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e-Government and the Elderly: A Two Country Comparison

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ABSTRACT

This paper first identifies characteristics of aging populations across two countries: the USA and Australia. Government web sites of special interest to the elderly are then identified at three levels of government: National, State and Local. A random sample of these sites is tested for readability. Results show that reading levels of web sites are harder than those recommended and that this design flaw occurs across all levels of government and between the two countries. It is argued that the simple mistake of making material too hard for the elderly to read inhibits the transformative ability of e-government for this citizen group with special needs.

Keywords

e-government, elderly citizens, readability, access, engagement

INTRODUCTION

Although the use of the Internet by governments has become ubiquitous in developed countries there still exists a digital divide between sections of communities. This is especially so with the elderly (Hill, Beynon-Davies, & Williams, 2008; Bélanger & Carter, 2009; Niehaves & Plattfaut, 2010). Reported reasons for the continued divide include usefulness, trust, previous use and generally engagement, with perceived use identified as being a major contributor (Irani, Elliman, & Jackson, 2007; Carter, 2008). There is evidence that government web sites fall short not so much by lacking potential, but due to simple problems. Janssen, Kuk, & Wagenaar (2008) found that web sites are designed using very simple business models. Most of the pages they surveyed seemed designed simply to replace normal one-way communications with web pages containing the same material. Dhillon, Weerakkody, & Dwivedi (2008) have evidence to suggest that obvious process and information systems related issues pose significant practical problems for designers of government web sites. In health informatics we have found that the users' inability to read the material causes significant problems, especially for the aging. It seems self evident that material in web pages can only be useful if the intended audience can read it.

The purpose of this paper is to examine the readability of government web pages and examine the extent to which this simple issue has been considered in e-government for the elderly. We will show, from a wide collection of research outcomes, that reading is an issue that becomes increasingly important with advancing age. A large sample of government and government agency web pages are analyzed and a comparison drawn between the two countries USA and Australia. This comparison shows that extent to which reading levels have been considered by web page publishers at all levels of government and across the two countries.

E-government development and progress in e-participation

A recent United Nations study of how governments are using websites and Web portals to deliver public services (so called "e-government development") around the world found (unsurprisingly) that high income countries were at top of the e-government development index. The 2009 study found that the Republic of Korea had the highest e-government development index, followed by the USA and Canada, the UK and Northern Ireland and the Netherlands. Europe and the USA scored above the world average, as can be seen in Table 1, a list of the top ten countries in e-government development (UN, 2010:60).

The study also investigated world progress in e-participation by looking at the provision of online services against three benchmarks,including whether a government publishes information about issues under consideration, whether there are online channels for the public to engage with policy makers and so on, and whether citizens can have a bearing on decision making, e.g., voting online or using a mobile phone (UN, 2010:83). The Republic of Korea heads the e-participation list as seen in Table 1, followed by Australia, Spain, New Zealand and the United Kingdom.

E-Government Development Index Top 20 Countries			**E-Participation Index Top 20 Countries**	
Rank	Country	E-government development index value	Country	E-government E-participation index value
1	Republic of Korea	0.8785	Republic of Korea	1.0000
2	United States	0.8510	Australia	0.9143
3	Canada	0.8448	Spain	0.8286
4	United Kingdom	0.8147	New Zealand	0.7714
5	Netherlands	0.8097	UK and Northern Ireland	0.7714
6	Norway	0.8020	Japan	0.7571
7	Denmark	0.7872	United States	0.7571
8	Australia	0.7863	Canada	0.7286
9	Spain	0.7516	Estonia	0.6857
10	France	0.7510	Singapore	0.6857
11	Singapore	0.7476	Bahrain	0.6714
12	Sweden	0.7474	Malaysia	0.6571
13	Bahrain	0.7363	Denmark	0.6429
14	New Zealand	0.7311	Germany	0.6143
15	Germany	0.7309	France	0.6000
16	Belgium	0.7225	Netherlands	0.9000
17	Japan	0.7152	Belgium	0.5857
18	Switzerland	0.7136	Kazakhstan	0.5571
19	Finland	0.6967	Lithuania	0.5287
20	Estonia	0.6965	Slovenia	0.5143

Table 1: The top 20 countries in e-government

The report noted that many elderly people and other disadvantaged groups, the so-called digitally disadvantaged, in developed countries still did not participate (at all) in "digital society",. (UN, 2010:89)

These factors demonstrate that the USA and Australia are notable in that they are well developed and should be exemplars in making government information accessible to the elderly.

Australian use of and satisfaction with e-government

In a recent study of Australians' use of and satisfaction with e-government services, it was found that just over a third of people (38%) used the Internet to contact the government compared with face-to-face encounters (32%) and telephone contact (30%) (AGIMO, 2009).

Interestingly, the study indicated that the 55-64 age group now has the Internet as their preferred channel of contact. The 45-54 year old age group saw the biggest increase (6%) in e-government Internet usage since 2008. Three quarters (76%) of the 55-64 age group, and half (49%) of those aged 65 or more now use the Internet.

It was also found that previously satisfied users of e-government channels or the telephone were more likely to favour online government services other than face-to-face contact or mail (AGIMO, 2009:8). The report cites "convenience" as the chief motivation for using the Internet to contact government (four in five or 82% of users); this is also the case for those using the telephone (over two in five or 44%). However, channel features and "availability", the only option available, were also important motivators in deciding which channel to utilize to contact or deal with the government.

What kind of transactions are taking place once citizens connect with online government services?

> *Those who use the internet to contact government are more likely to be seeking information than undertaking another type of transaction. Half (50%) of those contacting government by internet were seeking but not providing information, a third (30%) were exchanging information, and one in five (20%) used the internet to provide information but did not seek any.* (AGIMO, 2009:27)

The Australian federal government remains the most accessed (43%), with state and territory (26%) and local government (29%) having similar contact levels (AGIMO, 2009:21).

The most commonly accessed services involved "community and social services" (27% or just over a quarter), followed by transport (14%), business services, economics, finance and taxation (11%), land, property, planning and construction (rising to 11% from 9% in 2008).

The report concludes that older users are adopting e-government services and other online technology channels such as email, SMS, and social networking sites in increasing numbers, with the exception of those citizens over the 65. According to the report, this 65 and older age cohort cite access and skill levels as barriers to use, however over two in five of this age group also indicated they were not interested in using online government services.

Australian study accessibility and useability issues

In the study one in four (26%) of all users had experienced unsuccessful attempts at locating government information or services online. The chief reasons cited were that the accessed website did not have the needed information (42%), the website was too difficult to understand (42%) or users did not know the relevant service or agency to contact (16%), and 15% did not know where to find the relevant web site. Just over ten per cent (13%) of those able to locate the relevant site experienced an unsuccessful search. Interestingly, those aged 55 and older were more likely to find the website too hard to use or understand (40%).

The highest proportion of dissatisfaction ratings was accorded to the categories "*being designed for all kinds of people*", followed by "*designed to help you get things done quickly*". Dissatisfaction was more likely for lower users of government websites. The age group 65 or older was less likely to give an excellent or good rating comparing the quality of government websites to other non-government business sites (AGIMO, 2009:34).

Apart from dissatisfaction with customer service (39%), one in four of those dissatisfied with e-government services cited a website usability issue, including website navigation (14% or one in seven). Focus groups raised the issue of "*having difficulty finding information which they are looking for and of understanding the language used by some government websites*". Therefore navigation and readability issues still affect some users of government online services (AGIMO, 2009:49).

Interestingly, when queried about how less frequent users of online services could be encouraged to increase their usage on online government services, usability (30%), better content and features (16%), awareness (9%) and infrastructure (7%) were cited as factors that would encourage increased usage.

The Australian findings accord with other accessibility and usability studies. These studies seem to indicate that people wish to use government web sites but are often unable to. Clearly there is a need to determine the reasons for web site failure.

Ageing and the digital divide

Of particular importance to the web designer are the issues of vision and other aspects of physiology and cognition that impede a person's ability to gain the information embedded in a website. The Australian Bureau of Statistics (ABS) has found the most commonly reported health condition is eye disease, including long sightedness and short sightedness. These account for up to 90% of reported health conditions (ABS, 2006). In the USA the leading cause of vision impairment is age-related and vision deficits are expected to increase with the ageing population (McGwin, Khoury et al. 2010). The majority (70%) of the population aged 45 years and older report vision problems even while wearing glasses or contact lenses. Poor vision manifests in many ways, some of which include an inability to read normal newspaper print or recognize a friend across the room (Leonard 2002).

Another commonly reported problem is cognitive decline. "Basic cognitive functions, such as the ability to activate, represent, maintain, focus and process information, decline with age" (Li, Lindenberger et al. 2001). Older people are easily distracted and find it harder to stay focused on relevant information while ignoring the irrelevant (Li, Lindenberger et al. 2001; Banks, Breeze et al. 2006; Park and Reuter-Lorenz 2009). This is important as being able to concentrate while not

being distracted by irrelevant information is necessary in order to finish off goals and work through problems (Mather 2010). A similar cognitive deficit is a decline in refresh memory; otherwise healthy older adults usually have problems in situations that require the management and coordination of multiple tasks involving the detailed recollection of events, information, or experiences.

In a large study of age-related verbal deficits on tests requiring the contents of long-term memory, it was found that those with low verbal ability remembered just over half of what they read, compared with those with high verbal ability who remembered more (80%) (Salthouse 1994). Studies of people with lower literacy skills found that scanning and skimming text to extract meaning is not done, instead members of this group plough through the text reading word by word. In particular, multi-syllabic words cause considerable difficulty. This group also experienced difficulty with search functions of websites because of their poor spelling of keywords; it is likely that low literacy users could also have some difficulty in "articulating" a relevant word or keyword appropriate to their search.

The USA Department of Education is quoted as estimating that 43% of the USA population has low literacy levels and that this is comparable to most other countries (Nielsen 2005), with the exception of Scandinavia. Literacy is an important construct in relation to computer and Internet usage (and therefore the use of online government services).

A Canadian and OECD international adult literacy and life skills study found that attitudes towards computers and their perceived usefulness are more favourable when prose, document, numeracy, and problem-solving skills are higher (Statistics Canada and OECD, 2005). Difficult reading levels in web pages have been shown to specifically exclude the elderly from information.

This paper seeks to present an overview of the extent to which this is apparent in web pages produced by the various levels of government over two countries, Australia and the USA.

Gauld, Goldfinch and Horsburgh (2010:185), after a large investigation into the "demand" side for e-government services in Australia and New Zealand, found a "digital divide" and varied take up, use and interaction with online government, and in a concluding remark caution:

> *The wider benefits of e-participation and e-democracy still remain largely unrealised, however, as does the use of 'transactional' services to a considerable extent. As such, despite the rather excited rhetoric and air of inevitability given in much of the literature from governments, practitioners, and some academics, e-government is unlikely in the foreseeable future to deliver the benefits that are ever promised, but continue to be somewhat elusive. It remains a work in progress that deserves further study.*

The combination of declining visual skill and declining cognitive skill, and aspects of literacy in an increasingly large mature age population, would indicate that it is extremely important that government websites should be usable, providing information for all, including the elderly.

Method

The research question investigated was "do government web sites demonstrate sensitivity to the reading needs of their constituents?" We decided to investigate this question over all three layers of government in two English-speaking countries with significant investment in e-government: the USA and Australia. A random sample of government departments and agencies was generated for each country using the lists at

- http://australia.gov.au/directories/australian-government-directories/a-to-z-list-of-government-sites
- http://australia.gov.au/directories/state-and-territories-listings/states-and-territories
- http://www.alga.asn.au/links/obc.php
- http://www.usa.gov/Agencies/Federal/All_Agencies/index.shtml

(all accessed Sept 15, 2010)

In both countries this included agency main websites, those intended for services to the elderly, and "corporatized" organisations tasked with delivering government services to citizens. Main pages need to be included here as access to specifically directed information is normally navigated through the front page. All pages chosen were examined to make sure each was one that might be accessed by the elderly.

To examine the readability we selected pages that were "front pages" (those listing information and services) and pages with lists of information as well as pages with detailed information.

To gain a clear idea of the readability of text we employed three measures: the Flesch-Kincaid reading ease index (REI), the Flesch-Kincaid reading grade equivalent (GE), and Gunning's fog readability index (GF). These were chosen principally as they allowed us to check results against several studies that have found readability to be a problem with medical websites: (Badarudeen 2010); readability levels of health pamphlets distributed in hospitals and health centres in Athens, Greece (Kondilis, Akrivos et al. 2010); the readability and comprehension instruments used for print and web-based cancer information (Friedman and Hoffman-Goetz 2006); an analysis of patient information on the American Academy of Otolaryngology –Head and Neck Surgery website (Greywoode, Bluman et al. 2009); print and web-based cancer information (Friedman and Hoffman-Goetz 2006) readability standards for informed-consent forms as compared with actual readability (Paasche-Orlow, Taylor et al. 2003), readability assessment of internet-based consumer health information (Walsh and Volsko 2008). These measures have the following significance: GF and GE are indications of the number of years of schooling required to read a text. GE has a maximum of 12 and GE a maximum of 17. The REI gives a numerical outcome that is higher in easier to read text. Recommended levels for the general public are within the 60 to 70 range.

These measures are not only commonly used, but are reliable measures of the ability of people to extract information from text. Klare (1974-1975), conducting an extensive analysis of readability formulas and their application to various documents or "text" including manual calculations and computer software, concluded that these readability estimates provide "sufficient" indications about the readability of text. Klare (1974-1975) concluded that simple word and sentence counts satisfactorily indicate the readability of a piece of writing, finishing off with the remark "*formulas provide good indices of difficulty, but do not indicate causes of difficulty or say how to write readably*". Meyers, et al (1993:246) also found that "*text factors help to determine the readability and comprehensibility of text*".

More recently, Friedman and Hoffman-Goetz, (2006) undertook a systematic review of readability and comprehension instruments used in print and on the web, where the characteristics of each literacy tool were analysed, including the variables and computations, text passage length, administration time, interpretation, and strengths and weaknesses. They concluded that to overcome some weaknesses related to some of the formulae and to improve reliability, multiple readability formulae be used.

The readability indices were averaged to see if patterns emerged over the different levels of government, the different types of pages, or between the countries. A determination of range for each index was relevant to show the extent of variation in the pages studied. Comparison of means was not done, as this is not relevant to our question of the extent to which governments can exclude the elderly by inappropriate reading levels.

Results

The indices for all pages studied showed a mean reading age of 13 years of schooling, as shown in Table 2. Recommended values for the Flesch reading ease index range from 60 to 70. The average of 40 calculated for all government web pages indicates a high level of difficulty. The most difficult reading pages required at least undergraduate levels of reading (17) and had extremely low reading ease scores. Note that a Gunning Fog index of 17 or a Flesch Kincaid index has maximums of 17 and 12 respectively. Pages with higher scores are registered as the maximum. One in ten (10%) of web pages studied showed these maximum values. Table 2 reports the values for all web pages studied.

	Gunning Fog index	Flesch reading ease	Flesch Kincaid
mean	12.81	42.22	8.61
min	5.88	5.98	4.04
max	17	72.38	12.00
range	11.12	66.4	7.96

Table 2: Reading indices for all web pages

The means in Table 2 indicate that government web sites are, on average, very hard to read. Although the sample size here is moderate, the extent to which this is an indication across the sample is illustrated in Figure 1. This shows that the distribution of scores is roughly normal (has some symmetry and a single mode). This would suggest that the mean of the sample is indicative of the nature of the readability of the pages. A similar test was performed for each subgroup and found that no subgroup fell outside this normal pattern. The chart also shows that very few pages fell in the upper levels (easier to read) and several fell in the lower levels (to the left of the chart, showing exceptionally difficult text.)

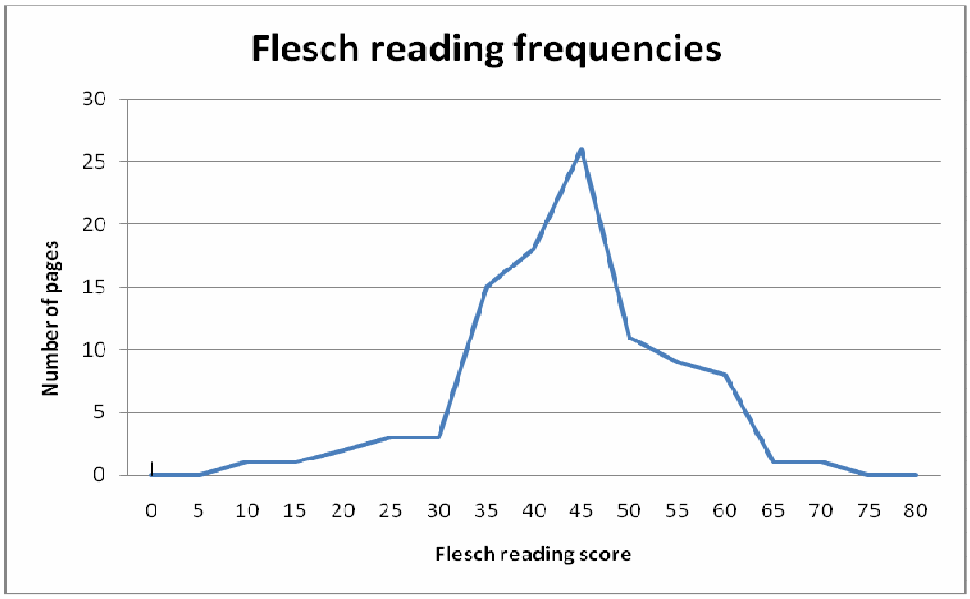

Figure 1: Frequency of Flesch reading scores for all pages.

The comparison of countries showed no obvious patterns. Table 3 shows that the reading age indexes were a little higher for Australia (13.26 vs 12.55 out of 17 and 8.79 vs 8.51 out of 12 respectively) but the ease index showed the USA sites to be a little easier to read (41.42 vs 42.67, where higher scores mean easier to read). The difference between these measures may be due to the difference in interpretation of English between the countries, but can mostly be traced to some outliers in the USA sites. The averages show that web sites are at a very difficult reading level in both countries, and both countries showed most web sites to be outside the recommended reading ease values.

	Gunning Fog index	**Flesch reading-**	**Flesch Kincaid**
Australia	N = 82		
mean	13.26	41.42	8.79
min	8.31	5.98	4.37
max	17.00	67.79	12.00
range	8.69	61.81	7.63
USA	N=144		
mean	12.55	42.67	8.51
min	5.88	10.36	4.04
max	17.00	72.38	12.00
range	11.12	62.02	7.96

Table 3 – index values across countries

Both the USA and Australia operate with three tiers of government: National, State and local. Table 4 shows that none of these tiers had web pages with accessible reading levels. Table 4 shows that reading age means were around a Gunning Fog of 13 out of 17, and nearly 9 out of 12 for Flesch-Kincaid. Reading ease was approximately 40, with no tier of government having an average near the recommended 60 to 70. The question of citizens being deprived effective access to government information is beyond doubt, and these figures indicate that access to the poorly literate who are not elderly may also be a significant question.

	Gunning fog -	**Flesch reading-**	**Flesch Kincaid**
local	N=90		
mean	12.09	44.57	8.17
min	5.88	10.36	4.04
max	17.00	72.38	12.00
range	11.12	62.02	7.96
state	N=60		
mean	13.21	41.55	8.87
min	8.63	13.62	5.53
max	17.00	72.24	12.00
range	8.69	58.62	6.47
national	N=80		
mean	13.45	40.20	8.96
min	8.31	5.98	4.37
max	17.00	67.79	12.00
range	8.69	61.81	7.63

Table 4: Reading indexes for levels of government

The research team noticed that most government departments and agencies have sparse text on their opening pages. Both types of page should be accessible – for the elderly to get needed information they must first navigate the site as a whole. The nature of pages might have an effect on readability. Table 5 shows that reading ages for the different types of web pages is very high and reading ease does not approach the recommended levels.

	Gunning fog -	**Flesch reading-**	**Flesch Kincaid**
Front pages	N=20		
mean	13.93	37.55	9.27
min	10.30	5.98	6.86
max	17.00	51.98	12.00
range	6.70	46.00	5.14
Information pages	N=200		
mean	13.22	40.44	8.81
min	8.31	10.80	4.37
max	17.00	67.79	12.00
range	8.69	56.99	7.63

Table 5: Indexes by page type

Outliers

There were 12 pages found that exceeded the recommended readability level of 60-70 set down by the United States Department of Health and Human Services (USDHHS). This is too small a proportion to allow systematic analysis but the actual sites may lead other researchers to determine underlying causes for these sites to be different. They include only one Australian page – a site that provides information on aged care subsidies. The USA pages include 7 county, 3 state, and 1 national page. Of these, four are devoted to aging resources pages, four are tourism pages for the state or county, and the others are for specific programs. The research team could not determine any peculiarlities that made these pages more likely to have been framed in easy language.

Limitations

Our random sample of web pages found only two that scraped into the minimum level of readability. The sample is too small to determine any pattern in these two pages. The study was not intended to examine differences between the countries, and until a sample returns a significant number of readable pages, conclusions about where readable pages can be found must remain a future study.

Conclusion

Much work is done every year on making web sites usable and attractive. This is important work, but the simplest purpose of a government web site is to inform the citizens. To ignore the reading age of material on web sites is to create a barrier that especially affects the elderly and poorly literate. Of course the Internet should be a valuable tool for involving citizens in government, but currently in these two countries it can be clearly seen that the tools are not being used to inform all demographics of the population. The solution to this problem is mostly one of awareness. When a page is ready for publishing it should be tested against a reading index. To create a readable page involves some simple steps:

- Reduce the number of sentences and concentrate on the information needed by the user
- Reduce the number of syllables in each word – minimise the utilisation of extemporaneous polysyllabic terminology (use short words)
- Use common parlance rather than the phrasing used for internal communication

Transformative government is possible from the viewpoint of techniques and technology. The very first step must be the engagement of all citizens with the web presence of government. There is ample evidence that this engagement is not taking place with the growing populations of the elderly (Hill, Beynon-Davies, & Williams, 2008; Bélanger & Carter, 2009; Niehaves & Plattfaut, 2010). One significant reason for this lack of engagement has been identified as perceived usefulness (Irani, Elliman, & Jackson, 2007; Carter, 2008). Our results show that there is a general lack of attention paid to how readable government web sites are. It seems clear that a readable web site would be a minimum requirement for users to find the site useful. The United States Department of Health and Human Services (USDHHS) resolved that material is considered "easy to read" only if written below a 6th-grade level (Joint commission 2007). We found that this level is not attained in either country, at any level of government, nor in any type of page. By comparison, a study of web page readability (Lukaitis and Davey 2011) has found commercial web pages to have Gunning Fog mean values of 6.03 and reading ease means of 59. It seems from these figures that it is possible for web pages to be both informative and readable. One might postulate that organisations whose financial survival is dependent upon with the clarity of the information on their website take access more seriously than governments. It would appear on the surface that governments can do considerably better in providing information that all their citizens, including the elderly, can read.

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