose themselves on the internet in discussion groups, they upload videos, family photos, create websites, run internet businesses.

*Age Group:* They tend to be the younger members of the group, but not exclusively.

*Information:* From the interviews it was clear that some in this group see it as their responsibility to correct incorrect online information when they encounter it and particularly if the information is related to their field of expertise or work prior to retirement. Typically they post personal opinions, reviews or contribute to Google Earth by uploading images.

*Skill:* The distinguishing behaviour of the Augmenters is constant learning and the willingness to contribute online content. They are intent on creating their own digital footprints.

*Characteristics:* The people in this group consider the internet as their primary means of communication and social contact. Unlike the Browsers, who only communicate with people they already know, this group is far more comfortable with social media such as twitter and face book and connecting with people they have never met. They are also active in terms of content sharing online with a focus on social tagging websites such as delicious or photo sharing websites such as picasa or flickr. They use social technologies to form new relationships.
4 DISCUSSION

Table 1 shows that these older users were mostly using the internet to get things done more easily and quickly, but for things they normally do. The internet was used for information gathering, but mostly as another way of getting information they would normally get from traditional sources. The internet was used to communicate, but just as an alternative way to do what they would normally do with older technologies. There was very little evidence that the internet had brought completely new behavior into their lives. It is notable that there was little evidence of using the internet to socialize, to extend their reach, of reaching out to new people. All of the high use applications are solitary. The four main classes of use: instrumental, information seeking, entertainment and social also highlight a missing behavior. There was very little evidence of contributing to the internet. In this group there was almost no mention of posting photographs to Flickr, or uploading videos to YouTube or contributing to discussion boards. Very few mentioned maintaining websites or hosting blogs. Zhao (2007), defined blogging as a form of mutual knowledge sharing a way of „growing older together”, but in this sample only a single respondent mentioned blogs. It appears that these users are passive consumers of the internet, or at best, use it as a substitute for other communications methods.

Previous work has suggested that this might be because of factors preventing this class of user from fully utilizing the resources available. However when the respondents were asked „Is there anything that prevents you from using the internet as much as you would like?” the two main barriers mentioned were time and cost. For older people who are on a limited retirement income, affordability of broadband access is an issue at present. Our findings are similar to Pan and Jordan- Marsh (2010) who reported cost as a barrier in internet access in the Chinese sample of older people. The biggest number of complaints was that they were so many demands on their time that they could not spend as much time on the Internet as they wanted to, not that they didn’t know how to. The only technological barrier mentioned was speed of connection, and the complaint was that broadband was too expensive so they had to put up with slower downloads. A few commented on eye strain and problems related to posture from spending so much time in front of the computer, but in general their complaints were not about the Internet itself, but about not being able to use it as much as they wanted to. These findings contrast with previous research that found that age related issues were barriers to ICT use (Adam and Kreps, 2006; Cameron, Marquis and Webster, 2001; Roberts, 2001; Tay, 2001). These users were complaining that they could not get enough internet use, not that they felt excluded or in any way disadvantaged.

These findings also differ from Peacock and Kunemund (2007) who explored the prevalent internet usage patterns in sixteen European countries. That study produced eight reasons why older people do not use the internet. Their conclusion was that for older citizens, age continues to have a differentiating effect on Internet access, independent of marital, occupational, and educational status. Hill, Beynon-Davies and Williams (2007) found that four factors impinged on internet use by older people: personal perceptions, interpersonal relationships operating skills and culture. However there was no evidence in our sample of cultural issues, lack of uptake due to operational skills and no evidence of significant negative attitudes. Overall, this research tends to dispute those views, and to the contrary, suggests that the older respondents in this sample are actually active internet users.
Other studies have attempted to classify older users by the types of applications they used (Chadwick and May, 2003; Phang et al, 2006; Xie and Jaeger, 2008; Sum, Mathews and Hughes, 2009). This research complements and extends these previous studies. Table 2 summarizes the four types of older users found in this research, and their defining characteristics.

Table 2. Classification of older users and usage characteristics

<table>
<thead>
<tr>
<th>Type</th>
<th>Rejecter</th>
<th>Utilizer</th>
<th>Browser</th>
<th>Augmenter</th>
</tr>
</thead>
<tbody>
<tr>
<td>Characteristic</td>
<td>Dismissive</td>
<td>Conservative</td>
<td>Active</td>
<td>Contributor</td>
</tr>
<tr>
<td>Technology</td>
<td>WP, email</td>
<td>Google, banking</td>
<td>Entertainment, Social</td>
<td>Social sites, Web2.0</td>
</tr>
<tr>
<td>Frequency</td>
<td>Weeks, months</td>
<td>Frequently</td>
<td>Daily</td>
<td>Continuous</td>
</tr>
<tr>
<td>Age Group</td>
<td>Oldest</td>
<td>Diverse</td>
<td>Diverse</td>
<td>Youngest</td>
</tr>
<tr>
<td>Information</td>
<td>Offline</td>
<td>Limited</td>
<td>Restricted</td>
<td>Wide ranging</td>
</tr>
<tr>
<td>Skill</td>
<td>Uninterested</td>
<td>Static</td>
<td>Helpers</td>
<td>Explorers</td>
</tr>
</tbody>
</table>

The same type of user that are here called Rejecters were earlier identified by Wyatt, Thomas and Terranova (2002). They classified Rejecters, Resistors, Excluded and Expelled; but that study was not primarily about older people. Rejecters were described as „those who have stopped using the internet voluntarily (p.36)” or as ex-users who have computers at home that they continue to use for other purposes but „not for internet access” (p.31). This is not what motivated the Rejecters in this research, but has obvious parallels. A study by Vuori and Holmlund (2005) classified older user and non-users as „healthy indulgers” and „ailing out-goers” based on age. In contrast this research did not find that age determined behaviour. The Rejecters in this sample were not „ailing out goers” and were not restricted to the oldest of the sample.

Miles (1995) explored different types of non use: non use of an entire system or non use of a specific aspect. However, these Rejecters were not of this type, because their non use is not a form of active resistance. As Wyatt, Thomas and Terranova (2002) found, the Utilizers were simply being selective about what applications they use.

Other researchers have found evidence of groups of older people whose internet use is associated with positive emotions and enjoyment (Rosenthal, 2008; Ng, 2008). However, the Internet use by the Browsers in this sample clearly goes beyond simply enjoying information seeking (Campbell, 2008) and communicating as entertainment and mental stimulation (Rosenthal, 2008). Although not identified as Browsers, Rosenthal (2008) describes a group of users having a sense of „pleasure, enthusiasm and passion” (p. 620) associated with their computer use. Ng (2008) called these users „motivated experts who are able to showcase their computing skills in public” (p1).

Vuori and Holmlund-Rytkonen (2005) found dissimilarities in behaviour were predicted by age. This was not well correlated in this research, but their finding that older people use the internet for same activities as younger people, but to different extents was. The identification of Utilizers and Browsers in this research also concurs with Madden (2005) and Madden and
Fox (2006), who found that older people were not doing file sharing or content creation. In our samples these two activities were done by Augmenters but not by other groups.

5 CONCLUSION

This research set out to investigate the internet information seeking behavior of older users in New Zealand. Its finding show that older internet users are diverse group with a wide range of skills and attitudes. They are not a special group in that they have special needs distinct from the population at large, but they do exhibit specific internet behaviours. This research has gone some way towards identifying these behaviours and has confirmed some previous finding, and refuted others.

The research is based on a sample of active users of the internet in NZ, and therefore the conclusions cannot be extended to non-users in NZ or elsewhere. Further research is needed to confirm the generalization of these findings to investigate whether they hold true for other groups.

References


