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Abstract: The advent of computers, the internet and other Information and Communication Technologies (ICT) has brought significant changes to individual's and communities across the globe. However, these technologies are not equally or universally accessible to all individuals and communities and disparities in ICT access exist. In particular gaps currently exist between those people considered to have access to ICT services and those who do not. These gaps are commonly referred to as the digital divide. A range of factors have been identified to help explain the digital divide including income, educational level, age and location. In Australia a digital divide has been identified between rural and metropolitan areas. One initiative that attempts to address the digital divide in rural Victoria is the The Access@schools program. This program provides rural communities throughout Victoria with access to ICT resources in local schools. From funding provided as part of Access@schools, Chiltern Primary School in north-east Victoria has attempted to advance this idea by implementing a notebook borrowing program that allows the Chiltern community to borrow, take home and use notebook computers. An analysis of the program involving semi-structured interviews with eight program participants and five key informants identified a range of benefits and impacts on individual users and the community, as well as some areas for improvement.

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Addressing the Digital Divide in Rural Australia

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Addressing the Digital Divide in Rural Australia

ABSTRACT

The advent of computers, the internet and other Information and Communication Technologies (ICT) has brought significant changes to individual's and communities across the globe. However, these technologies are not equally or universally accessible to all individuals and communities and disparities in ICT access exist. In particular gaps currently exist between those people considered to have access to ICT services and those who do not. These gaps are commonly referred to as the digital divide. A range of factors have been identified to help explain the digital divide including income, educational level, age and location. In Australia a digital divide has been identified between rural and metropolitan areas. One initiative that attempts to address the digital divide in rural Victoria is the The Access@schools program. This program provides rural communities throughout Victoria with access to ICT resources in local schools. From funding provided as part of Access@schools, Chiltern Primary School in north-east Victoria has attempted to advance this idea by implementing a notebook borrowing program that allows the Chiltern community to borrow, take home and use notebook computers. An analysis of the program involving semi-structured interviews with eight program participants and five key informants identified a range of benefits and impacts on individual users and the community, as well as some areas for improvement.

INTRODUCTION

Over the past few decades there has been a steady increase in individual's reliance and use of computers in communities around the world (Barkume 1993), yet this has not been evenly distributed across individuals or communities (Curtin 2001; Rombel 2000; West 2003). To address these inequalities in ICT, many initiatives have been applied to improve access to associated technologies and the necessary computer literacy (ACT Government 2003; Devins et al. 2007; Huggins et al 2002, Keyes 2003).

In Australia figures indicate (Australian Bureau of Statistics 2006) a steady rise in people using computers and the Internet. In 2005-06, 70% of Australian households had access to a computer at home (up from 44% of households in 1998) and 60% of Australian households had home internet access (up from 16% of households in 1998) (Australian Bureau of Statistics 2006). This trend has lead to Australia being ranked as ninth in the top 100 Internet users per capita around the world (*NationMaster.com* 2002). However, there is an uneven distribution of ICT resources throughout the nation (Devins 2003), leading to inequalities in access particularly in rural and remote communities. The digital divide, a term first coined in the early to mid nineties (Foster & Borkowski 2007), has been used to describe a variety of issues associated with the use and access to ICT resources.

Although there are numerous definitions of the digital divide it is commonly defined as a concept that “marks a gap ... between those who have high a level of access ... and those people who have little or no access” to ICT (Rooksby, Weckert & Lucas 2002b). A number of factors have been identified as contributing to the digital divide including; income, education, age, location, disability, opinion, gender and culture (ACT Government 2003; Curtin 2001; Curtin 2001; Lloyd & Hellwig 2000; Lloyd & Hellwig 2000).

An Australian Government study (Department of Communications 2003) highlighted the issues of the digital divide in Australia, mentioning the lack of research and evaluation of perceived gaps in the digital divide, and of funded initiatives attempting to address these issues (Curtin 2001; Department of Communications 2003; Feighan 2004; Norris 2001; Powell 1999; Rao 2003; Servon 2002; Stone 2001). Other authors (Beamish 1995; Curtin 2001; Feighan 2004; KPMG Consulting LP 2000; Warschauer 2002) have expressed similar concerns (Feighan 2004; Powell 1999; Stone 2001; Warschauer 2002). Curtin (2001) noted there had been few studies of individuals’ use of ICT, and this is supported by other authors (Brown & Licker 2003; Feighan 2004; Stone 2001). A number of studies including Rao (2003) mention the need for program evaluation, so lessons can be learned for future programs and policy development. Studies by a number of authors (KPMG Consulting LP 2000; Rao 2003; Servon 2002; Stone 2001; Rao 2003; Tiene 2002, Tiene 2004) indicate the need for further study of the digital divide, particularly relating to the benefits and experiences of ICT users .

The literature suggests there is a need for further research and evaluation of programs addressing the digital divide in rural areas, particularly focusing on the benefits and experiences of individuals of ICT technologies, and the identification of innovative and successful program models. In light of these identified needs, an analysis of a small-scale notebook program based at Chiltern Primary School in north-east Victoria was undertaken. The aim of the analysis was to establish the program’s impacts and benefits on individuals and the community in addressing the digital divide and identifying areas for program improvement. The research questions were:

1. What are the benefits of the notebook program to the program participants?
2. Has the notebook program assisted in improving access to the internet and computer applications for the program participants?
3. How has the notebook program assisted in improving usage of computer applications and the internet for the program participants?
4. How can the notebook program be improved?

The first part of the paper provides an overview of the literature relating to the digital divide and highlights some of the factors that have been linked to the existence and cause of the digital divide. Although many programs have been developed to address the digital divide, the literature identifies

the need for further research of the digital divide and program evaluation. The second part of the paper briefly describes the Chiltern Notebook Borrowing Program, a small-scale program aimed at addressing the digital divide in a small rural community in Australia. A more detailed description of the Program and analysis of the Program can be found in Selwood, Atkinson & Black (2005).

what the literature says

The following discussion provides an overview of the digital divide, its significance, and how it is being addressed through a range of initiatives. The term digital divide was first coined in the early to mid nineties (Foster & Borkowski 2007) and has subsequently been used to describe a variety of technology related issues resulting in inequalities among individuals and communities. There are numerous definitions of the digital divide (Curtin 2001) however there are some common elements among the definitions (Leigh & Atkinson 2001; Lloyd & Hellwig 2000; Pluss 2004; Rooksby et al. 2002b; Shade 2003; Stone 2001; Warschauer 2002)

A number of definitions include the issue of inequality among users or different socio-economic groups (Curtin 2001; Lloyd & Hellwig 2000; Meredyth & Thomas 2000; Warschauer 2002). Other authors have expanded the definition to incorporate a number of different levels or scales (Pluss 2004; Rooksby et al. 2002b; Stone 2001). For example, Pluss (2004) identifies three levels; the global, the social and the democratic divides. While Lloyd and Hellwig (2000) use the terms 'information rich' and 'information poor'. In contrast, Stone (2001) proposes two levels referring to the 'International Divide', the difference between countries, and the 'Domestic Divide' the difference between groups of people within countries.

In addition to providing definitions many of these authors expand their discussions for example Stone (2001) details the complexity of the digital divide, in relation to it being location and situation specific. In contrast Rooksby, Weckert and Lucas (2002a) suggest there is no digital divide, but rather a continuum, or perhaps a multitude of divides and that the digital divide is not solely about access but also accessibility to information, relevance of information and information literacy (Rooksby et al. 2002a). They also suggest that "the digital divide marks a gap, more or less clearly delineated, between those who have a high level of access ... and those people who have little or no access" (Rooksby et al. 2002a). This study defines the digital divide as the multiple divisions between individuals and areas with high levels of access to Information and Communication Technologies (ICTs) and persons or areas without such access.

Why is the Digital Divide Important?

The issues associated with the digital divide vary across the world and include issues of access, culture and income (Tiene 2004). The issues associated with the digital divide vary across the world and include issues of access, culture and income (Tiene 2004). These issues are being addressed in different ways around the world and will be discussed later in the paper. While the

issues associated with the digital divide may differ across individuals, communities and countries there are some common elements. Most authors agree information technologies, such as computers and the Internet, are an integral aspect of society (Rooksby et al. 2002b; Tiene 2004) and the internet is a necessary information and communication tool for a knowledge-based economy (Shade 2003). Globally the digital divide is identified in terms of the difference in access to the internet between developed and developing countries (Rombel 2000; Tiene 2002; Tiene 2004).

In Australia it is clear that those groups which are socio-economically disadvantaged will become further disadvantaged if they are excluded from the technologies others take for granted (ACT Government 2003). Certainly some authors such as Servon (2002) perceive technology as a tool of inclusion or exclusion. She also notes that the lack of awareness about closing the digital divide is low and suggests this can be remedied by making sure that the Internet is included in policies and programs to ensure universal access.

While the digital divide has generated significant literature there is still no universal agreement over whether it exists or not (Leigh & Atkinson 2001). For example some authors (Leigh & Atkinson 2001; Rooksby et al. 2002b). Servon, (2002) downplay the existence, of the digital divide and even debate its very existence while others acknowledge its existence but debate its scale and degree (Curtin 2001).

The literature also addresses the digital divide in relation to different scales. Some authors (Leigh & Atkinson 2001; Rooksby et al. 2002a) consider the digital divide from an individual's perspective. For example (Lenhart 2000) found that individuals without access to ICT were less networked and trusting of technology, and worry about breaches in their privacy more. In contrast to other authors (Beamish 1995; Leigh & Atkinson 2001; Norris 2001) who view the digital divide from the perspective of communities. For example Rooksby et al. (2002a) suggest that internet based programs have the capacity to offer cheaper delivery of common services to communities, for example banking. This can benefit those traditionally disadvantaged groups receiving services they previously did not have access to, for example personal banking from home computers. Leigh and Atkinson (2001) believe that by providing citizens with access they may become more active in local community issues. Beamish (1995) also notes that by providing access to ICT, it is possible to strengthen and vitalise existing communities, leading to the advancement of citizen involvement in public affairs and by connecting community members it is possible to create virtual communities and more effective and efficient systems of government (Norris 2001). In contrast to the previous authors, other authors discuss the digital divide at a country level rather than at the community level (Curtin 2001; KPMG Consulting LP 2000; Norris 2001; Rao 2003). This is particularly significant when it was recognized that at the start of 2000 only 5% of the world's population had accessed the Internet (Tiene 2002).

The use of ICT is not restricted to local communities though, with governments considering information and communications technologies essential skills required in a society (Kenny 2003; KPMG Consulting LP 2000). However, in many countries, including Australia, the issue of where a person is located is one of the main hurdles to acquiring technology based skills, and this is an issue requiring further investigation (ACT Government 2003). Curtin (2001) suggests communication-based resources, particularly ICT, have the ability to lessen the effect of physical distance. Both Rao (2003) and KPMG Consulting (2000) suggest that the digital divide is an important government issue, with the identification of knowledge a key resource of future development (Rao 2003). As many ICTs are designed to provide information which then has the potential to fuel knowledge (Rao 2003), and therefore it can be extrapolated that access to such technologies is vital for any future development.

Once the significance of providing access of ICT services to people is established, then the next step in addressing the digital divide is to prove the problem actually exists. As previously indicated there is considerable literature that shows that there are significant gaps in access to ICT services (Curtin 2001; KPMG Consulting LP 2000; Leigh & Atkinson 2001; Norris 2001; Rooksby et al. 2002a; Servon 2002; Stone 2001) and much of this literature supports the need to address the phenomenon referred to as the digital divide. There is no doubt there are gaps in access to technologies (Leigh & Atkinson 2001) and there are a number of factors that contribute to problems of access to ICT services including : adequate infrastructure (Curtin 2001; KPMG Consulting LP 2000; Norris 2001), cost (Curtin 2001; KPMG Consulting LP 2000; Leigh & Atkinson 2001), knowledge, opinion and culture (Feighan 2004; Leigh & Atkinson 2001; Servon 2002; Shade 2003; Stone 2001).

The above review of the literature demonstrates that the digital divide exists and there is a need to actively address the issue. According to Stone (2001) this needs to be addressed at both the global and local levels to ensure the divide does not widen and may even be narrowed or closed. The next section of the paper outlines a number of factors that contribute to the existence of the digital divide.

FACTORS INFLUENCING THE DIGITAL DIVIDE

There are many factors identified in the literature that have been associated with the existence of the digital divide. For example one study identified eight factors: income, education, age, location, disability, opinion, gender and culture (Gibson 2003). These factors will be discussed in more detail below, however it is first necessary to define 'access' to ICT.

Access to ICT

Access to ICT (ACT Government 2003; Beamish 1995; KPMG Consulting LP 2000; Leigh & Atkinson 2001; Rooksby et al. 2002a) has been defined by a number of authors. In one study (ACT

Government 2003), access was divided into three components; access, ability and affordability. Access is described as technical access from home, community or public access points. 'Ability' is explained as the provisions of training and support, including culturally appropriate training, and 'affordability' is referred to as the cost of access to appropriate technologies. Rooksby et al. (2002a) use similar terminology in defining access, however they also identified a number of other factors such as access to knowledge, access to technology, access to communications, access to control, access to goods and commodities and access to participation. By identifying these additional factors, Rooksby et al. (2002a) highlight the barriers of access to ICT services.

According to (Beamish 1995) barriers to technological access include, cost, physical access to public equipment, training, cultural attitudes, content, methods of communication and bandwidth. Although not an exhaustive list it provides the foundation for considering some of the underlying access problems associated with the digital divide. Physical access relates to a person's ability to gain access to the necessary equipment and Rooksby et al. (2002a) consider physical access by specifying requirements including basic computer facilities, word processing, data storage and printing, more advanced communication and information services, web browsing, searching and discussion mediums.

Access is clearly a multifaceted concept encapsulating a number of factors, however for this study, access is defined as the ability to gain reliable physical access to ICT resources at reasonable levels, for example fully functioning computers with dial-up or faster internet access. As technology changes the number of barriers to technology access can increase and change and this is reflected in the literature. Eight of the most commonly cited barriers are; socio-economic, education, age, location, disability, opinion, gender and culture, and these will now be addressed in detail in the following section. The influence of each of these factors will vary depending on the context and they are not ranked in any particular order.

Socio-economic factors

Many authors (ACT Government 2003; Curtin 2001; Feighan 2004; Lloyd & Hellwig 2000; Rooksby et al. 2002a), have identified a number of socio-economic factors that influence the digital divide. One of the most commonly cited factors is income. In 1995, during the infancy of the World Wide Web, Beamish (1995) found that the cost of computers and technology was beyond the reach of most American families and nearly a decade later, it is clear that the cost of ICT is still a major factor influencing its adoption (Curtin (2001). Leigh and Atkinson's (2001) report on the digital divide in the United States identified a range of influential factors, including skill, need and cost which can inhibit the uptake of technology in lower income areas. Rooksby et al. (2002a) expands on this list of factors by adding the need for affordable setup and running costs associated with computer and internet use. Similarly the study by Curtin (2001) of the digital divide in Australia, concluded that as an individual's income increased so too did their likelihood of having access to technology. This study also found that at a global scale people on lower incomes are less likely to be connected to the

internet and the associated services (Curtin 2001). Several other studies have identified income as a factor influencing the digital divide but regard it as no more important than other factors (Australian Bureau of Statistics 2006; Lloyd & Hellwig 2000).

Education

Many studies discuss the influence of education on access to ICT (Curtin 2001; Leigh & Atkinson 2001; Lloyd & Hellwig 2000; McLaren & Zappala 2002). In their Australian study of barriers affecting technology uptake, Lloyd and Hellwig (2002) found an individual's educational level was the most significant barrier to ICT access rather than income. However, most studies cite education and income as the most important factors influencing access probably because they are often interrelated (Stone 2001).

For example, Curtin (2001) considers education as a key factor in determining access, with findings that show that university graduates are two and a half times more likely to have home internet access than others. The skills that are acquired through education and learning are also mentioned as an important factor influencing ICT uptake (Hargittai 2002; Kenny 2003; Warschauer 2002). Hargittai (2002) comments on the relationship between a person's access to technologies and their ability to use it, is generally derived from some form of extended education. Whether or not education in general is the determining factor in access or use, the literature suggest that education in isolation cannot fully explain the digital divide, even when combined with income Bell et al (2002).

Age

Age is another influential factor in access to ICT (Cole 1998; Lloyd & Hellwig 2000) found that the young, healthy and computer literate find the information society a comfortable environment, while others, including the elderly, can find technology confusing and hostile. This is particular the case for people 55 years and older who tend to be disadvantaged in terms of access to ICT services (Lloyd & Hellwig 2000). Curtin (2001) also found that ICT access is more accepted by people below 40 years of age however other authors (Hargittai 2002; Lloyd & Hellwig 2000; Millward 2003; Stone 2001) suggest the connection between age and limited access increases with age.

Location

Location is another factor cited in the literature as having a significant impact on access to ICT. This is supported by many authors (Bell 2004, Curtin 2001; KPMG 2000, Leigh & Atkinson 2001, Lloyd & Hellwig 2000, Rao 2003, Rooksby, Weckert, et al 2002a, Stone 2001) however there is a lack of agreement on the reasons why this is a significant factor. The most commonly cited reasons include choice, infrastructure limitations and appropriate programs.

Disability

A disability can be a physical or mental impairment and is a factor influencing the existence of the digital divide and is mentioned in a number of studies. For example, Cole (1998) mentions disability together with age, arguing that without assistance, people with disabilities may find it harder to gain access and possibly become excluded entirely. A disability was also identified as a major issue in the ACT Government's report (ACT Government 2003) on the digital divide emphasizing the need for home access to ICT services for disabled individuals. Williamson, Schauder, Stockfield, Wright and Bow (2001) in their study on the internet's importance for people with disabilities, found that if appropriate physical access is provided, the internet can increase a disabled person's involvement with the community. However the type of disability a person has greatly affects their ability to use and access technology (Stone 2001). For example, visually impaired people are more likely to be affected by the digital divide as current technologies are highly visually orientated (Stone 2001).

Individual's opinion

The sixth factor mentioned in the literature is individual's opinion which refers to a belief, possibly a misconception, about a particular issue. Lenhart (2000) touches on opinion briefly stating that non-users are often concerned by a number of factors when considering ICT access including cost, lack of need and inhospitality. According to Lenhart (2000) non-users can be categorized into three opinion groups; the 'eagers': those will most likely go online and are least affected by earlier issues, the 'reluctants': who feel the internet has little value for them, and the 'nevers': who believe the internet to be dangerous, hard to use, may threaten their privacy and is expensive. Feeling safe whilst using ICT is also another factor in relation to opinion raised by both Keyes (2003) and Devins et al. (2007). In both these studies a feeling of trust and security among individuals improved or extended usage was observed. Interestingly, Keyes (2003) found that home access and use to ICT services played an important role in improving an individual's sense of safety online.

Gender and culture

Although commonly mentioned in the literature (NTIA 1998), the findings on the influence of gender to ICT access are mixed, however most studies suggest that females are more disadvantaged than men in relation to access to ICT. Van Dijk and Hacker (2003) indicate that the gender gap in possession of ICTs is closing, but there are still gaps in skill and usage. Although gender may be a barrier to accessing ICT the literature suggests it is not a significant factor particularly in developed countries, in comparison to other factors previously discussed. It is possible that the gender gap exists as part of a cultural issue, or as a result of cultural practices and beliefs on the use of technology. The term culture is defined broadly to include ethnicity and family unit types. For example some American studies have shown that ethnic minority groups are disadvantaged in terms of access to ICT (NTIA (1998), NTIA (2000), Lenhart 2000). In Australia statistics indicate that the type

of family unit or marital status reflects the household's likelihood of having access to ICT (Australian Bureau of Statistics 2006; Curtin 2001; Lloyd & Hellwig 2000)

The literature suggests that each of the seven factors discussed above have varying degrees of influence on creating and perpetuating a digital divide, however it appears that no single factor can wholly explain its existence and it may be a combination of factors.

ADDRESSING THE DIGITAL DIVIDE IN AUSTRALIA

The uptake of ICT in Australia in recent years has led to the country being ranked ninth in the world in terms of per capita usage (Curtin 2001), comparable to other developed countries like the USA and Canada. While this assumption is correct in some respects (Curtin 2001), there are elements of the digital divide within Australia that differentiate it from other developed countries. For example, in Australia a digital divide exists between metropolitan, and rural and regional areas (Australian Bureau of Statistics 2006) that is primarily related to the cost and quality of service (ACT Government 2003; Curtin 2001; Department of Communications 2003; Rooksby et al. 2002b).

Other factors also influence the level of access for communities in the rural-metropolitan divide such as income, education, age (Curtin 2001), speed, choice of connection, and lower quality infrastructure in rural areas (Curtin (2001), ACT (2003). The ACT Government's (ACT Government 2003) report also highlights other disparities in access, for people with disabilities and cultural differences such as Aboriginal and Torres Strait Islanders.

With technology such as the internet now becoming an integral part of life in Australia (2002a), every Australian State has in some way become involved in addressing digital divide issues. Evidence suggests the existence of gaps between metropolitan and rural areas of the country (Lloyd & Hellwig 2000) with many of the initiatives being funded by Federal and State agencies (Department of Communications 2003; Rooksby et al. 2002b).

One example is the Networking the Nation program, which funds a number of large and small initiatives around the country (Rooksby et al. 2002a). These include programs such as the CTC@NSW program (CTC@NSW 2007), designed to place community tele-centres in small communities of less than 3000 people (Rooksby et al. 2002a), the 'Reach for the Clouds' wired housing scheme (Meredyth & Thomas 2000), and the Access@schools program, setup to provide Internet access and training through Victorian public schools (*Multimedia Victoria* 2007). A review of

the literature suggests that Australia compares well with other developed countries in terms of identifying and addressing digital divide issues (Curtin 2001).

In the case of education, one of the problems in trying to reduce the effect of a digital divide is that ICT is an expensive item in a school's budget (Tiene 2002). Therefore the Access@schools program, implemented in 2001 by the Victorian Department of Education and Training, aimed at addressing the problems relating to ICT access in regional and rural areas was an important initiative. The program was designed to enable schools in regional and rural Victoria to provide their local communities with free or affordable access to the Internet and to their information and communication technology (ICT) facilities through the provision of funding government school programs within Victoria. The Access@schools program targeted communities where access to technology was typically limited and its implementation was premised on a belief that schools would be best able to provide computer access to their communities outside normal business hours. Chiltern Primary School, in North-East Victoria, was one school that participated in the program. Initial funding to this school was used to purchase six notebook computers that could be borrowed and taken home by members of the community on an overnight or weekend basis. The Notebook Borrowing Program was a novel approach to bridging the digital divide in a small rural community and the findings of the analysis of the program have provided feedback to The Notebook Program managers, administrators and funding body.

The Chiltern Notebook-Borrowing Program was selected for analysis because it represented a unique and innovative approach to addressing the digital divide in a rurally disadvantaged community. Chiltern is a small township of 1200 people about 35kms from Wodonga on the Hume Highway. According to the Socio-Economic Indexes for Areas (SEIFA) data indicates that Chiltern would be classified as a socio-economically disadvantaged town (ABS 2001). For example, 45% of the rural population living outside the township boundaries had a weekly family income of \$1000 or more compared to 25% of those living within the township. The median family income in Chiltern is between \$600 and \$699 a week compared to Australia and Victoria that have median incomes of \$800 to \$999 respectively. Figures (ABS 2006) also indicate that Chiltern had less computer users than the metropolitan areas. Of those living in Chiltern, only 32.4% of the population had used the internet, compared to 37.1% of Australians, and 38.6% of Victorians, and of those living in Metropolitan Melbourne, 41.1% of the population had used the internet.

An analysis of the program and its implementation was sought by the funding body, the Victorian Department of Education and Training to establish the benefits and impacts of the program on individuals and the community. The following section of this paper provides a brief

description of The Notebook Program as one example of a program aimed at addressing the digital divide in rural Australia. A more detailed description of this study and the findings can be found in Selwood, Atkinson and Black (2005).

METHODS

A mixed methods approach was adopted for this study using semi-structured interviews, secondary data analysis and questionnaires. Thirteen respondents were interviewed and included, program participants (8) and key informants (5). Program participants were community members who had borrowed the notebook computers from Chiltern Primary School and key informants were individuals who had been involved in developing, administering and implementing the program such as the school principal and ICT trainers. It should be noted that all the program participants interviewed were female and had some association with the primary school. The interview questions were adapted from previous work by Doll and Torkzedah (1988) and interview data was analysed through transcription of audio-taped interviews, interview coding and final analysis.

Coding the data enabled the interviews to be condensed to a more manageable size assisting the final analysis phase. To aid the large task of coding each of the interviews the NVivo qualitative software package was utilised. An open coding method was used which entailed systematically reading the interviews and coding the data into dynamically generated categories. The final step in analysing the data was to apply a thematic categorisation technique to the results of the coding process. To draw out conclusions and related results however, there was a need for displaying the categories and themes in some manner, and inspecting their validity. The final step in analysing the data involved following all of the discovered themes and looking at what was coded to each one, searching for the similarities, differences and general views held by the participants.

Quantitative data were collected from borrowing forms completed by the notebook borrowers. Information on the notebook users, type of usage, name of software used and number of hours used was collected prior to and following the borrowing of the notebooks. Using the interview and questionnaire data allowed triangulation of the data to develop a more complete picture of the impact and benefits of the program.

RESULTS AND DISCUSSION

Respondents identified a number of benefits of the Notebook Program. These included benefits for individuals at home and work, benefits communicating, using and access to information,

as well as benefits for the school and the community as a whole. While most respondents felt knowledge of the program by the community was limited this may be partly explained by the poor and limited advertising of the program. Respondents considered local businesses were benefiting from the program although this was mostly the training programs conducted as part of the original Access@schools program. However, the training programs allowed business owners and employees to undertake computer based training to assist them in improving their general ICT skills. The notebooks were used during the training sessions to increase the number of computers available and the number of possible participants, resulting in greater benefits to the community.

In contrast to the literature, respondents in the Chiltern program did not mention the community benefits of such programs. For example, benefits mentioned in the literature included increased local communication, seeking local information and contacting local government officials and agencies (Beamish 1995; Leigh & Atkinson 2001; Norris 2001; Rooksby et al. 2002b) and were not cited by any of the respondents. The data in this study suggests the benefits of the notebooks have been more school or individual based than specifically related to the community. There were however, several important benefits for individuals within the community that did become involved, including increased ability and confidence, better communication, increased access to information, fewer access time constraints and access to low cost resources. All the program participants interviewed benefited in some way from their involvement in The Notebook Program, whether simply through an increase in ICT access at home or an improvement to being able to conduct online research.

As well as determining if the program benefited the program participants the analysis sought to investigate if the program assisted in improving access to the internet and computer applications for the program participants. Prior to the introduction of The Notebook Program there were limited options for the community to access ICT resources such as computers and the internet. These included home access, access at work, using the primary school's computers as part of the Access@schools program, using a friend's computer, Chiltern library's single computer, the Community Education Centre resources or traveling to a nearby town to use an internet café or other community resource. One of the aims of The Notebook Program was to increase the access available to those living in and around Chiltern by allowing them to take the notebooks home out of school hours. Of the options that existed prior to the program, only access at home gave unlimited access, as the other options involved being restricted by time, cost and/or use. The benefits of The Notebook Program for the users were there were fewer limitations on who could use them, and fewer time constraints compared to the alternatives (for example the local library and the earlier Access@schools program). In this regard the data indicates The Notebook Program improved access to ICT for the program participants with a fairly high level of unrestricted access to ICT resources that was not readily available to them through previous options.

The analysis of the program also sought to investigate if the program assisted in improving usage of computer applications and the internet for the program participants. The results indicate that using the notebooks improved program participants' comfort and confidence using computers and the internet, and were important in enabling those using the notebooks to further their use. With the freedom of use provided by The Notebook Program, the respondents found they began exploring and experimenting with the notebooks as time progressed, a sign of increased confidence with the technology.

Many of the program participants found as they continued using the notebooks, their ability and familiarity with the technologies improved resulting in a range of benefits including being able to perform tasks faster, locating sites on the internet more easily and distinguishing between useful and false online information. Although all the improvements in usage were at an individual level, the implications for the community level cannot be disregarded as this increases Chiltern's overall ICT literacy, provides greater access to information and improved communications, and has enabled many program participants to improve their knowledge and skills. This indirect community benefit is important as individuals as employees can apply their new skills to their job, thereby benefiting the businesses.

While the analysis of The Notebook Program demonstrated some benefits particularly to the program participants the study findings also revealed a number of areas for program improvement that should be considered by future program developers and funding bodies, and current program managers. Many of the problems that arose over the course of the program were dealt with by the time the interviews had been conducted and these ranged from the general use of the notebooks to problems connecting to the internet at home, computer viruses and difficulties in the administration practices. Respondents suggested ways these issues could be addressed such as additional technical support both at home and within the school, improved instructions sent home with the notebooks, compulsory initial training, clear use guidelines, and revised administration processes. Basic introductory training was seen by two respondents as an effective way of minimising many of the issues that had previously arisen largely during the preliminary stages of the program. The need for training in conjunction with increased access to ICTs is supported by the literature (Servon 2002, van Dijk & Hacker 2003). Some respondents mentioned the need for a more comprehensive manual being available for notebook users. An alternative approach discussed by many of the respondents was the provision of a telephone support service to the notebook users, however, there is an on-going cost associated with this option. The issue of school-based technical support was also raised by several of the key informants. In a number of cases the notebooks were returned to the school in an unusable state, with large periods of time spent correcting settings made by notebook users. This put these notebooks out of use for the school.

Although this was a small study with a limited number of respondents the findings suggest that this small-scale program has the capacity to bring direct benefits to individuals using the notebooks in their own homes and indirect benefits to the community. In contrast to other large-scale rural

programs such as the UK Information Society and the Australian CTCs (Huggins & Izushi 2002, [CTC@NSW](#) 2007) The Notebook Program provides an effective small-scale program with low financial and time establishment costs. In addition, the Program was able to address a number of factors identified in the literature that limit or inhibit individuals accessing and using ICT. For example, The Program provides a low cost, flexible service to individuals in a community classified as socio-economically disadvantaged (ABS 2006). The findings also indicate The Program improved opportunities for accessing ICT and learning new skills in a rural community that had previously had limited access to computers and the internet, a significant issue in rural areas (Huggins & Izushi 2002). The study results suggest The Program benefited individuals by increasing confidence, safety online, ICT skills, and familiarity with technology. These are all factors identified in the literature as limiting access and use of ICT and contributing to a digital divide (see Leigh & Atkins 2001; Lenhart 2000, van Dijk & Hacker 2003). In addition to identifying benefits to individuals the analysis of the Program also revealed a number of problems including participants' lack of knowledge about the computer set up and software, lack of technical support and the ongoing costs of supporting the program. Respondents identified a number of possible solutions such as extra technical support both at home and within the school, improved instructions for participants, compulsory initial training, clear use guidelines, and revised administration processes. These results provide important feedback to the Program developers and managers, and for policy makers and future program developers.

CONCLUSION

The past few decades has seen a steady increase in individual's reliance and use of computers in communities around the world. However, these technologies are not equally or universally available to all individuals and communities and disparities in ICT access exist. This gap has been coined the digital divide and a number of factors have been indicated in its existence. Australia is currently ranked nine in the top 100 internet users per capita around the world and there has been a steady rise in people using computers and accessing the internet. Despite this high take up of ICT and the internet a digital divide exists between rural and metropolitan areas. A number of programs and initiatives have been implemented including the Chiltern Primary School Notebook Borrowing Program.

The analysis of the Program identified a number of benefits for Program participants including easy access to ICT in their homes, improved ICT skills and increased confidence. The benefits for the broader community were limited but did improve links between the school and community. While this type of small-scale community-based program has the capacity to benefit other similar rural communities, the problems identified in this program evaluation need addressing and should be used by program developers to improve future programs. Further research opportunities in relation to the digital divide in rural areas could include a long term evaluation of the Notebook Borrowing

Program over several years, comparison of programs set up to address the digital divide in rural and/or metropolitan areas and comparisons between Australian programs and overseas programs.

REFERENCE LIST

ACT Government (2003). *Community IT Access Plan*, viewed 2 February 2007. Available online [HREF1].

Australian Bureau of Statistics (2006). *Household Use of Information Technology, Australia*, viewed 15 March 2007. Available online [HREF2].

Barkume, M. (1993). "Everywhere you look, a computer", *Occupational Outlook Quarterly*, v.36, n. 4, p. 4.

Beamish, A (1995). *Communities on-line: community-based computer networks*, (Masters Thesis). Massachusetts Institute of Technology, Department of Urban Studies and Planning, Cambridge, USA.

Bell, P, Reddy, P & Raine, L (2004). *Rural Areas and the Internet: Rural Americans Internet use has grown, but they continue to lag behind others*. PEW Internet & American Life Project, Washington.

Brown, I & Licker, P (2003). "Exploring Differences in Internet: Adoption and Usage between Historically Advantaged and Disadvantaged Groups in South Africa" in *Journal of Global Information Technology Management*, v. 6, n. 4, p. 6.

Chauhan, B (2004). *E-Mail and Snail Mail United*, BBC, viewed 9 March 2007. Available online [HREF3].

Cole, G (1998). "Access for all: an industry standard: information enabling computer use". *Financial Times*, 28 October, p. 13.

CTC@NSW, NSW Department of Commerce, Office of Information and Communication Technology, Sydney, viewed 25 February 2007, Available online [HREF4].

Curtin, J (2001). *A digital divide in rural and regional Australia*. Department of Parliamentary Library, Canberra.

Annual Report of the Networking the Nation Board, 2003, Australian Government, Canberra.

Devins, D (2003). *Connecting communities to the internet: a selection of good practice from the wired up communities programme (2000-2003)*, viewed 27 February 2007. Available online [HREF5].

Devins, D, Darlow, A, Burden, T & Petrie, A, *Connecting communities to the internet: evaluation of the wired up communities programme (2000-2002)*, viewed 28 January 2007. Available online [HREF6].

Doll, W & Torkzadeh, G (1988). 'The measurement of end-user computing satisfaction', in *MIS Quarterly*, v.12, n.2, p.259-274.

Understanding the drivers of online data usage: and empirical analysis (2004). VICNET, Melbourne, Australia.

Foster, S & Borkowski, A, *Who Coined the Term?*, viewed 25 February 2007. Available online [HREF7].

Hargittai, E (2002). "Second Level Digital Divide: Differences in People's Online Skills". *First Monday*, v 7, n.4.

Huggins, R. and Izushi, H. (2002). "The Digital Divide and ICT Learning in Rural Communities: Examples of Good Practice Service Delivery", *Local Economy* v.17, n.2, p.111 – 122.

Kenny, C (2003). "Development's False Divide", *Foreign Policy*, n.134, p.76.

Keyes, D (2003). *Seattle Community Technology Program*, viewed 16 February 2007. Available online [HREF8].

Evaluation of the SchoolNet1 Initiative (2000), Canada.

Clear Thinking on the Digital Divide (2001), Washington, D.C.

Lenhart, A (2000). *Who's Not Online: 57% of Those Without Internet Access Say They Do Not Plan To Log On*, Pew Internet, Washington, viewed 1 March 2007. Available online [HREF9].

Lloyd, R & Hellwig, O. (2000). *Barriers to the take-up of new technology.*, Canberra, viewed 25 February 2007. Available online [HREF10].

McLaren, J & Zappala, G. (2002). *The 'Digital Divide' among financially disadvantaged families in Australia*, viewed 31 January 2007. Available online [HREF11].

Meredyth, D & Thomas, J. (2000). "Virtually no policy: modulating the digital divide" *Southern Review*, v.33, n.2.

Millward, P. (2003). "The 'grey digital divide: Perception, Exclusion and Barriers of Access to the Internet for Older People", *First Monday*, v.8, n.7.

Multimedia Victoria, Connecting communities - access@schools, viewed 13 March 2007. Available online [HREF12].

NationMaster.com 2002, viewed 8 March 2007. [HREF13].

Norris, P. (2001). *Digital divide? civic engagement, information poverty, and the internet worldwide*. Cambridge University Press, Cambridge, UK.

- NTIA (1998). *Falling Through the Net: Defining the Digital Divide*, Department of Commerce, USA, viewed 9 March 2007. Available online [HREF14].
- NTIA (2000). *Falling Through the Net: Toward Digital Inclusion*, Department of Commerce, USA, viewed 9 March 2007. Available online [HREF15].
- Pluss, M. (2004). *ICT Update: Geographical Dimensions of the Digital Divide*, Geography Teachers Association of N.S.W, viewed 22 January 2007. Available online [HREF16].
- Powell, A.C. (1999). "Falling for the Gap" in *Reason*. v.31, n.6, p.42.
- Rao, S. (2003). "Information Systems in Indian Rural Communities" in *The Journal of Computer Information Systems*. v.44, n.1, p.48.
- Rombel, A. (2000). 'The global digital divide' in *Global Finance*. v.14, n.12, p.47.
- Bridging the digital divide: a study into connectivity issues for disadvantaged people* 2002a.
Notes: Report for ACT Information Management .
- Rooksby, E, Weckert, J & Lucas, R (2002b), "The rural digital divide: the rural society" in *Rural Society*, vol. 12, no. 3, pp. 197-210.
- Selwood, A, Atkinson, J & Black, J (2005). 'Bridging the Digital Divide: An analysis of a notebook borrowing program at a rural primary school in Australia', *Communication, Internet & Information Technology CIIT 2005* , CIIT.
- Servon, L.J. (2002). *Bridging the Digital Divide: Technology, Community and Public Policy*, Blackwell Publishing, Malden.
- Shade, L.R. (2003). "Here Comes the DOT Force" in *The International Journal For Communication Studies*, v.65, n.2, p.107-120.
- Stone, T (2001). *Spanning the Digital Divide: Understanding and Tackling Issues*, bridges.org, Durbanville.
- Tiene, D (2002). "Addressing the Global Digital Divide and its Impact on Educational Opportunity" in *Educational Media International*, v.39, n. 3-4, p211 - 223.
- Tiene, D (2004). "Bridging the Digital Divide in the Schools of Developing Countries" in *International Journal of Instructional Media*, v.31, n.1, p.89.
- Van Dijk, J. & Hacker, K. (2003) "The Digital Divide as a Complex and Dynamic Phenomenon" in *The Information Society*, v.19, p.315-326.
- Warschauer, W. (2002), *Technology and Social Inclusion: Rethinking the Digital Divide*. MIT Press, Cambridge, MA.

West, D (2003). "Is computer access enough? A multilevel analysis of the barriers of engagement" in *Southern Review*. v.36, n.1, p.23-33.

Williamson, K, Schauder, D, Stockfield, L, Wright, S & Bow, A (2001). "The Role of the Internet for People with Disabilities: Issues of Access and Equity for Public Libraries in *The Australian Library Journal*, v.50, n 2.

HREF1

http://www.cmd.act.gov.au/Documents/bb_actionplan.pdf

HREF2

<http://www.abs.gov.au/ausstats/abs@.nsf/lookupMF/ACC2D18CC958BC7BCA2568A9001393AE>

HREF3

http://news.bbc.co.uk/2/hi/south_asia/3514252.stm

HREF4

<http://www.ctca.net.au/>

HREF5

<http://www.intelligentcommunities.org.uk/documents/WUCFinalReport-final.doc>

HREF6

<http://www.dfes.gov.uk/research/data/uploadfiles/RR389.pdf>

HREF7

http://www1.soc.american.edu/students/ij/co_3/digitaldivide/history.htm

HREF8

<http://www.cityofseattle.net/tech/indicators/default.htm>

HREF9

http://www.pewinternet.org/PPF/r/8/press_release.asp

HREF10

<http://www.natsem.canberra.edu.au/publications/papers/dps/dp53/dp53.pdf>

HREF11

http://www.firstmonday.org/issues/issue7_11/mclaren

HREF12

http://mc2.vicnet.net.au/docs/Connecting_Communities_booklet.pdf

HREF13

<http://www.nationmaster.com>

HREF14

<http://www.ntia.doc.gov/ntiahome/fttn99/>

HREF15

<http://www.ntia.doc.gov/ntiahome/fttn00/contents00.html>

HREF16

<http://hsc.csu.edu.au/pta/gtansw/publications/itupdate/Digital%20Divide.htm>