



Archived at the Flinders Academic Commons:

<http://dspace.flinders.edu.au/dspace/>

This is the published version of this article.

The original is available at:

<http://ci-journal.net/index.php/ciej/article/view/639/582>

Please cite this as: Newman, L.A., Biedrzycki, K. and Baum, F.E., 2010. Digital technology access and use among socially and economically disadvantaged groups. *Journal of Community Informatics*, 6(2), 1-31.

© 2010 The Authors

This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution-NonCommercial-ShareAlike 2.5 License.

DIGITAL TECHNOLOGY ACCESS AND USE AMONG SOCIALLY AND ECONOMICALLY DISADVANTAGED GROUPS IN SOUTH AUSTRALIA

Citation: Newman, L., Biedrzycki, K., & Baum, F. 2010 Aug 29. Digital Technology Access and Use among Socially and Economically Disadvantaged Groups in South Australia. *The Journal of Community Informatics* [Online] 6:2. Available: <http://ci-journal.net/index.php/ciej/article/view/639/582>

Lareen Ann Newman
Flinders University
lareen.newman@flinders.edu.au

Katherine Biedrzycki
Flinders University
katherine.biedrzycki@flinders.edu.au

Fran Baum
Flinders University
fran.baum@flinders.edu.au

Introduction

This paper analyses the digital technology experiences of socioeconomically disadvantaged groups in Australia. It reports on a qualitative study which explored how these groups access and use information and communication technologies (ICTs), specifically computers, Internet and mobile phones. The ability to access digital information and communication networks (in particular via the Internet and mobile phones) is increasingly seen as vital to full citizen participation in the economic, social, educational, political and cultural life of modern society (Lee, Markotsis & Weir, 2002; Kvasny, Kranich & Schement, 2006; Vinson, 2007). This is particularly so as the prevalence of digital access and use across populations is increasing rapidly, and as businesses and government move to greater ICT-mediated provision of services, support and information. In 2010 the Australian Federal Communications Minister even saw Internet Broadband access as becoming the fourth essential utility after water, gas and electricity (Conroy, 2008), while Huttner (2008) suggests that within the space of ten years a world without the Internet has become as unthinkable for many people as a world without telephones. However, data on ICT access show that a good proportion of populations even within the developed world still have limited or non-existent access and opportunities for use.

Digital access in Australia

Data for 2007-08 shows that 75% of Australian households have access to a home computer (compared with 44% in 1998), while home Internet access of all types (Dial-up, Broadband, etc) has increased fourfold to 67% (up from 16% in 1998) (Australian Bureau of Statistics (ABS), 2008a), yet, only half of all Australian households have a Broadband Internet connection (ABS,

2008a). At the same time, mobile phone access increased rapidly in only six years from 24% of Australian households in 1996, to 72% in 2002 (ABS, 2007a), and with 82% of Australians aged 14 or older using a mobile phone in 2006 (Department of Broadband, Communications & the Digital Economy, 2008). However, the distribution of digital technology access is not even across the Australian population and the socio-economic characteristics of households in particular continue to influence the rate of computer, Internet and Broadband connectivity. Households less likely to be connected are those with lower household incomes, those with no children under 15 years, and those outside of major metropolitan areas (ABS, 2008a). A particular difference is recorded between households with an annual income of AUS \$120,000 (of whom 81% had Broadband access) compared to only 38% of households with incomes less than AUS \$40,000 (ABS, 2008a; the median Australian household income at the 2006 Census being AUS\$21,000 to AUS\$31,000: ABS, 2007b).

Socioeconomic differentials in digital ICT access are also evident in state comparisons. In 2006-07 some Australian states lagged well behind the national averages, with South Australia, for example, having only 57% of households with computer and Internet access compared to 76% of households in the Australian Capital Territory (home to Australia's capital city of Canberra, many federal government agencies, and with higher than average proportion of its population in higher socio-economic groups) (ABS, 2007c). The same differential exists for Broadband Internet connection (42% and 68% respectively) (ABS, 2008a). Australia also records an unequal distribution in household digital technology connection *within* states, which again generally reflects socioeconomic differences. At the 2006 Census for example, 41% of households in the less-advantaged Northern Adelaide metropolitan area of South Australia reported no Internet connection, compared with only 33% of households in the more-advantaged areas of Eastern Adelaide (Glover, Hetzel, Glover, Tennant & Page, 2006). Similar differences exist in regional/remote areas, with 70% of households in the remote Aboriginal Anangu Pitjantjatjara Yankunytjatjara (APY) Lands being without Home Internet compared to only 16% in the remote mining township of Roxby Downs (2006 Australian Census, in Glover et al. 2006).

This unequal distribution of digital technology access and use between different groups in society has been named "*the digital divide*" (Parsons & Hick, 2008). However, this term implies a dichotomy of technology "haves and have nots" (see Gurstein 2003 for a full discussion of the many dimensions along which the divide can occur). Although those with lower socio-economic status are generally the least likely to access and use digital technologies (ABS, 2008a; Diaz et al., 2002; Fogel, 2003; Goslee, 1998; Notley & Foth, 2008), quantitative data highlight that in South Australia the distribution of digital access clearly follows the socioeconomic *gradient*. Thus Figure 1 shows that a higher percentage of households in each quintile are without home Internet as socioeconomic status (SES) declines. The importance of studying gradients rather than just a dichotomous divide has been emphasised by the World Health Organisation's Commission on the Social Determinants of Health (CSDH, 2008). We therefore draw on the public health literature to describe the socioeconomic differences in digital access and use as a *digital gradient* across the whole population, rather than simply a divide between those connected digitally and those not connected.

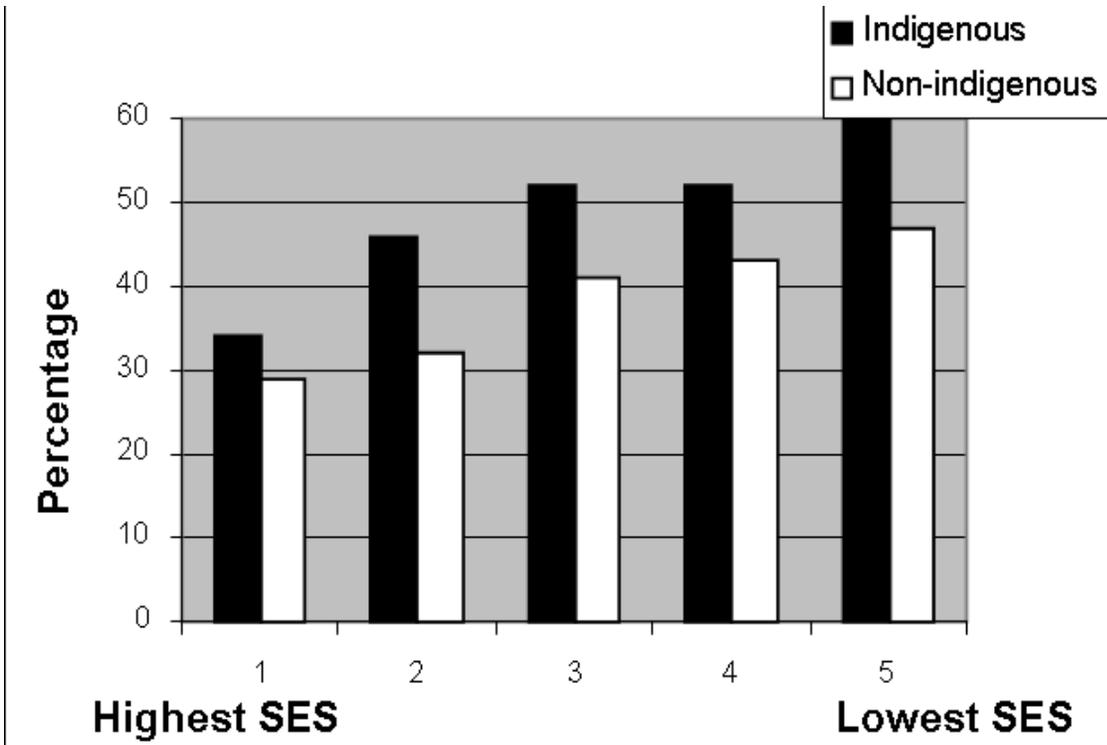


Figure 1: Proportion of South Australian households without home Internet, 2006. (Source: Glover et al. 2006, based on ABS 2006 Census of Population & Housing.)

National data already shows the potential for the digital gradient to steepen and in turn affect access to other opportunities, including financial savings. For example, by 2006-07, just over half (53%) of the 9.9 million Australians using the Internet at home reported using it for education or study, 52% used it for work related purposes, and 61% used it to buy goods or services for private use (ABS, 2008b). Online transactions can save travel and queuing time as well as travel costs and fees (Department of Communication Information Technology & the Arts, 2001), all of which may be particularly beneficial for those already disadvantaged by lower incomes, lower physical mobility or lack of transport. Even in metropolitan areas where the need to overcome distance may be less obvious than in rural/remote areas, digital ICTs can still benefit health by overcoming geographical and social barriers to accessing information and services. Goslee (1998) also argues that lack of access to computers and affordable Internet services could leave lower-income families cut off from work-related opportunities.

Government and businesses are increasingly moving to ICT-mediated strategies to interact with consumers on health care, social security, commerce and other services, and to disseminate information. The proliferation of e-government could also exacerbate disadvantage, considering that many people of lower-socio-economic background are more likely to be accessing services and supports that are publicly funded. The increasing pervasiveness of e-government is shown in increased digital contact between citizens and government. For example in 2007, 59% of Australians contacted government at least once over the Internet and for a quarter this was the main contact method (Australian Government Information Management Office, 2007). By 2006 increasing proportions of Australians were also responding to the government and business shift to online service and information provision by using the Internet to access government information

and lodge tax returns (ABS, 2007e). Furthermore, the South Australian state government has sought efficiency gains by transforming Government service delivery through encouraging customers to use on-line, self-service modes (Government of South Australia, 2008).

The close correlation between the digital, socioeconomic and health gradient is also cause for concern. The socioeconomic health gradient has long been evidenced in the epidemiological and medical literature, where research consistently finds that those in disadvantaged areas and groups (including Indigenous or First Nations peoples) who are lower down the social gradient face greater risk of chronic disease and general health disadvantage than their more advantaged and non-Indigenous counterparts (see e.g. Banks et al., 2006; Baum, 2008; Hofrichter, 2003; Mackenbach, 2005). The digital gradient is quite likely to extenuate socio-economic differences and in turn this double jeopardy will contribute to differential health outcomes. This effect will almost certainly intensify as access to an increasing amount of information and resources that help people get on in life are differentially available to those with good digital ICT access. The Australian Federal Government has a National E-Health Strategy (Department of Health & Ageing, 2008) which aims to increase the amount of consumer-provider interaction and consumer-consumer interaction via digital ICTs, yet which takes no obvious account of the implications of the digital gradient in access and use among consumers and says nothing about the need to consider equity of access and the unequal distribution of resources and capabilities required to access ICTs (Newman, Baum & Biedrzycki, 2009).

Despite quantitative data clearly showing inequities in digital access by socioeconomic variables, to date there has been little research in Australia to understand why ICT access and use are lower in groups of lower socioeconomic status (SES) and little research examining the experiences of using, or trying to access, ICT from the perspective of people within these groups. McLaren and Zappala (2002) point out that in Australia we know little about the factors associated with access and use of ICT among different status groups. Furthermore, Notley and Foth (2008) suggest that researchers need to consider more than just the technical issues of access and use and also explore social, cultural and motivational issues, including the interplay with income levels, digital literacy and perceived need. Others argue an additional need to consider the relevance, appropriateness, and awareness of certain ICTs and their potential benefits, differing levels of adoptive behaviour, and the role of social networks as facilitators to ICT access and use (Australian Communications & Media Authority (ACMA), 2007; Gilbert, Masucci, Homko, & Bove, 2008; Gilmour, 2007; Kvasny & Keil, 2006). In particular, there are concerns that as access and use of digital ICTs become central to being able to participate fully in various spheres of society, if those in more-advantaged groups continue to have better digital access, this could leave those in less-advantaged groups even less advantaged than before, hence widening the gap in digital access and use (Boese & Scutella, 2006; Lee, Markotsis & Weir, 2002; Vinson, 2007) and, just as importantly, in turn widening the gap in access to other life opportunities which are afforded by ICTs.

This paper reports on selected findings from a qualitative study conducted in 2008 in metropolitan South Australia among lower-income and disadvantaged groups. The study investigated ways in which access to, and use of, digital technologies operate as determinants of health and wellbeing, and how increased access and use could be supported for these groups, when participants saw that as desirable.

Methodology

The research reported in this paper was conducted as part of the *Health In All Policies* health lens analysis of the South Australian State Plan target to increase Broadband usage, a project undertaken jointly by the researchers with two state government agencies: the Health in All Policies Unit at the South Australian Department of Health, and the Information Economy Directorate at the Department of Further Education, Employment, Education, Science & Technology (see Golder, Newman, Biedrzycki & Baum, 2010 for more details). The empirical research component of the project used six focus group discussions conducted between August and November 2008 in five outer-suburban and one inner-city area of Adelaide (the capital city of South Australia - home to 73% of the state's population: ABS, 2008b). Focus groups allow for an initial grounded exploration of issues through interactive discussion and are particularly valuable for researching with people from lower status backgrounds or "vulnerable" groups because they give a "voice" to the research participants and allow them to define what is relevant and important to understand their experiences (Liamputtong, 2007:106; Liamputtong & Ezzy, 2005:96-97). The metropolitan focus was chosen because there is already existing research and programs on how to support digital technology use in rural/remote Australia.

To maximise chances of recruiting people from lower socio-economic and disadvantaged groups, recruitment assistance was sought from individuals working in local communities and service organisations within the researchers' networks, with an emphasis on community workers known to have trusting relationships with lower status groups. The settings and providers were located in areas identified by Glover et al. (2006) and ABS (2002) as being of lower socio-economic status according to education level, income and occupation group. Recruitment was focussed in the 25 to 55 year age range – the main family formation and working age group - since there is already some Australian focus on researching digital technologies with disadvantaged youth (see e.g. Blanchard, Metcalf & Burns, 2007) and on older culturally diverse communities (see e.g. Goodall, Ward & Newman, 2010). The six focus groups, with a total of 55 participants, were:

- one women-specific community support group (8 participants; "Women's group")
- one men-specific community support group (7 participants; "Men's group")
- one work/unemployment support group (10 participants; "Work group")
- one group living in community rental housing provided at an affordable price to people on low incomes and/or at risk of homelessness (5 participants; "Housing group")
- one Aboriginal group (15 participants; "Aboriginal group")
- one African-born recent-refugee group (10 participants; "Refugee group")

LN and KB conducted the focus groups and used the same schedule of questions for each group, with additional areas explored as raised by participants. The question schedule was developed from a literature review, questions from previous digital surveys (e.g. ACMA, 2007; Blanchard, Metcalf & Burns, 2007; Lee, Markotsis & Weir, 2002), and discussion with the Research Reference Group. Areas of questioning covered by the schedule that are relevant to this paper were:

1. the ICTs people were using (or not using);
2. where people had access to these technologies;
3. how people originally learned to use various technologies;
4. perceived facilitators and barriers (social, cultural, economic, etc);

For the refugee group who were not proficient in English, the researchers' questions and participants' responses were interpreted into the group's native language by an accredited and experienced interpreter who was known and trusted by the group, and participants' responses were interpreted back into English. Focus group discussions were tape-recorded verbatim and transcriptions were analysed for content and themes (although for the refugee group, only the English part of the discussion was transcribed). Each participant was thanked for their participation with a free lunch preceding the group discussion and an AUS\$30 shopping voucher. At the end of each discussion the participants were also asked to complete a short survey form to supply information on their demographic background and ICT use. For the refugee group the survey form was translated into their native language. The researchers and community workers provided some assistance to a small number of participants to complete the forms due to limited reading/writing skills. Six of the 55 participants declined to complete the survey form. The research project was approved by the Social & Behavioural Research Ethics Committee at Flinders University.

Results

Socioeconomic and demographic profile of focus group participants

The survey forms confirmed that participants were more socially and economically disadvantaged than the state population as a whole, with greater proportions living in rental housing, having lower household incomes and living with perceived financial strain, having limited education and lower level occupations (see Figure 2). The demographic data also showed that the majority were in the intended age range of 25-54 years.

Access to digital ICTs

This section describes whether or not ICTs were available to people. Later sections cover the very different issue of actually using ICTs. Participants accessed technologies in a variety of ways: directly through personal ownership, indirectly through another's ownership (e.g. friend, family member), or indirectly through free or paid public access (e.g. library, Internet café). Some had access to a wide variety of technologies through personal or household ownership, including the latest models with many advanced functions. Others owned older technologies or ones with minimal functions, and some owned very few:

I have a mobile phone, just a basic one. It doesn't have Internet or anything on it. Computer with Internet - it's only dial-up - digital camera, digital set top box for the TV (Women's group).

[I have] mobile phone, digital camera, my computer runs dual screen monitors with Internet. We have VOIP Internet phone, three laptops, GPRS system for the car, a media centre that runs on our TV network. And then the Wii game console which was also connected to the network... I do have an IT tech as a partner though, so he does contribute a lot (Women's group).

I use a mobile phone and that's about it (Employment group).

I haven't even got a mobile [phone]... The only digital thing I've got in the house is a microwave [oven] (Aboriginal group).

Figure 2: Socioeconomic and demographic characteristics of study participants

Socioeconomic

- Almost all resided in postcode areas of lower socioeconomic status
- Three quarters lived in rental housing (public/private); few were buying or owned their own home
- Three quarters had a household income equals to, or less, than the state average
- Two-thirds reported living with some degree of perceived financial strain
- Two-fifths were educated to only Year 11 or less (12 years of schooling or less)
- Most were in lower level occupation groups
- Ten percent were unemployed (double the state average of 5.2% in October 2008: ABS 2008c)

Demographic

- Three quarters were in the intended age range of 25-54
- Two-thirds were female
- Two-thirds were born in Australia and one-sixth in Africa
- Over a quarter were Aboriginal Australians (compared to less than 2% of the state population: ABS 2007d)
- One in ten was a sole parent with children
- Over half had children under 18 living in their home at least some of the time
- Three quarters felt they spoke English very well
- Two-fifths spoke a language other than English at home

The mobile phone was the most commonly owned digital technology. Other technologies owned included other computer equipment (printer, scanner, copier, fax), television equipment (hard-disk recorder, DVD player, digital set-top box, video camera), stand-alone and Internet-connected gaming equipment (X-box 360, Playstation 2, Nintendo), and music-related equipment (MP3 player, iPod, surround sound system).

i) Phone access (mobiles, landlines and public payphones)

The large majority owned their own mobile phone, while a few used a friend's or family member's phone, and only two had no mobile phone use. Overall just over a quarter had no landline phone, although half the Aboriginal respondents had no landline. This suggests that landline-substitution

could be more common in lower-income groups. In our study, landline-substitution mainly occurred due to people's desire to minimise financial outlay for more than one phone connection:

I have two mobiles. No landline for 8 years (Women's group).

A greater proportion of those without a landline phone were in public or private rental housing, while none of those buying/owning their own home were without a landline phone:

Many years ago I had the phone in my name [in a share house] and everyone moved out and didn't pay me. So now, yeah, I'm paying it [debt] off very slowly and it's going to take some time (Housing group).

A few had access to the Internet on their mobile phone but hardly any used this function, either because they felt it was too expensive or because they were on a prepaid option which did not allow Internet access (rather than a more expensive plan which often did provide mobile Internet, but this could also depend on having a good credit rating, which some did not have):¹

I tried to use [Internet on my mobile phone] but I'm on 3 Network and they don't let you use the Internet when you're on Prepaid, you have to have a plan... and I won't go on a plan (Employment group).

While everyone who answered the survey had some phone access and use, three had no home landline and their only access was via a friend or family member's phone. Some still used a public payphone to minimise or have control over financial costs, or as an alternative if their mobile was not working:

I will not buy credit for my phone ever, for any reasons whatsoever. I'll go to the phone box if I have to ring someone, I'll send text from the phone box (Housing group).

Having both a home landline and mobile phone enabled some to make the best use of each, with affordable local contact via their mobile and affordable distant or overseas calls on their landline. A landline also allowed other people to call them more cheaply than calling to a mobile phone:

We don't make many calls out but we have our landline so people can call us... otherwise they can't afford to talk for ten minutes on a mobile call (Women's group).

The two people without a mobile phone offered a range of reasons for their non-use, including "not needing" one, "not being interested", "not having the skills", "too expensive", and "my phone is too old".

ii) Computer access

Respondents had a variety of ways to access computers, including in completely private spaces (home or work), semi-private spaces (areas shared with known others e.g. college computer room), or completely public spaces (area shared with predominantly unknown others e.g. a library). A small proportion had no computer available anywhere. Around two-thirds had personal or household ownership of a home computer (the state average is 71% of households – ABS, 2008a). This means that almost one third did *not* have a home computer, and the Aboriginal respondents were far less likely to have a home computer. Overall, about one third of

respondents had computer access at a place of learning or a public library/community centre. Although official statistics show that one third of Australians use a computer at their workplace (ABS, 2008a), very few in the focus groups did this, probably because most were in unskilled and semi-skilled work (e.g. hospitality, labouring) or were unemployed or not in the labour force.

However, even though a computer might be available, it was not necessarily used, and even when an available computer was used there could be issues concerning the location quality (e.g. degree to which people perceived others could watch their use, degree to which use had to be planned/booked in advance), and around the skills and literacy needed to use the computer. Depending on the purpose for use, the perceived quality of access could influence the degree of use (discussed in the next main section).

iii) Internet access

Although most respondents had the Internet available somewhere if they needed to use it, not all took advantage of this. As with computers, even when the Internet was available and was used, there could still be quality issues about the location of availability, and the degree to which people had the skills and literacy to use it well (discussed later). Considerably fewer respondents used the Internet at work compared with all South Australians (ABS 2008a), which is not surprising since fewer were in the labour force.

Less than half the participants had home Internet access (45%, compared with 60% of all South Australian households in 2007-08 – ABS, 2008a). A comparison of home computer and home Internet access with use suggests that a considerable proportion had a home computer that was *not* Internet-connected. Some found that having no landline phone negated their ability to access the Internet, or meant that to have home Internet they felt forced to pay for a landline, or that they had no option but to buy the most expensive Internet connection i.e. wireless Broadband:

Most phone companies, to get the Internet, you need to have a landline, to get Broadband. I've been inquiring about it - they're smart! (Aboriginal group).

We could only get Broadband if we had a fixed line, which was [phone company] telling us to get a fixed line basically, [which means we'd have to spend] more money (Employment group).

Internet connection type

Wherever they connected to the Internet, just over half had Broadband available (cable or wireless). Two-fifths did not know their connection type, and very few reported having Dial-up. Just over one third reported a home Broadband connection (compared with the 56% average for Australian cities, and 68% in the Australian Capital Territory: ABS, 2008a).

Influence of ICT location on access and use

The location of access and use could influence the degree of use, the reasons for use, and the extent of use. For discussion, use is divided between private/semi-private and public locations.

i) Private access (shared with known others)

The most private ICT access was seen as at home, because it was deemed convenient and (for adults) less time- and content-restricted than access at semi-private or public locations. Home access could also provide more timely access to information:

Without the Internet I would have had to spend a lot of time at the library. What I've found with libraries is the information's not there and often you'll look up a book or something and it'd be at another library so you'd have to wait for it to come in and then it comes in and you find out it hasn't really got anything in it you wanted because it was written in 1973 (Housing group).

For education a private space supported better concentration and freedom from time limitations and interruptions that could occur in a public space:

If I'm doing a uni assignment or something like that it's nicer to do it in private and just have that private time where I can just concentrate on it, whereas [in public space] you don't know who... is going to come in and expect you to talk to them (Housing group).

Home use could also be incorporated into daily life:

You can make a cup of tea while it's [computer] doing its thing, or wash the dishes (Women's group).

You might just have a few hours sleep, wake up in the middle of the night and you're wide awake. Why not jump online and do some work if you've, you know, got the opportunity and you feel like it (Housing group).

Fitting ICT use into daily life was particularly important and more convenient for women with young children, for whom public access without crèche facilities made computer/Internet use difficult:

In a community centre or in a library you've also got the fact you've got children and your children aren't going to want to sit next to you for an hour, while at home they're playing with their toys or they're in bed or something like that (Women's group).

Have you ever waited in line at Centrelink [federal government agency for social security payments and services]? Or in the line at the post office? That's the reason I do it [pay bills and banking online] to save time, and also dragging kids to like, Centrelink, to the Post Office, to the bank, you know, to there to there to there, they just end up getting grumpy and ratty, and to do it all from the convenience of your home is just [so much easier] (Women's group).

Home-based ICT access also saved travel time and costs related to domestic duties such as shopping or banking:

When I go down to my sister's place I use her computer, like she does all my banking online and we do everything from bill paying to basically just doing everything. [Otherwise I] have to drive to six or seven different places paying cash for it (Employment group).

Some people only had computer access in a semi-private place i.e. where they either knew the other people or knew that they shared common purposes such as study; this included computer access at the house of a friend or family member, a college room, and common areas in community housing:

I access computers either when I come to college or at my cousin's or brothers' house (Aboriginal group).

I know enough people I could ring up and say "Hey on the weekend can I come over and can you turn your computer on and do something for me?" (Women's group).

While semi-private places could be private enough, they were presumably not as easily accessible as home ICT access, but this was not mentioned by participants as a barrier. For those less attached to using ICTs, and hence perhaps less likely to want continual or easy access, semi-private use seemed quite acceptable and particularly if it removed the need to use their own financial resources. However, relying on another person's ICT access could mean that access was easily lost:

I haven't been using [computer at friend's house] because she got a big bill, she's just trying not to turn it on (Women's group).

ii) Public access (shared with unknown others)

The existence of public access to computers and the Internet could suggest that everyone can access these technologies if they want them, yet we found a wide range of social, transport and privacy barriers to public access. About a third of our respondents said free public access to computers and/or the Internet was available to them at libraries and community centres. Another third had public access at colleges where they were studying or at other places of learning - e.g. English-language college, adult further education campus. Some also had access at specialist community support centres (e.g. disability support centre, homeless women's support centre).

There were both benefits and disadvantages to ICT access in these locations as compared with home use. Although home access could be more convenient, some found that free public access saved them spending their own money, which was particularly beneficial for those on tight budgets:

I've got about another 18 months to go of Broadband [at home, then] I think I'll start using the library. Costs, yes. [And] it will get me off my arse and go out somewhere (Men's group).

I prefer just to go down to the library. I wouldn't have the Internet bill, I wouldn't have my phone bill, I wouldn't have to go out and buy a printer, I wouldn't have to go out and buy you know the ink... I wouldn't have to go and buy paper. It's somebody else's problem not mine (Work group).

However, if many others were also looking for this same cost-saving then demand could outstrip supply:

I think the library is good because it's got free Internet and if you book time you can get free use of it, but some people go there every day so it saves them money, but they've booked it up [so] that you have trouble getting time (Employment group).

Public access could offer faster technology than available at home, but this was only a benefit when speed was particularly important:

I've had Dial-up for years now and I'm just used to it, and I just think, well If I need something faster I go here [common room in community housing] or to [homeless women's support centre]'s computers (Housing group).

Sometimes public access meant that computer/Internet use could be combined with other tasks at the same location:

If I was waiting to see my [medical specialist] or anyone like that I'd go in and I'd just spend an hour or so at the [library]. I'd just have to go in there first off and I could come back in an hour's time and there'd be a computer (Employment group).

Public ICT use could also be only incidental to other activities, rather than regular:

Don't have anything to do with the Internet unless I deal with some school stuff and that at [college]. I don't have a very lot of technology stuff (Men's group).

While just over a quarter said a computer was available at a library or community centre, only half of these actually used a computer at that place. Some felt that there were privacy concerns with public use, depending on what they were using it for:

In a public library you get everybody else around you watching what you're doing. Where[as] in your house you might have your partner or kids around but they're not really knowing what you're doing or anything (Women's group).

Public use could also be difficult due to time restrictions:

I've been there [local library] and tried to use them but you only have like an hour limit on them. If you're going to research something and you think you can do it in an hour, then I'd like to learn from you (Housing group).

And some public locations could be useful or more supportive than others:

I found that the [X location] library was great, you could always get a computer for 2 hours, but the [Y location] one's really hard (Employment group).

If I know I need a whole day worth of research, which often I do, I go to the Disability Resource Centre and they've got a bunch of computers there and they're not brand new but they're fine.

You can go in and use them as long as you want and no one really hassles you (Aboriginal group).

Some locations also had restrictions on what websites or facilities could be accessed, which could discourage use:

At most organisations, sites are blocked, like chat lines, MSN, hotmail even - so you can't even access your email, which you need to do (Aboriginal group).

Public ICT access could also be inconvenient to travel to, particularly if people did not have a private car or drivers' licence:

I used the TAFE [Internet - at further education institute] but I had to go all the way down to Regency Park which isn't that far from the City but... it's easier not to go that far - some days I'm just really not physically capable of actually getting there (Housing group).

A small number also discussed pay-for-service access at Internet cafes but there were not many of these in the lower SES areas where most respondents lived or worked:

There's not a lot of Internet cafes down this area though. The closest one is [10km away at major shopping centre]... There was one at [2km away], then at [8 km away] and then at a deli [0.5km away] and then that closed down (Women's group).

The cost of Internet cafes was also restrictive for those on low incomes:

If you're going to go to an Internet café, for half of their costs you might as well have dial-up at home because their costs are pretty exorbitant for a very short period of time (Women's group).

Therefore, if Internet cafes were used they were mainly for one-off purposes, or for limited use as a stop-gap if a more convenient alternative was temporarily unavailable (e.g. home computer had broken down), or if a faster connection was needed for a particular task.

Use of ICTs

Whereas previous sections considered what ICTs people *had available to use*, this section looks at whether people were *actually using* the technologies and what features they could use.

i) Variation in context and quality of use

A key finding was that a technology's availability, even at home, did not mean that it was used frequently, put to an extensive range of uses, or even used at all by people in these lower-income and disadvantaged groups. A short discussion string from the women's group illustrates this:

(Participant 1): My mobile usually spends its time at the bottom of my bag, dead.

(Participant 2): Yeah, I don't use mine very often.

(Participant 3): Mine's been disconnected at the moment.

And from the men's group:

I have a mobile phone which I use only for emergency calls.

Even among those who had an ICT permanently available to them, the "horizontal divide" (Cho, 2004) or "second divide" (Zhao & Elesh, 2006), or what we could call a sub-group gradient, was noticeable, where wide variation existed between people *within* the lower socioeconomic and disadvantaged groups in terms of their frequency or extent of ICT use. Similar situations were found with home computers and home Internet. For example, some had a home computer but

rarely used it because others had priority use (particularly an issue mentioned by women with dependent children) or they simply had little reason or opportunity for use:

I had five children and we had one computer so I never got time, except for when they were in bed... and I lost my keyboard [skills] and all my skills (Employment group).

I don't get time to use a computer anymore. Not with a 2 year old (Women's group).

I do have a computer at home but it sits in the bedroom collecting dust. I've got the Internet on, yes, but I never use it (Employment group).

I do have an email address but I never use it, so every time I go to load up on it it says "Access denied" (Employment group).

Some users were adamant that although they would put a technology to a certain use, there were other things they would never want or be able to do. For example, some who were using the Internet said that they would never do online banking, purchasing, blogging, chatting, or webpage creation. On the other hand, some made frequent or extensive use of just one part of their technology's functions, or of one technology much more than another:

I use my mobile to tell the time... it's got a nice big clock on it (Aboriginal group).

My [mobile] phone I don't really use. It's for people to contact me, I don't ever buy credit. My computer however I am on 90% of the time. I use it for anything from Internet banking, we purchase things worldwide from various websites, check the weather, my TV guide, all my parenting forums like parenting information, things like that (Women's group).

ii) Reducing or discontinuing use

Some participants had previously used an ICT but had then partially or completely given up use due to unexpected or high financial costs, loss of interest, changing priorities, or not replacing a previous model:

I used to work for [government] for about 10 years and I could do computers... But now I don't do computers anymore because I'm not interested, it's too fast (Aboriginal group).

Over the years I've had my own Internet connections and I've had all sorts of gizmos and that.

But at the moment [I just have the mobile] phone and a very old computer that I just use to play games (Housing group).

Some were in the process of reducing their ICT use because they felt they no longer gained benefits, or the technology's maintenance had become too expensive:

I'm starting to get more away from using a mobile. In fact I leave it at home when I go out to the shop (Housing group).

I actually done [did] a big favour for my friend, she's basically house bound and her mobile phone doesn't work for her and the best thing that I ever did for her was put on the landline for her (Housing group).

Whether to buy a technology or continue its use was sometimes relative to competing needs or desires, and this was particularly an issue for those with limited disposable income:

The Internet [on your phone] ... that's costing you money without you knowing it... I got the Internet disconnected because I was pressing the wrong buttons [and incurring phone costs by connecting to the Internet without knowing it] (Aboriginal group).

I got mine [mobile phone] cut off... because I tended to ring [daughter] all the time to see how she was going, and the bill went up and up, so I don't have the mobile anymore (Aboriginal group).

Skills

Many participants had not acquired the skills to use anything other than the basic features of a technology, for example many had not moved beyond “talk and text” on a mobile phone. Although most had their own mobile phone, fewer felt they could make a phone call “really well” and a small percentage could not use a mobile to send or receive text. Those who could not send a text message at all were across all age groups:

I have a mobile but I only know how to answer it. Going into and sending messages – I wouldn't have a clue (Aboriginal group).

There was also variation in the skills participants had to use computers beyond the basics, with a proportion unable to undertake activities such as turning a computer on/off or using a mouse. Access and use was heavily influenced by whether or not people had the ability to find appropriate ways to learn the skills to use technologies. Of those who used mobiles, computers and the Internet, many had learnt via informal pathways or had their use mediated by others because they had friends or family they could turn to, while others had sought assistance from people they knew who could offer help, and yet others had learnt on their own by trial and error. Those with limited or no social connections had no-one to teach them and few people to digitally connect to anyway. Some of the refugees had been given basic instructions on phone use by a non-government organisation when they arrived in Australia. With few exceptions, participants who were not currently using a technology felt that inadequate formal support was available to learn and then continue using that technology. Users sometimes found it difficult to get “helpful” help from Internet or phone providers.

Those who used technologies, including frequent or advanced use, therefore often had outside facilitators to get them started and/or progressing to more advanced features. Factors important in setting people up for learning technologies were often that they already had the necessary social capital (e.g. friends to assist them), and economic capital (e.g. money to buy and maintain technologies), and educational capital (e.g. cognitive abilities, confidence, English literacy, numeracy, technical ability). Some had also learned to use computers and/or Internet through IT-specific courses at work.

Factors influencing differential ICT access and use

The South Australian research showed that the digital technology use of an individual or group is strongly influenced by their lifetime pathway of accrued resources and capabilities. These in turn relate to the social determinants of health and wellbeing, and to previous opportunities in life such as education, employment, social connections, and income (see Commission on Social Determinants of Health, 2008).

i) Education & employment resources

Prior education and employment history influenced current digital technology access and use. In particular, a person's lifetime opportunities to accrue an education influenced their English literacy (both for native and foreign language speakers), their digital literacy, and their technical literacy, all of which are essential for accessing, reading and making sense of text on computers, mobile phones and the Internet. A significant finding was that a history of working or studying in environments where computers and Internet were used was an influential factor in people gaining the skills and confidence to access and use these technologies. Going through school with computers and the Internet increased skills levels for some of the younger participants:

I learnt a little bit of computers at school, and then I did a computer course to help me gain employment (Women's group).

Employment had sometimes provided training opportunities:

I've learnt a lot of [computer] skills through work (Aboriginal group).

In my previous job I had to learn how to use computers and the Internet (Men's group).

However, not all younger participants had the income or opportunity to maintain personal use of technologies after leaving school. Education and employment could also facilitate access and use if the desire to access work and study opportunities were key motivators in learning to use computers or the Internet. Some had specifically enrolled to study IT-related courses in order to facilitate other learning or employment opportunities. For others, the need to enrol online led to their first realisation that digital technology use is becoming an increasingly necessary key to opening the door to education:

I got into the course I'm doing at the moment... because someone from here researched on the web for me, she printed out several web pages, so having access to the Internet helped me get into my current course (Housing group).

Some people had not had the opportunity to use computers or the Internet through school, further study or work. They appeared less likely to have basic skills or motivation to use computers and the Internet in their private lives. One in particular however, saw the Internet itself as potentially providing her with an education of sorts:

I didn't have a very good education and I can really only read basic fictional books. I think with the computer it would improve my spelling because you have to spell properly or the computer does not compute. And exercise my brain - it's like any other muscle in your body that needs exercising and my brain doesn't get all that much (Housing group).

ii) Literacy and learning ability

In the focus groups, an individual's literacy skills influenced their ability to use digital technologies, and particularly the quality and extent of use. Three different types of literacy issues emerged:

- I. Basic English Literacy (for native and non-native English speakers);
- II. Technical Literacy;
- III. Digital Literacy.

Basic English literacy (reading, writing and speaking) was an issue for a number of participants and posed a barrier to certain technology use. It was also an issue for some native English speakers:

I have a problem with the reading and writing side of it. OK I admit that no worries, and it doesn't mean that I don't know what I'm doing. But I find that with the Internet if you have to go on the Internet and you can't damn well read the words that they want you to put on, how are you supposed to access the Internet in the first place? (Employment group).

English literacy was also a barrier for those with English as a second language, especially among the refugee group. They would welcome learning the most basic computing skills in a way that overcame language barriers (suggesting perhaps a facilitator who spoke their language):

Everything is in English – Internet, even mobile phones, everything is in English and that's a big barrier... A big barrier remains the language because you can have the website, you search for it, and you are given a lot of information and everything's in English (Refugee group).

Government websites in English posed particular barriers, but lack of English could be overcome if this group could find websites in their native language or another language in which they had some proficiency:

She is saying that there is a good number of people [who] normally do the search on Internet concerning information from our country and this information would come out in either [x], that's one of the main languages from our country, or in French [which some of them can also understand] (Refugee group).

Most people who identified lack of English as a barrier had other non-technological ways of communicating and finding information, such as from newspapers, others in their community, or flyers from welfare organisations, or simply by waiting for someone to tell them:

With me I find that usually the information comes to me anyway after a while, you know when it's been circulating around for a while (Men's group).

As to go on to the Internet to find out information, well I've got the Carers Network which is near enough next door to me, you know across the road and in the shopping centre (Men's group).

An individual's learning ability or learning style could also influence whether or not they had learned to use digital technologies or felt they could attend formal courses or ask others for help to learn:

I'm probably the only composite [competent] person with digital stuff, I'm great with electronic stuff and that. I play around with my mobile phone and take pictures on my mobile phone and send them (Employment group).

I haven't asked people that live here to teach me or just show me the Internet because I feel like I'm taking up their time or they might not have the patience, and I'm not the quickest person off the mark you know (Housing group).

Technical literacy was also required to at least some level in order to access and use digital technologies (in particular the Internet) and some felt this was akin to learning a new language:

They're [computers] not even English, they've got their own language. It's a new language we've got to learn you know, and there's "bits" and there's this and that... (Work group).

This could also cause people to feel stressed:

I've sort of got the gist of how to turn it [computer] on. I have no idea how to turn it off but he [friend] said it was just the reverse, but that's just too hard [for me] (Housing group).

Even on my telephone, when it says 'SMS' I just hang up because I don't know how to do it! (Aboriginal group).

A good proportion felt that their technologies had too many complicated features and they needed someone to show them how to use them, while some wanted the option to purchase more basic technology:

I've got a mobile [phone] but I don't use it... don't know how (Aboriginal group).

If I had a choice, I'd have a phone that had nothing, no colour screen, no camera, no buttons, except for one that you could program phone numbers you absolutely needed, to call 000, maybe family members. I just want something I can talk to people on and they can contact me (Housing group).

Lack of technical proficiency combined with lack of English proficiency therefore presented a double barrier to digital technology use for some.

People's level of understanding about the 'digital world' and in particular the 'online world' also mediated their technology use. Those who were more confident that they could safely navigate their lives incorporating digital technologies were more likely to use them, while those who were unsure were more likely to disengage or make only limited use. One issue was knowing which websites to visit and which were trustworthy:

Well, just doing research on the Internet for example, I mean there just so much stuff out there and you've got to wade through it. How do you recognise what's quality and what's not? (Housing group).

Some also pointed out that not having experience with the digital world, or with particular technologies, led to fear of them and hence limited use or non-use:

I think there would be older people who are actually scared to ring a mobile. It's a big long number starting with a '04'. They'd think "it's a mobile" and especially if they get asked "Would you like to leave a message" on voicemail they think "Oh my god, what's a voicemail?!?" (Aboriginal group).

Many were afraid of the costs they might incur if they got locked into a contract, or if they gave their credit card details online. The use of online information, services and support therefore depends on people's literacy and skill level, and reasons for seeking information.

Physical capabilities

Having the physical ability to use a technology was also a factor determining use. A few people mentioned their manual dexterity or visual acuity as causing difficulties:

I've got eye trouble... vision impaired... I find it very hard to use phones, computers... I find it really difficult because I have to wear these bifocal things (Aboriginal group).

I reckon they should have a new mobile for older people! Even the buttons, big people with big hands push two buttons at once. It's true, I've had to ring people for them because their phones are too small (Aboriginal group).

One participant who was a carer for his blind mother noted a raft of supports from formal organisations such as the Royal Society for the Blind. Some of the moves to digital provision offered continuing alternatives and some did not:

Royal Society for Blind... just recently they actually sent [my mother] an SMS on her mobile phone. She can't see any of the buttons or anything but it doesn't bug her because she knows where the thing is... They actually sent her an SMS saying that I think [phone company] have changed to go to sending everything via email like contracts and stuff like that. Yeah I rang them up and I said "Nup [no], you can't do that with my mum" and they're going "No, unless you pay \$2.00 that's what's happening" and I went "No she's visually impaired and she has someone come over her house and read her mail and stuff like that" and they're like "Uh, no worries we'll keep sending out the letters and everything no charge" (Men's group).

Other people found there were direct physical impacts on their health which affected their degree of technology use:

On the Internet or the computer your eyes start to ache and water so you have to go away from the desk. That's the problem that I get all the time (Aboriginal group).

And if you're not sitting right...you can get a sore lower back, your posture. (Aboriginal group).

I don't like the computer, it gives me a headache (Men's group).

Social connections

Our research showed that people's ICT use was often mediated by, as well as motivated by, their existing social networks. This means that people with few or no friends or family could have little incentive or motivation to use, or no-one to show them how to start using a technology, so that

people with existing poor social connections cannot necessarily benefit from the potential to increase their social connections through digital technology use:

Not having a network of friends or acquaintances doesn't help, so the phone is not much use if you don't have those (Housing group).

My daughters are always after me to get a mobile but they're not living with me so there's nobody to teach me (Aboriginal group).

Others asked people in their social groups to use technologies on their behalf:

My friend has taught me to use the basic features... the book's pretty thick and to read it I can't comprehend it (Housing group).

I taught my nana and aunties everything they need to know about their mobiles... it took them a few months though!... They had no idea (Aboriginal group).

My 13 year old granddaughter helped me and she's so quick and I think it's because they [young people] play with their phones so much (Employment group).

Financial resources

Considering that the research was conducted among lower-income and disadvantaged groups, it is not surprising that ICT access and use was related to financial resources. For those not using a mobile phone or the Internet, perceived cost was one of the main barriers:

The Internet is an extravagance for us... It's like a luxury (Employment group).

My daughter wants a laptop but I can't afford one (Women's group).

Even people employed... find it difficult to keep up with it (Men's group).

People's perceptions of their income relative to the cost of purchasing, using and maintaining digital technologies could determine whether they were motivated to purchase and use the technology frequently. For those who owned mobile phones and had a home Internet connection, the ongoing costs were seen at best as quite expensive and at worst a choice between essential services:

I'm having to choose between a car and several things at the moment ... and I need a car, I can't use public transport... for my back – I have a spinal injury... and I think it'll come to that, where the computer will just have to go (Men's group).

I'd like a games console. But that's just a want, not something I need. I can't even afford to run my car though! (Women's group).

One respondent was trying to work out ways to cover the costs of maintaining his technologies by sharing his house with a boarder who helped pay for utilities, in which he included Internet. On the other hand, some were using their mobile phone on a very limited basis intentionally to limit the cost, with some only accepting incoming calls, and thus eliminating the need to purchase credit:

I usually reply [on my mobile phone]. I don't often initiate calls. If it's to be a conversation I'll go either to an office here [to use phone in community housing]... - or I'll go down the public phone (Housing group).

Many were wary about entering long term contracts for phone or Internet connections, especially those who had unstable employment or who were on pensions.

A significant issue was that people perceived that to access the most basic connection (i.e. dial-up) a home landline phone connection was needed. However, low-income participants were reluctant to pay monthly rental for a landline connection, which they perceived was "money for nothing":

I used to have a landline and it was only incoming calls... I don't want to pay the landline because they are false. Somehow they're charging for a bit of wire that's coming to your house...\$29.00 rental [a month?]. If I need to ring out I'd go down the public phone box... If I haven't got the time I'll use my mobile phone, if it's got any credit (Men's group).

A wireless Internet connection was therefore the only option for some people, which was often perceived as too costly. A few mentioned that they had tried accessing the Internet on their mobile phones but saw this as too expensive. Some participants identified financial stress associated with purchasing, maintaining, upgrading and using mobile phones, computers, and the Internet on a limited income. A few suggested that they would not be able to sustain their current expenditure, such as in home Internet connection, unless they made a significant sacrifice or found a way to increase their income.

Discussion

Our research has enabled us to identify particular pathways to digital use (or non-use) which demonstrate how existing socioeconomic inequities create barriers to digital use or contribute to differences in the frequency and quality of digital use. Figure 3 highlights how there is a vicious cycle by which lack of (or limited) digital access or use creates further barriers to improving the underlying determinants of that use.

Our research demonstrates that digital access and use among lower income and disadvantaged groups in Australia is also related to a range of broader social determinants of health, such as education, income, housing tenure, and social connections. Factors we found acting as barriers relate back to the reasons why people are in lower socioeconomic or disadvantaged groups in the first place i.e. the barriers/enablers to ICT access and use are the resources and capabilities that people have accrued (or have not had the opportunity to accrue) during their lifetime, so that *a lifetime history of disadvantage or advantage strongly influences the resources and capabilities they currently have to access and use (and further benefit from) ICTs*. Unfortunately, in terms of finding appropriate ways to increase beneficial technology access and use, those who are current users (particularly high-end frequent users) are often the ones designing digital divide programs (by dint of their higher education, higher income, higher level occupations). We suspect that many of the resources and capabilities which support current users, such as their lifetime of accrued educational and income advantage and stable housing tenure, are invisible to them and hence lead them to suggest and design solutions to the most obvious barrier to ICT access and use for non-users: the technologies themselves and the technical skills required to use them, rather than understanding the role of more underlying determinants of use.

Our research therefore adds an Australian perspective to findings from overseas research (e.g. Kvasny, Kranich & Sement, 2006; Ortiz & Tapia, 2006) that technological solutions alone cannot by themselves “reduce the digital divide” or, as we prefer to put it, *level out the digital gradient*, and that they need to be accompanied by a broader digital inclusion and socio-technical approach to address the range of other barriers in ways which are relevant to local community context. Our research also supports the existence of a “horizontal divide” (Cho, 2004) or “second divide” (Zhao & Elesh, 2006), or what we could call a *sub-group gradient*, where wide variation can exist between people *within* lower socioeconomic and disadvantaged groups in terms of their frequency or extent of digital access and use. Furthermore some people face multiple barriers, for example lacking financial resources to enable them to purchase or use a technology in the first place, or lacking the social connections to support them in learning to use ICTs, and once they do have access then facing additional hurdles due to a low level of English literacy which undermines their ability to use Internet sites predominantly written in English and/or lacking digital literacy to support safe navigation through the online world. Existing policies and practices are, therefore, in danger of accentuating the inequities unless additional measures are taken, some of which we outline below.

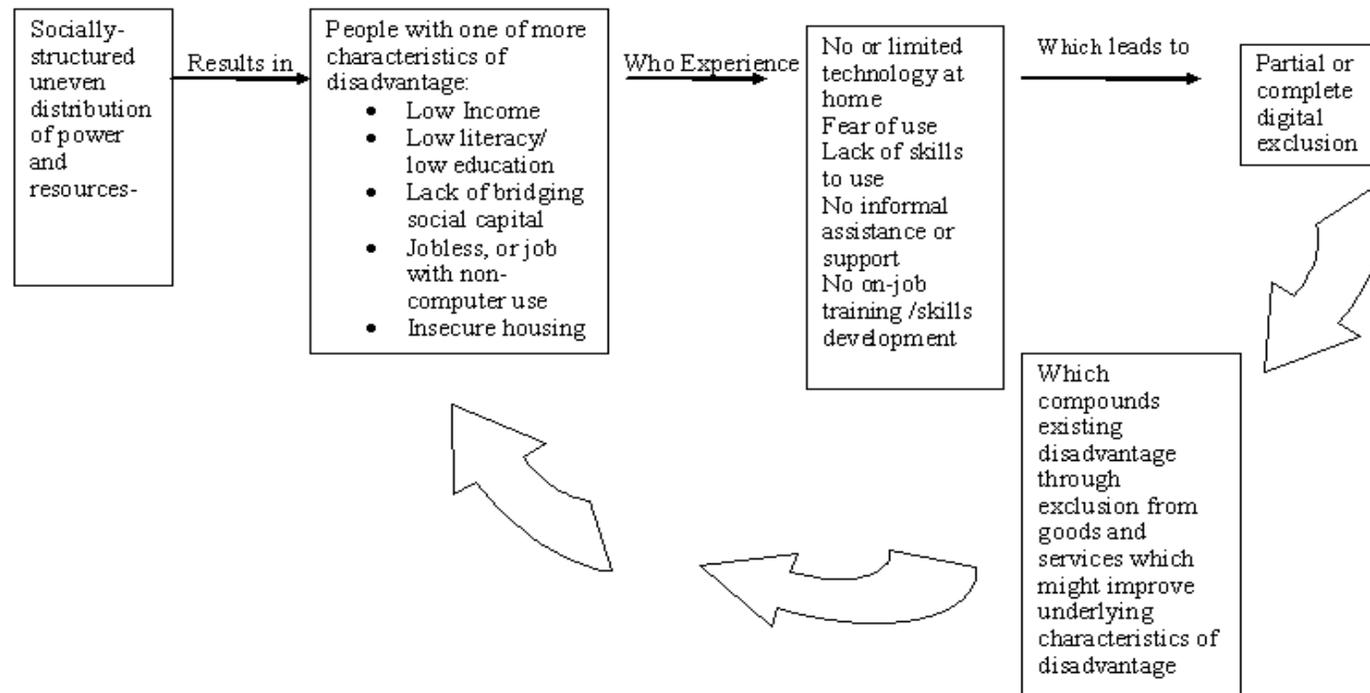


Figure 3: Pathways to Digital Exclusion: A Vicious Cycle

Implications for supporting digital inclusion

Despite a common assumption in government and society in general (perhaps held more by high-end technology users) that digital technologies can be a panacea to the digital divide, our Australian research supports the small amount of US research (Gilbert et al., 2008; Kvasny & Keil, 2006) which finds that digital inequalities experienced by the urban poor are embedded within historic and current structural inequalities, which are embedded within historic and current structural inequalities, which include poverty and lack of access to 'decent' schools, and which can negate or override techno-centric fixes such as simply providing free digital access.

Basic education and literacy:

Our research found that a range of literacies were required to successfully access and use technologies, once there was a motivation. However, in 2006 the Australian Bureau of Statistics conducted a national survey of Australians' Adult Literacy and Life Skills as part of an international study coordinated by the OECD (Organisation for Economic Co-operation and Development) and Statistics Canada and found that 7 million adult Australians aged 15 to 74 (almost half of the entire the adult population) have literacy levels below the minimum required to meet the complex demands of everyday life and work in the emerging knowledge-based economy (Australian Bureau of Statistics, 2006). This means they would have difficulty reading and understanding a newspaper, magazine or website. Literacy levels were lower for those with lower levels of education, fewer years in education, and those who were unemployed or not in the labour force. In other words, raising basic English literacy levels in Australia (including for native speakers) is a major basic requirement for increasing access to written information sources on the Internet.

Secure and stable housing history:

Another factor influencing people's ability to access ICTs which are purchased on anything other than a prepaid basis is a stable housing history. This both enables the accrual of a good track record in paying landline bills with a telecommunications which can then support landline Internet purchase. In addition, a stable housing situation, where the purchaser is not constantly moving between different homes, is perceived to be required to purchase a longer-term ICT contract. If this is not the case, then a prepaid mobile phone may be deemed to be more appropriate but this is not perceived at present to support the most affordable Internet options.

Landline substitution and the increasing "mobile-only" population:

Another major finding from our research, which has only very recently emerged in the literature, is that of landline-substitution being higher among lower-income and disadvantaged groups (i.e. use of a mobile phone as the main phone contact or home phone, and discontinued use of a landline phone). In our study this was particularly the case for people on low incomes who saw paying for the use of a landline (in addition to their phone call charges) as an unnecessary outlay from a limited budget. Having a mobile-only was also the choice of people who moved frequently between different "homes" or properties. Our research suggests that this change in type of phone access

presents a barrier to some households and individuals using the Internet as they perceived costs to be lower for dial-up Internet via a landline than they are for wireless access. Even though wireless access is becoming cheaper and low-denomination prepaid options are also becoming available, many people in these groups were unaware of these latest options. Landline-substitution also has major implications for the representativeness of academic and market research surveys that are based on sampling from a list of landline phone numbers (e.g. the White Pages). The mobile-only or “cell-only population” has recently been commented on by other authors (see e.g. Ansolabehere & Schaffner, 2010). In the socioeconomically disadvantaged groups in our study about one in three people had no landline and only had a mobile phone. This is similar to rates reported recently in the USA for “wireless substitution”, where one quarter of American households now have no landline phone and only a cell or mobile phone (Center for Disease Control, 2010).

Geographical and social location of ICT access and use:

While public ICT access does have its place, we found mixed experiences of it and therefore argue that public access cannot be seen as *the* solution to flattening the digital gradient because it does not support the same quality, frequency, extent or timeliness of use as compared with private home access. Although most public libraries in Australia now offer computers and Internet access for free, use may require registration. Only just under half the adult Australian population (46% aged over 18) visit a library (ABS, 2008e), and library membership is below the average for those with lower levels of education and lower socioeconomic status (ACNielsen, 2001:16). Public access is also not equally available to everyone, with mothers with young children facing barriers to use if childcare is not provided, and those with transport or mobility difficulties can not easily travel to public locations. The Canadian idea of extending their ICT Community Access Programs with a mobile-service which takes ICTs to people’s homes in the same way as a traditional mobile book library, may help overcome this problem for some population groups (see Industry Canada, 2004).

Alternative types of access:

Since some people in the groups said they were quite happy with their current non-digital means of accessing information, particularly with face-to-face options which overcome their literacy or technical problems, there is an urgent need to maintain offline provision of services supports and information. This was also found to be the case in a study in South Australia on aging migrants with poor English literacy (Goodall, Ward & Newman, 2010). On the other hand, for those ready to transition to ICT-mediated access, appropriate ways are needed to help them migrate to online services and online information sources in a way which continues to meet their needs rather than leaving them “lost” and floundering to meet their needs in the digital world. Our focus group participants suggested the need for personalised, drop-in, language and literacy-specific ICT courses for complete beginners to be provided free in local venues accustomed to dealing with people with low incomes, low literacy etc.

Implications for measuring digital access and use:

A strength of qualitative research is that it reveals people’s experiences of relating to and using ICTs within their daily lives. Our research showed that even those who in

quantitative terms can be measured as *having access to the technology* do not necessarily *use the technology*, use it very frequently, or put it to many uses in ways from which they derive benefits. This has implications for what measures we use to quantify technology access and use (see also Gurstein 2003 for further discussion on this). Furthermore, quantifying access and use, such as '74% of households have Internet Access', must be interpreted with a more complex and nuanced understanding of "digital connection". The fact that people can also have access at several different places means we need to, for example, measure access via a suite of technologies (e.g. they could have no landline, but have Internet on their mobile-phone, and use a home computer offline for games). This is particularly the case as technologies converge and the Internet becomes accessible both by PC and increasingly on mobile platforms.

Measuring "depth" or "quality" of use is also required beyond the simple 'have-have not divide. For example, we can question whether there is really any comparability between two people who both record a home Internet connection but where one uses it once a fortnight just to check email and the other is online several hours every day for a wide variety of uses. We can also question whether privately extended use at home should be measured the same as one-off use in a public location when they clearly have a different quality, extent, depth and frequency. Furthermore, if we graph "technical connection" (e.g. for home Internet) by socioeconomic status and find the gradient completely flat at or near to zero, it would still be possible that some people were making little or no use of this connection, and that there would still be differences in the depth, frequency or "usefulness" of the use relative to their needs. Making something available does not necessarily mean people "have access" to it, or that they have the necessary resources (social, financial, mobility, physical etc) to access and benefit from it, even if they have the motivation. Our research also shows that there is an important need for ongoing collection and reporting of ICT access and use data by indicators of socioeconomic status and disadvantage (e.g. income quintile, education level, occupation group, English language proficiency) if the argument is to be maintained for developing digital inclusion strategies and programs, and the interlink between the social health gradient and digital gradient is to be further explored.

Conclusion

Our research identified a digital gradient across the population which means that digital technology access and use increases as socio-economic advantage increases. We used focus groups to gain an understanding of the impact of having no or restricted access to digital technologies. This research painted a picture of the ways in which structured disadvantage shapes the opportunities that people have available to support their access to and use of digital technologies. Low income, low literacy, lack of bridging social capital, being jobless or in a job which does not involve using digital technologies, and having insecure housing all contribute to restricting access to digital technologies. Ironically, in a society where access to a range of goods, services and societal benefits is achieved by using these technologies, those with restricted digital access because of their existing socio-economic disadvantage are further disadvantaged by virtue of being excluded from the various benefits of access. This may be particularly relevant in the area of health, where those with lower levels of health and higher levels of health need are likely to also be those with lower levels of resources to enable them to participate in the e-health and m-health revolutions.

As digital technology assumes an increasingly central role in society by providing a gateway to many social and economic benefits, existing patterns of disadvantage are being compounded and entrenched. Our findings suggest an urgent need for policies which increase digital inclusion for all groups and which pay particular attention to the provision of digital access, and supports to use it, for those living with existing levels of disadvantage, along with the identification of practical pathways to increase people's levels of resources and capabilities to use digitally-mediated communication.

References

ACNielsen (2001). *A national survey of reading, buying and borrowing books for pleasure*. For Department of Communications, Information Technology & The Arts. Retrieved December 12, 2009 from http://www.australiacouncil.gov.au/__data/assets/pdf_file/0013/34105/natiional_survey_reading.pdf.

Ansolabehere, S., & Schaffner, B. F. (2010). Residential mobility, family structure, and the cell-only population. *Public Opinion Quarterly*, 74: 244-259. doi:10.1093/poq/nfq018

Australian Bureau of Statistics (2002). *Adelaide: A social atlas, 2001 census of population & housing*. Catalogue number 2030.4. Canberra: Commonwealth of Australia.

Australian Bureau of Statistics (2006). *Adult literacy and life skills survey, summary results, Australia*. Catalogue number 4228.0. Canberra: Commonwealth of Australia.

Australian Bureau of Statistics (2007a). *Australia's environment: issues & trends*. Catalogue number 4613.0. Canberra: Commonwealth of Australia.

Australian Bureau of Statistics (2007b) *2006 census of population and housing: media releases and fact sheets*. Catalogue number 2914.0.55.002. Canberra: Commonwealth of Australia.

Australian Bureau of Statistics (2007c). *Household use of information technology, Australia, 2006-07*. Catalogue number 8146.0. Canberra: Commonwealth of Australia.

Australian Bureau of Statistics (2007d). *General social survey: Summary results*. Catalogue number 4159. Canberra: Commonwealth of Australia.

Australian Bureau of Statistics (2007e). *Population distribution, Aboriginal and Torres Strait Islander Australians, 2006* Catalogue number 4705.0. Canberra: Commonwealth of Australia.

Australian Bureau of Statistics (2008a). *Household use of information technology, Australia, 2007-08*. Catalogue number 8146.0. Canberra: Commonwealth of Australia.

Australian Bureau of Statistics (2008b). *Australian social trends, 2008*. Catalogue number 4102.0. Canberra: Commonwealth of Australia.

Australian Bureau of Statistics (2008c). *SA stats, November 2008*. Catalogue number 1345.4. Canberra: Commonwealth of Australia

Australian Bureau of Statistics (2008d). *Australian libraries facts & figures from the ABS*. Canberra: Commonwealth of Australia. Retrieved February 2, 2010 from <http://www.abs.gov.au/ausstats/abs@.nsf/mediareleasesbytitle/CA4119DC3357FC70CA25744F0082D80C?OpenDocument>

Australian Communications & Media Authority (2007). *Telecommunications today: Consumer attitudes to take-up and use*. Belconnen ACT: Commonwealth of Australia.

Australian Government Information Management Office (2007). *Australians' use of and satisfaction with e-government services*. Department of Finance and Deregulation. Canberra: Commonwealth of Australia.

Banks, J., et al. (2006). Disease and disadvantage in the US and England. *Journal of the American Medical Association*, 295(17): 2037-45.

Baum, F. (2008). *The new public health* (3rd ed.). Melbourne: Oxford University Press.

Blanchard, M., Metcalf A., & Burns J. (2007). *Bridging the digital divide: Creating opportunities for marginalised young people to get connected*. Sydney: Inspire Foundation and ORYGEN Youth Health (University of Melbourne).

Boese, M., & Scutella, R. (2006). *The Brotherhood's social barometer: Challenges facing Australian youth*. Fitzroy, Victoria: Brotherhood of St Laurence. Centers for Disease Control & Prevention's National Center for Health Statistics (2010, May 12). *Wireless substitution: Early release of estimates from the national health interview survey, July-December 2009*. Retrieved August 14, 2010 from <http://www.cdc.gov/nchs/data/nhis/earlyrelease/wireless201005.htm>

Commission on Social Determinants of Health (2008). *Final report - Closing the gap in a generation: health equity through action on the social determinants of health*. Geneva: World Health Organisation.

Conroy S (2008, March 12). Address to the Australian Telecommunications Users Group (ATUG) Breakfast Event. Commonwealth Minister for Broadband, Communications & the Digital Economy. Retrieved May 5, 2008, from http://www.minister.dbcde.gov.au/media/speeches/2008/address_to_atug_conference

Department of Broadband, Communications & the Digital Economy (2008, February 5). Online statistics. Retrieved April 16, 2009 from http://www.archive.dbcde.gov.au/2008/01/statistical_benchmarking/online_statistics

Department of Communication, Information Technology & the Arts (2001, n.d.). *Save @ home*. Retrieved January 11, 2007 from http://www.archive.dcita.gov.au/2001/07/save_at_home

Department of Health & Ageing (2008). *National e-health strategy*. Canberra: Commonwealth of Australia.

Diaz, J.A., et al. (2002). Patients' use of the internet for medical information. *Journal of General Internal Medicine*, 17(3): 180-185.

Fogel, J. (2003). Use of internet information by women with breast cancer. *Health Expectations*, 6(4): 361-362.

Gilbert, M.R., Masucci, M., Homko, C., & Bove, A.A. (2008). Theorizing the digital divide: Information and communication technology use frameworks among poor women using a telemedicine system. *Geoforum*, 39(2): 912-925.

Gilmour, J. (2007). Reducing disparities in the access and use of Internet health information: A discussion paper. *International Journal of Nursing Studies*, 44: 1270–1278.

Glover, J., Hetzel, D., Glover, L., Tennant, S. & Page, A. (2006). *A social health atlas of South Australia* (3rd ed.). Adelaide: Public Health Information Development Unit, University of Adelaide.

Golder, G., Newman, L., Biedrzycki, K., & Baum, F. (2010). Digital technology access and use as 21st century determinants of health: Impact of social and economic disadvantage. In I. Kickbusch & K. Buckett (Eds), *Implementing health in all policies: Adelaide 2010* (pp. 133-143). Adelaide: Department of Health South Australia. Retrieved August 14, 2010 from <http://www.health.sa.gov.au/pehs/HiAP/implementinghiapadel-sahealth-100622.pdf>

Goodall, K., Ward, P., & Newman, L. (2010). Use of information and communication technology to provide health information: What do older migrants know and what do they need to know?. *Quality in Primary Care*, 18(1):27-32.

Goslee, S. (1998). *Losing ground bit by bit: low-income communities in the information age*. Washington DC: Benton Foundation.

Government of South Australia (2008). *South Australian government ICT strategy – Ask just once*. Adelaide: Office of the Chief Information Officer.

Gurstein, M. (2003). Effective use: a community informatics strategy beyond the Digital Divide. *First Monday*, Volume 8, Number 12(1). Retrieved August 29, 2010 from <http://firstmonday.org/htbin/cgiwrap/bin/ojs/index.php/fm/article/view/1107/1027>

Hofrichter, R. (Ed.), (2003). *Health and social justice: A reader on politics, ideology and inequity in the distribution of disease*. San Francisco: Jossey Bass.

Huttner, S. (2007). The Internet economy: towards a better future. *OECD Observer*. Retrieved March 12, 2008 from <http://www.oecdobserver.org/news/fullstory.php/aid/2330/>

Industry Canada (2004, January 16). *Evaluation study of the community access program (CAP)*. Audit and Evaluation Branch. Retrieved November 23, 2009 from <http://www.ic.gc.ca/eic/site/ae-ve.nsf/eng/01420.html>

Kvasny, L., & Keil, M. (2006). The challenges of redressing the digital divide: a tale of two U.S. cities. *Information Systems Journal*, 16(1):23-53.

Kvasny, L., Kranich, N., & Schement, J. (2006). Communities, learning and democracy in the digital age. *Journal of Community Informatics*, 2(2).

Lee, L., Markotsis, D., & Weir, T. (2002). *Social impacts of the new economy*. Canberra: Department of Industry, Tourism & Resources.

Liamputtong, P. (2007). *Researching the vulnerable*. London: Sage Publications.

Liamputtong, P., & Ezzy, D. (2005). *Qualitative research methods* (2nd ed.). South Melbourne: Oxford University Press.

McLaren, J., & Zappala, G. (2002). The 'digital divide' among financially disadvantaged families in Australia. *First Monday*, 7(11). Retrieved March 25, 2008 from http://firstmonday.org/issues/issue7_11/mclaren/allacademic.com/meta/p96480_index.html

Mackenbach, J.P. (2005). *Health inequalities: Europe in profile*. Report for UK Presidency of the European Union.

Newman, L., & Biedrzycki, K. (2009). *Use of mobile phones as a vehicle to increase internet use to improve health and wellbeing in South Australia*. Report on research conducted under the "Health In All Policies Health Lens Initiative" for the South Australian Department of Health and South Australian Department of Further Education, Employment, Science and Technology. Adelaide: Australian Health Inequities Program and Southgate Institute for Health Society & Equity, Flinders University.

Newman, L., Biedrzycki, K., & Baum, F (2009, August 16-20). *Implications of the digital divide for of e-health: The need to understand technology access and use among low socioeconomic and disadvantaged groups*. Paper presented at the 4th International Conference in Community Health Nursing Research, Adelaide.

Notley, T.M., & Foth, M. (2008). Extending Australia's digital divide policy: An examination of the value of social inclusion and social capital policy frameworks. *Australian Social Policy*, 7:87-110.

Ortiz, J., & Tapia, A. (2006). Deploying for deliverance: A digital divide content analysis in municipal wireless networks documentation. *Proceedings of the 12th Americas Conference on Information Systems (AMCIS) 2006*: 755-763.

Parsons, C., & Hick, S. (2008). Moving from digital divide to digital inclusion. *Currents: New Scholarship in the Human Services*, 7(2). Retrieved August 13, 2010 from <http://currents.synergiesprairies.ca/currents/index.php/currents/article/view/23>

Pew Internet & American Life (2009, July 22). *Wireless internet use*. Retrieved September 11, 2009 from <http://www.pewinternet.org/Reports/2009/12-Wireless-Internet-Use.aspx>

Vinson, T. (2007). *Dropping off the edge: The distribution of disadvantage in Australia*. Sydney: Jesuit Social Services and Catholic Social Services Australia.

Zhao, S., & Elesh, D (2006, August 10). *The second digital divide: Unequal access to social capital in the online world*. Paper presented at the Annual Meeting of the American Sociological Association, Montreal Convention Center, Montreal.

1Footnote: In the time since these focus groups were held, the options available from mobile phone companies have expanded considerably so that some companies now offer prepaid mobile including an Internet data allowance alongside talk and text, all of which can be used interchangeably. The use of Internet on mobile phones among lower-income Australians is the subject of another recent research project (Newman & Biedrzycki 2009).