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Silver Surfers Search for Gold: a Study Into the Online Information-Seeking Skills of Those Over Fifty

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Abstract Older adults are now the fastest growing population of online users the world over (Olson et al. *Ageing International*, 36(1), 123–145, 2011). Encouraging data continues to emerge regarding the rate of Internet adoption among those over fifty in particular (Hernandez-Encuentra et al. *Educational Gerontology*, 35(3), 226–245, 2009). Yet questions as to the effectiveness of such use and of training designed to advance the skills of our senior surfers continue to go unanswered. While a great deal has been written on seniors and technology in general, very few studies “regarding age and its influence on search behaviour” can be found (Singer et al. 2012). This paper uses Literature Review as a method to scope and define this gap. The need for future research that specifically addresses online searching behaviours and effective training in this area for those over fifty is discussed.

Keywords ICT · Seniors · Computer use · WWW · Search behaviour · Digital immigrant

Introduction

The increasing longevity of a growing proportion of the world’s population, faster and cheaper access to internet technologies, and the promotion of lifelong learning have all contributed to senior citizens becoming the fastest growing population of online users (Olson et al. 2011). Such use should be celebrated given the myriad of benefits consistently attributed to computer use among this cohort, be them social, physical, or psychological. More than just “contributing to a sense of well-being and empowerment” (Robertson-Lang et al. 2011), computer use is credited with assisting one’s adjustment to ageing, providing mental stimulation (Jun and Evans 2007), improving confidence, cognitive abilities and social connectedness, and reducing depression,

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isolation (Blaschke et al. 2009) and fear of technology. Of more interest to this paper, however, are the benefits reported regarding training those over fifty specifically in internet-based technologies like search engines and how to maximise these benefits. Using search engines or browsers like Google has fast become synonymous with using the internet itself. Indeed “one out of every 10 min a person spends online” is spent on such searching and this, coupled with an increasing reliance by our elderly on the internet for health related information, warrants further considerable research (Waller 2011, p. 761).

Quantitative studies like those conducted by Cody et al. (1999) and more recently, Woodward et al. (2011) found that seniors specifically trained in use of the World Wide Web (and not just computer use) experienced “greater self-efficacy, [...] greater social support from friends, [...] significantly higher quality of life” (Woodward et al. 2011), less anxiety, less negative attitudes towards ageing and better health overall (Cody et al. 1999). Other commonly reported results of online training include an increased life satisfaction, an openness to learning new skills, increased perception of the benefits associated with technology and an enhanced sense of belonging (Blaschke 2009; Dorin 2007; Winstead et al. 2012).

Method

To locate all relevant empirical research, peer-reviewed journals were identified through search in the following databases: Informit, Proquest, A + education and ABI / Inform. In the search multiple terms and phrases relating to technology, ageing and search engines were combined to yield maximum matches. The literature discovered was reviewed with three aims in mind: to highlight the reported current skillset of our senior computer users; to discuss the most commonly reported impediments to further skill attainment; and to identify existing advocated strategies for training seniors in search engine use. In doing so the paper provides a context for the advancements already made and serves to potentially inform the design of future senior-specific training in search engine skills so that more of our older generation can reap the numerous aforementioned benefits.

Typical Nature and Level of skill of Silver Surfers

Before discussing the limited literature which identifies measures aimed at improving the skills of our online seniors or the research that reports the potential impediments to training this age group, the paper will now turn to the computing and searching skills those over fifty are reported to currently have.

Generic Computing Skills

Computer use in and of itself, can prove a frustrating and challenging experience for those brought up without such technologies. This may be attributed, at least in part, to a skill shortage experienced by many over fifty. Older adults are frequently reported as experiencing generic computer operational difficulties (Gust 2006; Hernandez-Encuentra

2009; Lugano 2008; Olson 2011; Russel et al. 2008), which can then discourage their continued use and desire to attempt more challenging tasks, like searching the internet. Much of this difficulty has been categorised into two areas of skill shortage: poor manipulation of the hardware itself and unfamiliarity with technological terminology. Not surprisingly, most older citizens have had minimal previous experience in using modern input devices. Indeed, as de Ruiter (2002) and Olson et al. (2011) report, the seemingly simple task of navigating a screen by driving a mouse seems onerous to those not familiar with its practice, including for example, the difference between the right and left buttons or the functionality of the scroll tool. Secondly, whilst younger users (often termed “Digital natives”), are found to be well versed in the metalanguage of computers, technical terminology can prove a serious encumbrance to seniors (Prensky 2001). In her 2005 article, Aula explained “much computer language is jargon and it is unlikely that older users will have encountered words like ‘Windows’ [or] ‘file menu’ before”. Instructions phrased in such a way, not to mention pop-up dialogue boxes can cause feelings of confusion and helplessness to new mature users (Dickinson et al. 2005). Such research, though informative, fails to advocate or review methods for assisting older users in overcoming these two areas of skill shortage.

World Wide Web Skills

For those tenacious enough to master these generic computer skills, a separate set of abilities is then required to successfully find information online using search engines or browsers like Google. These skills, it has repeatedly been found, are both numerous and complex, and not often conquered by our older adults (Lunn and Harper 2011). Kuiper et al. (2008) classify three types of skills inherent in successful online information seeking: Web searching skills; Web reading skills and Web evaluating skills. Though not utilising Kuiper et al.’s terminology, several studies can be found that highlight skill shortages in each of these areas among senior surfers, once again advocating for direct and targeted skills-based training, not just exposure or time online.

In terms of Web searching skills, if the mature novice can first successfully distinguish between the search box and address bar (a mistake commonly recognised), studies by Dickinson et al. (2005) and Aula (2005) found that this generation have trouble “specifying search terms” and generating effective research questions, arguably the first step in any successful online search. Older participants are also reported to more likely make frequent syntax errors or typos, fail to utilise Boolean operators like AND and OR (Aula 2005), and experience more difficulty “refining search terms” if initially unsuccessful (Dickinson et al. 2005).

Kuiper et al.’s second category of skills, Web reading, incorporates the ability to read both the screen interface and any web pages deemed informative (2008). Here seniors again present some weak habits that could prove inhibiting. To those experienced in internet use, extraneous information or tools on a standard web page including navigational buttons, drop down menus and icons are automatically and easily ignored when necessary. Older users, however, are reported to have trouble distinguishing and in turn, disregarding these visuals (Dickinson et al. 2005; Sharit et al. 2008). One study proposed that a user’s success in conducting online searches was related to how well they “restructure the information presented in a hypermedia-type environment” (Weller et al. 1994). The out-dated nature of this research, however, coupled with its focus on

cognitive styles as opposed to age-related cognitive degeneration limits its potential in this particular field. That is, no study to date has analysed the ability of older searchers to do this restructuring of information presented online. Searching for information online, if done efficiently, also requires that the seeker frequently scan pages instead of reading whole documents. De Ruiter suggests that unless this ‘scanning’ is explicitly taught, mature researchers continue to waste much time (2002).

Kuiper et al. (2008) also identify a third type of skill imperative to effective online searching. These skills require web evaluation and are likewise found to be lacking in many senior surfers. In their 2011 quantitative study, Robertson-Lang, Major and Hemming uncovered a “certain level of naivety among older adults who stated that because [the information] was on the Internet it must be credible” (Robertson-Lang et al. 2011). Failure recognising that many, if not most, sites online have commercial gain as their primary incentive is particularly upsetting among this age group who most commonly turn to the World Wide Web for health related answers (Robertson-Lang et al. 2011). Dickinson et al. (2005) found that even those senior surfers who were first educated about the varying credibility of sites, often followed links “without realising that they were advertisements” leading to confusion and ultimately, “irritation with the search engine” itself.

Though such findings, when presented collectively, paint a grim picture for the potential of older adults to become proficient web searchers, and researchers continually suggest they search in different and unique ways (Aula 2005; Gust 2006; Singer et al. 2012), more studies than not report that skill attainment among this cohort is possible (DeGraves 2000; de Ruiter 2002; Dickinson 2005; Dorin 2007; Gust 2006; Sharit et al. 2008; Singer 2012). In fact, contrary to a prevalent social discourse surrounding older adults and technology, very rarely is age itself reported to be the sole encumbrance to successful adoption of the internet and search engine use (Charness and Boot 2009).

Impediments

The potential barriers that discourage seniors from technology, or more specifically, web searching, identified by hitherto studies can be categorised into four distinct areas: issues of training and support, impediments arising due to the unique characteristics of the internet medium, attitudinal impediments, and age-related complications.

Issues of Training and Support

Numerous studies have reported that other people, and their interactions with seniors trying to learn to search online, can serve as both a catalyst for, and barrier to, continued use and motivation (Aula 2005; Chang and Lin 2011; Dickinson et al. 2005; Echt et al. 1998). That is, even if older learners have access to the internet at home (a statistically impressive feat in itself (Australian Institute of Health and Welfare 2007)) many suggest that positive “impacts are generally tied to the training and other social and interactive aspects of the intervention and not to the technology itself” (Blaschke et al. 2009; Meggarity 2010). One 2011 quantitative study, which distinguished two types of support available to older relatives, similarly found that emotional support played a

more important role in seniors successfully attaining web searching skills than the provision of hardware (Chu 2010). This may help to explain the common phenomenon of a computer bought by family members sitting unused in a senior's home for years on end (Aula 2005). Chu's findings also suggested that whilst positive support could improve the behavioural outcomes of older adults searching, problematic support reduced optimal outcomes (2010). There are numerous papers, in fact, that similarly discuss this connection between the type of training and support and the likelihood of senior participants becoming independent and effective search engine users (Cody et al. 2009; DeGraves and Denesiuk 2000; Dickinson et al. 2005; Woodward et al. 2011).

Impediments Related to the Internet Medium

Though older surfers, admittedly, are frequently reported to bring less experience and skill with them when accessing online information, the qualities which make the internet truly a unique, and therefore challenging, medium cannot be understated. Some research exists that examines the ways in which the uniqueness of the medium itself can impede searchers of all ages, whilst other researchers discuss the need for the design of web pages to consider aged users. Dickinson et al. explain that "computer software and most web content is developed by and for younger users and this can create [further] barriers to use for older people" (2005). Indeed, despite its indisputable potential, the internet is essentially an unstructured source which cannot guarantee effective results even with mastery at the user's end (Devlin and Burke 1997). Unlike the print resources familiar to those over fifty, this informative tool rarely adheres to any convention in terms of display. Moreover, its content changes constantly and the quality of information varies greatly with "most of the information", according to de Ruiter, being "grey" in nature (p. 203). Such characteristics make the World Wide Web understandably confronting, confusing and frustrating for all adults, especially those not familiar with its limitations. Though there have been numerous studies (Aula 2005; Zaphiris et al. 2007) that advocate for better web design which accommodates older surfers and their needs, (a move which would surely be justified given the rapidly growing global population of older adults), such requests at least hence far, have apparently, failed to motivate change in the web-design industry (Blaschke et al. 2009).

Attitudinal Impediments

Given these unprecedented limitations of the medium, scepticism among Silver Surfers about the potential value of the internet, coupled with a lack of confidence in using search engines are commonly reported (Boase 2003; Gust 2006; Hernandez-Encuentra et al. 2009). Such emotions, in turn, frequently lead to a decline in continued use. Indeed self-efficacy as a predictor of seniors' motivation and /or future patterns of internet use has now been well established (Chu 2010; de Ruiter 2002; Dickinson et al. 2005; Kambouri et al. 2006; Woodward et al. 2011). This may also help to explain why a senior's previous training or educational achievements have been found to impact upon their willingness to begin using the internet. One study reported that "for every year of education, older adults are three times more likely to use a computer or access the internet" (Woodward et al. 2011). If one has experienced educational challenges and overcome them before, they are less susceptible, it appears, to negative emotions

inhibiting them in new endeavours. Participants involved in internet training programs for seniors frequently attribute their earlier reluctance to go online with feeling scared that they would 'break' the technology prior to the training. (Aula 2005; Dickinson et al. 2005). Feelings of embarrassment have also commonly been reported to hinder older adults from asking for support, which in turn , results in a vast majority training themselves" or foregoing the experience altogether (Hernandez-Encuentra et al. 2009). Conversely, older "surfers [spend] more time online when computer efficacy [is] high, computer anxiety low, and attitudes toward ageing [are] positive" (Cody et al. 1999).

Age Related Impediments

Although "few if any studies on Internet information seeking have examined the role of [...] cognitive abilities in relation to search performance", researchers have identified the potential for degenerative effects of ageing to make skill attainment more difficult (Hernandez-Encuentra et al. 2009). The common misconception that adults over a certain age are simply "not fit for learning because their intelligence, memory, and sensory abilities have deteriorated" is, however, beginning to be challenged (Chang and Lin 2011). Zaphiris et al.'s 2006 article presents the impediments considered in their design of more senior-friendly web sites. They suggested that deteriorating eye-sight, "the most common physiological change" experienced by older adults, can make "reading text on a computer monitor an arduous task", whilst problems with hearing can reduce the benefits of, otherwise helpful audio output (Zaphiris et al. 2007). Psychomotor abilities and decline were raised for the potential impact on using a mouse and keyboard. Fisk et al. (2009) likewise remind us that there is a greater range of variation regarding the sensation of touch and capacity for movement among older citizens than their younger counterparts.

Loss of memory, focus and attention span were also identified by Zaphiris et al. (2007) as making internet use potentially more difficult for older people. Other researchers, however, caution that the rate of decline in memory and the type of memory affected is highly individual, meaning that the difficulties experienced in learning online skills are too (Fisk et al. 2009). Decline in working memory or processing times, for example, may impact on one's ability to effectively scroll up or down to find images or subsequent complimentary information (Fisk et al. 2009). Unfamiliar terms or computer 'jargon' used by instructors or encountered on a screen may likewise overload a senior surfer's working memory in a way that younger internet users would not experience. These and other common age-related conditions may help to explain the fact that although, more and more seniors are going online than ever, the rate of such use continues to steadily decrease with age (Australian Institute of Health and Welfare 2007).

Many researchers advocate that any associated disadvantages with ageing can, however, be negated by web pages that are senior-friendly and with training that is both individualised and age-appropriate (Sharit et al. 2008). That being said, the existing literature, even that which promotes the contribution of seniors to training and web page development (as will now be discussed), fails to study or measure the impact of any such contributions on skill attainment.

Suggested Strategies

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In an effort to minimise the ‘digital divide’ and the associated effects of marginalisation experienced by seniors when it comes to internet access and use, research into pedagogies proven effective in improving the search engine skills of older adults needs to be conducted. For, despite all the hitherto hindrances, studies continually find that “older adults report less anxiety, and increased confidence and self-efficacy about online searching when they are given Internet training” (Robertson-Lang et al. 2011). Though existing research pertaining to senior-friendly training programs vary widely in methodology from quantitative to qualitative studies, and mixed methods approaches, some common suggestions regarding effective training can be established within the literature. Not surprisingly, many of these relate to the environment or overall features of the training offered.

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Training Environment

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The success of training programs is often linked to the “age-appropriateness” of the lessons (Aula 2005; Dickinson et al. 2005; Echt et al. 1998). This targeting of a certain age-group, is not, as Cody et al. found, as easy as it sounds and better trainers will offer a self-paced program or one where a variety of ‘speeds’ or aptitudes are accommodated, regardless of the similarity in participants’ ages (1999). Aula’s qualitative study reported that “when the elderly felt the teaching proceeded at a pace they could handle [...] they felt that learning [...] was highly positive” (2005, p. 79). Such sentiments regarding the importance of lesson pace and age group were reinforced by (Echt 2013; Gust 2006) Dickinson et al. who found “negative consequences for older learners” when they were learning side by side with younger students (2005, p. 6). Researchers have also advocated that seniors be involved in the design of the training itself as young, tech-savvy experts with their assumptions and habits, can actually in themselves impede the success of such training (Blaschke 2009; Dickinson 2005). Considering the age of participants may also include choosing existing senior-friendly web sites to visit and practise on during training sessions and ensuring the search terms and topics are of interest to this cohort. As de Ruiter argues, “the best way to motivate someone to use a new tool is by showing the added value of that tool” (2002). A 2007 report by the Australian Government (entitled “Older Australians at a Glance”) found that many older Australians reported not purchasing internet services because they simply saw no need.

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Another overall trait repeatedly reported as being present in effective training programs for senior surfers is keeping instruction and steps simple (Gust 2006). It is vital not to expose the mature novice to the complexity of the web and evidence suggests that contradictory information or information regarding a variety of ways to do one thing is especially difficult for older people to recall or utilise (Aula 2005). Establishing this sense of simplicity in instruction may be facilitated through the (highly advocated) use of hard copy, step-by-step instructions which include both written and visual cues (Cody et al. 1999; Echt et al. 1998; Nahm and Resnick 2008). de Ruiter (2002) and Kambouri (2006) also report on the preference by seniors to attend internet training with a ‘hands on’ approach, where participants are highly involved and have lots of practice time. One unexpected, yet not isolated, suggestion in

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the literature was that television and radio programming or even mobile phones be used as mediums for delivering tips and instruction on computer and web use for seniors (Chang and Lin 2011; Hernandez-Encuentra et al. 2009). This suggestion though has not been the topic of any empirical research this far.

Training Goals

Future training for seniors in search engine skills should also aim to induce habits consistently found to distinguish good online searchers from poor ones. Most literature (Aula 2005; Kuiper et al. 2008; Quintana et al. 2012; Rasmusson and Eklund 2013; Ruthven 2010; and Waller 2011) for example, suggests that the best results are presented to search engine users who first categorise or consider their intent, or the type of information they are seeking. Similar habits were attributed to good online searchers by Robertson-Lang et al. (2011) and Singer et al. (2012) who reported that, time spent before the search itself was time well spent (2011).

Although few of these recommendations are the result of empirically tested training for seniors, what is promising is the increasing number of studies which predict that the right training can stop age being a factor in skill acquisition or the resultant “ability to conduct a successful web search” (Kubech, Miller-Albrecht & Murphy as cited in De Graves 2000; Echt 1998). What becomes apparent, importantly, is that the design of said ‘right training’ is no simple task, and requires striking a balance between catering for the needs of a potentially disadvantaged learner, and equipping seniors with the tools to capitalise on this potentially life-enriching medium. Similarly, a balance must be found between knowledge of the individual (including an understanding of one’s needs, skills and limitations) as well as knowledge of various impediments likely to affect those over fifty. If this balance can be reached, Kambouri et al. argue that “learners who use ICT [...] double the value of their study time acquiring two sets of skills” at once (2006, p. 213). That is, the senior learns not only the functional skills necessary to utilise the internet itself, but also the skills and knowledges that these processes expose them to. For a population that is frequently spatially and socially isolated, the value of these two sets of skills cannot be overstated.

Need for Further Research

Although, as can be seen, literature pertaining to seniors and technology is plentiful, the vast majority focuses on ICT use overall (Hernandez-Encuentra 2009; Lugano 2008; Olson 2011; Russel et al. 2008), the motivations inspiring such use (Chu 2010; Jun and Evans 2007; Perkinson 2013) and its associated benefits (Blaschke 2009; Dorin 2007; Kambouri 2006; Winstead et al. 2013; Woodward 2011), rather than the internet specifically or search engine use. Exceptions can be found, including studies by Singer (2012) and Zaphiris (2007), but these do not seek to address training issues or advancing the skills of our senior surfers. Studies that do, advocate strategies without rigorous testing as to their effectiveness. The qualitative studies of Aula in 2005 and Robertson-Lang in 2011 for example, though informative, make suggestions for future training based purely on the observations of seniors’ current search engine use. No intervention or training was administered prior to the observations, rendering any

suggestions made regarding ideal training environments and training success 333
questionable. 334

In Dickinson et al.'s 2005 paper, the authors concluded that, given the 335
current absence of age-appropriate and accessible interfaces, the most promising 336
method of encouraging older web-users is effective training. Though this study, 337
like that done by Sharit et al. in 2008, did appropriately include a training 338
course for seniors in its methodology, it failed to first test the initial skillset of 339
the participants, whilst the latter failed to conduct any measure of 'post' test. 340
Such oversights surely result in a study's inability to verify the effectiveness of 341
the pedagogies or training environment utilised. In 2009 Cody et al. attempted 342
to rectify this situation by administering measures both prior to, and after 343
training given to seniors on surfing the internet. These measures however, 344
targeted increased self-efficacy, not skill advancement and the success of the 345
training was purely quantified by the respondents' self-reporting. Despite these 346
studies contributing to a body of knowledge pertaining to seniors' use of search 347
engines, there exist significant gaps regarding the effectiveness of training 348
designed specifically for seniors in terms of advancing their searching skills. 349

If we are to truly empower and include adults over 50 online, the fastest growing 350
demographic of internet users, training offered must be based on strategies proven (not 351
assumed) to be effective in developing more than just their sense of confidence in 352
search engine skills. As such, there is a need for further research into the best, 353
empirically proven, methods of enhancing these skills in older citizens which consider 354
and embrace their unique needs. Such research would benefit from including a 355
systematic analysis of various training environments and pedagogies. 356

Conclusion 357

The commonly reported digital divide in skills experienced between younger and 358
older internet users is partially a "predictable outcome of historical and access 359
factors" (Dickinson 2005). Failure to address this divide would, however, be ill- 360
advised, given that within 5 years the number of people defined as elderly is 361
expected to exceed one billion (Blaschke et al. 2009). Despite a typically weaker 362
initial skill set and a variety of social and physical impediments to further skill 363
acquisition, millions of seniors are getting online every day, countering these 364
obstacles "with a strong desire to learn and a fascination with finding information 365
online" (Gust 2006). It's just as well. "Using a search engine is [now] one of the 366
most common activities on the internet" (Purcell et al. 2012). This helps to explain 367
why seniors attaining stronger search engine skills is so imperative, as is, thus far 368
neglected research which aims to inform the design of effective pedagogies proven 369
to facilitate such learning. 370

Conflict of Interest Renee Morrison declares that she has no conflict of interest. 371 372

Informed Consent As there is no person or personal data appearing in the paper, there is no one from whom 373Q26
a permission should be obtained in order to publish personal data. 374

Ethical Treatment of Experimental Subjects (Animal and Human) This article does not contain any studies with human or animal subjects performed by the any of the author. 375
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