



## Computers in Homes Literature Review

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## Executive Summary

This paper seeks to contextualise the Computers in Homes project by identifying key research findings relating to community-based ICT initiatives that attempt to bridge the so-called 'digital divide'. The paper discusses the benefits of and barriers to adoption of ICTs in the community and in the home and identifies the imperatives for an effective linkage between the use of ICTs at school and in the home.

This review suggests that a range of solutions are required to effectively address the 'digital divide' and that these include both public access facilities and home-based initiatives, such as Computers in Homes. Specifically, this paper concludes that, whilst public ICT facilities are important, they are not a panacea. Similarly, focussing solely on providing access to ICTs in schools is of limited or potentially negative benefit. Immediacy of access is important, as is recognition of a parent's motivations for the adoption of ICTs. It is clear from this review that projects such as Computers in Homes have the potential to improve educational outcomes and increase social capital by improving access to ICTs, linking home computer usage to school curriculum and motivating parents to become more engaged with their children's schools.

## Introduction

The Computers in Homes project works with low-income households in selected communities to provide recycled computers, limited free internet access and training in conjunction with local schools. Launched by the 2020 Communications Trust in 2000 the scheme has worked with over 1,000 families and is supported by the Ministry of Education and other private and public sponsors. A key attribute of computers in homes is that the computer is owned by the family but the project is situated within a school community (Williams, Sligo, & Wallace, 2005). The project began with pilots in Cannons Creek, Porirua and Panmure Bridge, South Auckland. It now extends to rural communities on the North Island's East Coast, inner city Wellington's Newtown School and refugee communities in Hamilton. Computers in Homes attempts to do more than bridge a digital divide; it also attempts to build networks within communities and, significantly, encourages families to have greater involvement with their children's schools.

This paper is not about Computers in Homes per se, rather it attempts to locate the project in a wider context of community informatics initiatives and projects that attempt to overcome the 'digital divide'. To do this, the paper provides a brief overview of the current policy context for ICTs in New Zealand, with a focus on the provision of ICTs to disadvantaged communities. It then goes on to identify themes of access and digital disadvantage and to provide an overview of and discussion on a range of community informatics initiatives, which have been identified to highlight a variety of typical approaches. This section also serves to contextualise the approach taken with the Computers in Homes project and to identify ways in which this approach differs and potentially supplements other models. The paper then goes on to present a discussion on issues relating to the adoption of ICTs in the home and to discuss the relationship between the usage of ICTs in school and access at home before providing some concluding remarks.

## Policy Environment

In this section the current prevailing New Zealand policy environment is discussed as it relates to the provision of ICTs to disadvantaged communities. The value of ICTs for community development was first recognised at a policy level through the Connecting Communities Strategy (Community Employment Group, 2002, p.15) and latterly in the Digital Strategy. Connecting Communities aimed to improve access to and the effective use of ICTs amongst communities, defining a 'connected community' as one which uses ICTs as an enabler to reach its goals and needs effectively and efficiently. More recently, the Draft Digital Strategy (New Zealand Government, 2004) was published, followed a year later by the full strategy (New Zealand Government, 2005). This provides "an integrated framework for existing and future initiatives to

encourage the uptake and effective use of ICTs for economic, social and cultural gain” (p.2) and sets out to create the conditions necessary for this through three inter-related areas:

1. Content: Information made available via digital networks.
2. Confidence and capability: The necessary skills to use ICTs effectively.
3. Connection: Affordable access to ICTs infrastructure (p.3).

The Digital Strategy is significant in that it signals a realisation that a whole of government approach to ICTs is required and that, even in a ‘developed’ country such as New Zealand, ubiquity and sustainability of ICTs, or innovation through ICTs, cannot be assumed. The Digital Strategy sets out a platform for ICTs up to 2010 and commits up to \$400 million of funding to a wide range of digital initiatives which are delivered by government, business and the NGO sector. Whilst some of these are existing work programmes, there is approximately \$60 million of new funding aligned with the Growth and Innovation Framework, which includes two contestable seed funds, the Broadband Challenge (\$24 million), focussed on broadband infrastructure partnerships in key urban centres, and the Community Partnership Fund (\$21 million), which provides matched funding for grass-roots ICTs initiatives. The strategy encompasses projects such as PROBE (provincial broadband extension), a regional broadband initiative that has been extended to address broadband availability in remote and under-served communities and a number of projects within the Ministry of Education. These include the innovative Digital Opportunities project, which funds partnerships between schools, ICTs organisations and the Ministry of Education in order to “improve learning through the innovative use of leading edge technologies” (Ministry of Education, 2006, p.1) and Computes in Homes, which is linked to the Digital Strategy through the Ministry of Education’s Digital Horizons fund.

Within a local government context, there is increasing but slow recognition of the role of ICTs. Some city and district councils have been notable in their recognition of ICTs within a service delivery and community development framework, most notably Porirua, Christchurch, Waitakere – for the development of a joint community and council ‘Digital city strategy’ (Williamson & Edwards, 2005) – and Wellington – who recently launched an ICT Policy that supports community ICTs and eDemocracy initiatives in the city (Wellington City Council, 2006).

## **Access to ICTs**

There is a significant body of literature identifying the benefits of and barriers to the uptake of ICTs (Craig & Williamson, 2005; Gaved & Anderson, 2006; Loader & Keeble, 2004; O’Neil, 2002). Often referred to as a ‘digital divide’, this term is somewhat misleading: The barriers that prevent or inhibit the uptake of ICTs are socio-economic, educational, geographical and dis-ability related.

Poverty is a barrier to adopting ICTs, hence the importance of projects to increase access, including Computers in Homes. Adoption is often related to educational achievement, hence the importance of just-in-time skill acquisition, life-long learning strategies and the integration of external usage of ICTs with curriculum. Given the increasing significance of ICTs, the inability to use or access them has the potential to create a new form of social exclusion in the guise of information poverty (Facer & Furlong, 2001; Katz & Rice, 2002).

Research suggests that the proximity of ICTs in part determines usage and value. Those with access in the home or at work report higher levels of satisfaction and more reliance on computers and the internet than those who lack immediate access (Williamson & Dekkers, 2005). There is a strong correlation between income and access to ICTs in New Zealand (as elsewhere). The urban poor, those living in rural locations and the elderly are more likely to lack internet access at home (Craig, 2003). According to the 2001 census, 50% of those owning their own home had internet access as opposed to only 11% of those living in state or local authority rental housing (Statistics New Zealand, 2002). Only 50% of single-parent families have internet access at home, compared to 78% of two-parent families (Ministry of Social Development, 2006). In 2004, over 65% of New Zealand adults had internet access, the 8<sup>th</sup> highest in the OECD and up from 37% in 2000. This figure rises to 70% in the 18-64 age group and to 80% for families from ethnic communities<sup>1</sup> (Ministry of Social Development, 2006). Pacific people were least likely to have internet access (39.5%), followed by Māori (45%). Māori also experienced the lowest growth in internet usage over the four years to 2004. Poor Māori uptake is, according to Parker (2003), the result of lower household incomes and poor educational outcomes.

## Community ICT Initiatives

There are numerous examples of projects that attempt to build community capacity, provide education, skills, networking and resources for communities and which attempt to bridge the divide between communities with access to ICTs and those without. The publicly-funded provision of community ICT facilities is now a well established model in the developed world (Selwyn, 2004).

The US cities of Austin, Pittsburgh and Seattle have taken a proactive stance regarding the provision of access, support and training for ICTs within their communities. This has occurred not as an altruistic effort but because those cities see the information economy as an important part of their future. However, despite local government support, all three cities report barriers to success that include funding, over-demand (or under supply) of facilities and sustainable support.

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<sup>1</sup> 'Ethnic' is defined as non-Māori, non-Pacific People and non-European (Office of Ethnic Affairs, 2002).

A significant critical success factor in all three projects is community involvement and the buy-in and re-invigoration of local communities is seen as an important factor (Servon & Nelson, 2001). The three projects that Servon and Nelson refer to all provide access to ICTs through existing public facilities, such as libraries, internet cafes or government agencies. This model is widely utilised as a way to provide access to disadvantaged communities and is mirrored to different degrees across the world, ranging from the nationwide library-based People's Network in the UK to local library projects in New Zealand and other initiatives in the community such as Smart Newtown or attempts by the UK ICT Consortium to co-locate ICT facilities with other community facilities, such as neighbourhood law offices and health clinics. Each of these projects attempts to increase access by providing public access in local facilities that are available to all who wish to use them. The currently draft New Zealand Digital Content Strategy contains a proposal for a localised version of the People's Network to be based in public libraries and CABs.

Individuals benefit by engaging in the conversations and activities of their community and personal as well as community learning and understanding occurs through an active contribution to community (Dewey, 1998). Community informatics initiatives often support this aim, promoting outcomes where learning can occur at a community as well as an individual level and this aligns with wider strategies for life-long learning and with ideas of personal empowerment (Kvasny, Kranich, & Schement, 2006). Pigg and Crank (2003) observe that a community's capacity to self organise is limited unless there is open access to information (and for this to occur, access to ICTs is required). Within communities, leadership is critical since ICTs are like any other community project, requiring leadership, and momentum so that the community can work collectively towards improving capacity through engagement. Rural initiatives have similar objectives to their urban counterparts, the aim is most often to improve access, raise ICT literacy skills and provide improved social infrastructure and opportunities for economic development.

Using ICTs to build community-level linkages promotes increased connectivity as a way of strengthening social capital. A lack of access to information and information networks has been identified as a contributing factor to the fragmentation of communities and to falling levels of community engagement (Foth & Adkins, 2006; Quan-Haase & Wellman, 2004). ICTs, and the internet in particular, are identified as tools to reverse this trend and to provide tools and information to communities (Pease, Wright, & Cooper, 2003). Such ICT-based community networks can lead to the development and maintenance of social capital and are able to provide support and information across both broad and specific relationships within a community (Wellman, 1996). This is supported by activities in Byron Bay, NSW, where the focus has been on creating community-oriented organisational 'communities of practice' through the integration of online and offline networks (Ardron & Nicholls, 2003). For this to occur, existing community

networks must already exist. However, despite the promise of community involvement, cohesion and empowerment offered by local community networks using ICTs, there is little evidence that communities in regional Australia have struggled to sustain community networks that can demonstrate increased social, cultural or self-reliance capital (Taylor & Marshall, 2002).

Community technology projects are invariably under-resourced and reliant on volunteer labour and goodwill to be sustainable, particularly in the early stages (Williamson, 2003) and the clearest conclusion that can be drawn is that a community must consider what happens when the project matures. Inherent in this is recognition of the value of such a community resource. Unfortunately, research into community informatics initiatives suggests that sustainability is often at risk because of a focus on short-term project-based funding (Day, 2003; Williamson, 2005). Such a short-term focus has implications for effective strategic planning as well as for sustainability. This problem is demonstrated in the operation of a community technology centre developed to engage youth in the central-Sydney suburb of Redfern-Waterloo which is attempting to bridge the digital divide and the cultural divide between youth and the wider community. Structurally, the project faces issues in terms maintaining links to the wider community supporting older youths to engage beyond the Centre, particularly since ICTs are often inaccessible in the wider community. The project suffers from major sustainability issues around funding and is reliant on volunteers and donations (Solomon, Rodrigo, & Sengara, 2003).

There are also many novel solutions to placing ICTs within under-resourced communities. Smith, Cambridge and Gush (2003) addressed technology literacy and lack of confidence through free, publicly funded internet access kiosks. These 'digital doorway' projects in an under-developed South African township demonstrate scalability by adopting concepts developed in India and involve an internet-enabled PC placed in a public area. This example and others clearly identify lack of confidence as a major issue to be overcome even before training can be commenced. It suggests that, by providing free and available access, people will start using the PC and will quickly gain sufficient skill and confidence to be able to operate it.

The foregoing has described a range of models for providing ICTs to disadvantaged communities. However, it is often difficult to assess whether such projects are successful or even sustainable and whether existing models can be successfully leveraged for use in other locales. There is a distinct lack of detailed empirical research into the effects of community ICT initiatives and, where it does exist, there is a tendency to conduct research over a short time period. It has been suggested that this is "in part because it was assumed that their effects would be positive" (Gaved & Anderson, 2006, p.4). This is not to dismiss or disparage community ICT initiatives as many demonstrably improve quality of life indicators but it does lend caution to a 'one-size-fits-all'

approach that focuses on the provision of public ICT centres. There are in fact signs emerging that the concept of 'universal access' based solely on public ICT facilities is limited. Recent initiatives by non-government organizations in the US and UK have begun to address this by developing online content with socially disadvantaged groups. However, even these strategies go only some of the way towards increasing the take-up of public ICT provision. Public ICT facilities are "useful for those that use them [but it] appears likely that such sites will only ever fulfil a limited social role and are certainly not a panacea to the perceived inequalities of the information age" (Selwyn, 2004, p.16).

## ICTs in the Home

Considering Selwyn's timely warning that public ICT facilities are not the panacea that some perceive them to be and that, as noted elsewhere, effective use can be directly related to the immediacy of access (Williamson & Dekkers, 2005), it is pertinent to the discussion to review how ICTs are adopted and used in the home. As ICTs become more ubiquitous, computers and the internet will increasingly permeate the lives of children, young people and families. For many, this is more and more likely to happen in the home and where such access is not available it is often because of an existing disparity (although, one should not ignore personal choice to not adopt ICTs). Lack of access creates a further level of information disparity that in turn has the potential to exclude and marginalise young people from social, cultural or economic activities later in life. Put bluntly, a failure to acquire basic ICT literacy skills increasingly reduces an individual's ability to get a job (Facer & Furlong, 2001).

Whilst children are often cited as a major factor in the acquisition of a computer and internet connection in the home for both parents and grandparents, this anecdotal reasoning appears to over-state the actual significance children play in the decision to adopt ICTs. The most important considerations appear to be the parent's own needs and abilities (Selwyn, 2004). Zhu, Taylor, Marshall and Dekkers (2003) observe that, in considering the adoption of ICTs it is important to consider the micro-level motivators, both societal and personal. Individuals must first be aware of and then motivated to want to use ICTs and must identify value in its ongoing use. Adoption is based on an individual's perception of the value and attributes of technology and the discontinuity of change caused by the adoption of ICTs can itself act as a barrier to uptake and ubiquity (Moore, 1999).

Research suggests that households with children are more likely to use the internet (and use it more) than those without (Katz & Rice, 2002), however, the role of children in family adoption of ICTs appears more symbolic than practical and most often used as "an official justification for buying/adopting a computer rather than as a strong and sustained guiding force" (Selwyn, 2004,

p.16). New Zealand statistics suggest that other factors are of more significance in the decision to adopt ICTs. Whilst two-parent families have above average rates of internet access (78%) this is in stark contrast to single-parent families, who have below average rates of internet usage (50%). This suggests that wider socio-economic factors inhibit the adoption of ICTs and is reinforced by statistics which show that Māori and Pacific peoples also demonstrate below average levels of internet adoption (Ministry of Social Development, 2006).

Facer and Furlong (2001) suggest that poverty is not always the reason for not owning a computer at home and that other family priorities can take precedence. In such instances activities, such as travel, are more highly valued than ICTs. This is seen in some UK migrant communities, however, it is equally likely that migrants will have above average adoption rates in order to maintain transnational networks, which is the case in New Zealand. Recognition also needs to be made of the perception of the value and purpose of technology; is it valued for entertainment rather than education or connectivity? In the UK there is evidence of a direct correlation between video game console ownership and low-income which is not apparent for computer ownership. Research in Finland suggests that consumption patterns for ICTs are similar to those of books and magazines and that, like books, the adoption of ICTs “attracts a higher social status” (Rasanen, 2006, p.13).

Post-adoption of ICTs, children are not necessarily seen as the primary beneficiaries within the family unit and “in terms of adults’ access to and use of ICT, the demands of children to use computers were a mitigating but not always dominant factor to be considered by parents” (Selwyn, 2004, p.15). Selwyn also suggests that the apocryphal child IT expert supporting older members of the family appears in large part to be a myth, with the weight of evidence suggesting that ICTs do not substantially alter the dynamics or power structures within a family unit and that the role children might play in supporting adults in their use own use of ICTs is at best peripheral.

The Australian Council of Trade Unions (ACTU)/Virtual Communities computer scheme has a number of similarities with Computers in Homes in that it provides a low-cost home computer, telephone support (for a limited time), three years internet access and advice. It is targeted at lower socio-economic households who might otherwise not be able to afford computer access. The levels of discontinuous adoption seen in this project appear to vary according to family or cultural norms, values and lifestyles (Snyder, Angus, & Sutherland-Smith, 2002).

There is often an assumption that the ‘digital divide’ is a problem faced by adults, however, evidence suggests that this is a simplistic view and that young people face very real barriers to information literacy and access to ICTs. Youthful abilities to adapt quickly to technological change

are only useful if one has access to that technology (Facer & Furlong, 2001). Children's uptake of ICTs is affected by their parents' acceptance of it and the familial attitude to learning. Whilst socio-economic issues play their part, a parent's interactions with their community and with their children's school are also a likely indicator of ICT adoption – parents who are more involved in their children's education or who have larger social networks appear more likely to encourage and support the usage of ICTs in the home and for learning (Snyder, Angus, & Sutherland-Smith, 2002).

## **Connecting Usage of ICTs at Home and in School**

It is a stated aim of Computers in Homes to provide children from disadvantaged communities with access to online educational resources from home and the literature appears to strongly support this aspect of the initiative. Strong linkages are needed between home and school usage of ICTs and that provision of ICTs solely in the school environment does not overcome the digital divide. Despite this, schools are often identified as a location for overcoming disparities in information literacy (Lewin, Mavers, & Somekh, 2003). Those on the wrong side of any digital divide are also at higher risk of achieving poor educational outcomes. It is too simplistic to directly correlate digital disadvantage with educational underachievement and, therefore, inadequate to attempt to solve the problem by simply providing ICTs within the school system or through over-resourcing schools in disadvantaged areas (Huang & Russell, 2006; Snyder, Angus, & Sutherland-Smith, 2002). Indeed, Facer and Young (2001) suggest that “rather than mitigating the impact of inequalities of access to computers in the home, the school environment may be amplifying them” (p.12). Lack of computer access in the home “is not compensated for in other sites, but increasingly impacts on the extent to which young people will participate in a wider computer culture” (p.15). Therefore consideration of digital inequality outside the classroom must be included in curriculum development (Lewin, Mavers, & Somekh, 2003).

The ACTU/Virtual Communities project (discussed above) has no formal link with local schools and this appears to be a significant weakness in the project (Sutherland-Smith, Snyder, & Angus, 2003). Schools appear generally unaware of family computer ownership levels or usage and there has been no formal attempt to integrate ICTs skills learned at home with the school curriculum. Research suggests home-based computer ownership projects such as Virtual Communities and Computers in Homes are more successful where curriculum recognises them and the divide between school and home ICT practices are formally bridged.

Familial attitude to education and ICTs appears to be important. Parents generally appear to regard the acquisition of ICTs skills as “essential for educational advancement and the literacies of power” (Sutherland-Smith, Snyder, & Angus, 2003, p.17), recognising that literacy in ICTs is

“part of the cultural capital necessary for educational success” (p.17). However, where families fail to broadly value education, barriers are created between home and school. This is demonstrated by one family in the ACTU project, where the teenage son, despite being highly skilled in ICT usage in the home environment, has no personal or familiar motivation to continue beyond the minimal level of compulsory education and is therefore actively disengaged from IT classes at school. This is reinforced by a dominant construction amongst UK youth of home computer users as ‘brainy’ and as being more likely to achieve academic success, suggesting that “social and cultural inequalities in terms of access to material and cultural resources are mistakenly reproduced via the educational system as biological inevitabilities” (Facer & Furlong, 2001, p.15).

## Conclusion

Computers in Homes is one strand in the Digital Strategy, alongside broader projects for improved confidence and connectivity and more specific projects that support disadvantaged communities to access ICTs in a variety of ways, ranging from ICTs in public facilities such as libraries to recycling schemes for affordable second-hand computers, telecommunications regulation. In their research into one Computers in Homes project, Williams, Sligo and Wallace (2005) suggest that the project “has value in providing the most basic ICT access, and it is being used by school communities to attempt to broaden people’s world-views” (p.11). This literature review suggests that, potentially, an approach such as Computers in Homes can make a positive contribution to overcoming inter-generational socio-economic and educational disparities and that it exhibits some key attributes of a successful community ICT project, namely that it provides immediacy of access to ICTs, that home usage is linked with use at schools and that the project extends beyond the simple provision of new technology to build social capital amongst and between families and schools. This review suggests that a number of different solutions to the ‘digital divide’ are required including public access and support for educationally-motivated home ownership and usage and that projects such as Computers in Homes make a valuable contribution to this.

The foregoing discussion has identified a number of important considerations for community informatics initiatives in New Zealand, which include:

- Research suggests that community informatics projects that involve community partnerships and have community-based as well as individual objectives can improve quality of life indicators, including increased social capital.
- Public access facilities are important but their value can be limited to those willing or able to use them and this model should not be seen as an exclusive solution.

- The provision of ICTs in schools by itself does not overcome the digital divide. Where usage is not linked to wider home and community usage it can actually be counter-productive.
- Access to ICTs in the home appears to provide significant benefits and these benefits increase for children when usage is successfully and overtly linked to school curriculum.
- There is a need to motivate parents in their own right to adopt ICTs for their own reasons.
- Parents who are actively involved in their children's education are more likely to value ICTs and encourage their adoption for education.
- Pacific people, Māori, refugees and families with low incomes appear to be at greater risk of information poverty and are less likely to adopt ICTs.
- Project sustainability and scalability can be at risk where the only funding options are project based and temporal.
- A stronger research agenda is required which should include both quantitative and qualitative studies. In particular, longitudinal research into the effects of ICTs in relation to 'quality of life' indicators is required.

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