Addressing the digital divide

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Keywords

Information technology, Developing countries, Communications technology

Abstract

The phrase "digital divide" has been applied to the gap that exists in most countries between those with ready access to the tools of information and communication technologies, and the knowledge that they provide access to, and those without such access or skills. This may be because of socio-economic factors, geographical factors, educational, attitudinal and generational factors, or it may be through physical disabilities. A further gap between the developed and underdeveloped world in the uptake of technology is evident within the global community, and may be of even greater significance. The paper examines a number of these issues at the national level in the USA, UK, Canada and New Zealand, looking for evidence of the "digital divide", assessing factors that contribute to it, and evaluating strategies that can help reduce it. The relevance of these strategies to developing countries, and strategies for reducing the international digital divide are also explored.

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Volume 25 · Number 5 · 2001 · pp. 311–320

Introduction

In the global digital information age those who are either unable to access the Internet and the World Wide Web through the application of information and communication technologies (ICTs) are increasingly disadvantaged in their access to information. In most Western nations government policies are being established which attempt to ensure that all citizens have the opportunity to access and effectively use ICTs in order to enable them to participate fully in the educational, social and economic activities and democratic processes, which make use of these technologies. The "digital divide" has become a convenient metaphor to describe the perceived disadvantage of those who either are unable or do not choose to make use of these technologies in their daily life.

There is an equally important digital divide that deserves our attention, and that is the gap between the state of ICTs, and levels of access and utilisation of the Internet in developed nations and the situation in less developed countries. Dramatic differences in access to the Internet are now becoming evident as usage in the West reaches 25 percent of the population in most Western countries and exceeds 50 percent in the most advanced Internet nations – the USA and Scandinavia. And this divide goes far beyond access to the Internet for scientists, scholars and students in universities and schools in developing nations, beyond the questions of access to the Internet for ordinary citizens, and must include access to the more valuable information sources, indexes, full-text databases, and e-journals, that are not included in the freely available information on the Internet, leaving scientists and researchers in developing countries excluded from knowledge that may be vital to agricultural, social and economic development.

As the term implies, the "digital divide" focuses on the higher end of ICTs involving the electronic transfer of information using digital formats which may themselves be replaced by new technologies within the next decade. It assumes that the benefits of these technologies and access to the world of information that is contained within them is a

Refereed article received 8 August 2001
Approved for publication 17 August 2001

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benefit that no citizen in the twenty-first century should be without, certainly not at least in the developed world. While we may accept this assumption, it is also important to remember two key points about the impact of technology on human civilisation:

(1) Technology does not in itself solve social and economic discrepancies within societies, and can often exacerbate them. Massive growth in the use of ICTs in India, for example, has had no impact at all on what has been described as "the highest concentration of poverty in the world".
(2) New technologies do not always replace the old. They may co-exist and in doing so enhance the range of human experience without necessarily diminishing the experience of those who do not use/utilise them, preferring older technologies to achieve the same ends.

For the majority of the world's population, telephones are a technology beyond reach; food, sanitation and literacy are more urgent needs (UNESCO, 1998). Bringing the Internet to an African village by the means suggested by some enthusiasts, using battery-operated computers and satellite access, focuses on the wrong end of the technology spectrum, and not the end that is of most benefit to the world's poorest communities. The Internet is not in itself an education, does not teach literacy, and requires highly-developed skills to access and interpret information found. A better solution for most of these communities still lies in the use of very basic technologies to promote traditional forms of education, enhance the delivery of healthcare, improve animal husbandry and crop management.

The contribution made by the Internet to the poorest nations of the world is likely to be, at least for the foreseeable future, in other ways. These include: the sharing of global knowledge and expertise to help support their initiatives against poverty and disease; the contribution of ICTs to the developed part of the economy in each developing nation which shows the same benefits from the application of ICTs as in developed nations; better communication with trading partners through e-commerce; ability to market tourism and trade opportunities through the World Wide Web; use of low wage economy and different time zones to monitor and process transactions around the globe. A recent address of the Secretary General of the United Nations to ECOSOC, outlines many ways in which poorer nations can take advantage of ICTs for social and economic growth (United Nations ECOSOC, 2000).

Who is excluded by the digital divide?

A number of research and policy papers addressing the issue of the digital divide identify specific groups of people as being especially disadvantaged in their uptake of ICTs. These include: people on low incomes, people with few educational qualifications or with low literacy levels, the unemployed, elderly people, people in isolated or rural areas, people with disabilities, sole parents, women and girls. Because they are often already disadvantaged in terms of education, income and health status, and also because of their profound cultural differences from the dominant Western culture of the developed world, many indigenous peoples, and some migrant and minority ethnic groups are identified as having a very low uptake of ICTs. In the USA, therefore, Afro-Americans, Latinos, as well as North American Indian nations are identified as needing targeted programmes to increase their participation in the digital economy. In New Zealand, the indigenous Maori people have very specific cultural and educational needs that are the focus of government programmes aimed at "closing the digital divide", but the large immigrant communities from the Pacific Island states also form a group of people largely excluded from the benefits of the digital revolution that the rest of the country is enjoying.

There is a developing debate as to whether this alienation from the culture of the Internet is due to the factors listed above, or is primarily due to socio-economic disadvantage. The influential Gartner Group (2001) report, "The Digital Divide and American Society", argues that there is a very strong correlation between socio-economic status and participation in the digital economy that suggests cause and effect. The report is based on data gathered in the USA, in February 2000, which shows that while only 35 percent of households in lower socio-economic groups have access to the Internet, 59 percent of those in lower middle income

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groups, 73 percent of those in upper middle income groups, and 83 percent of those in the top income groups have access to the Internet. These disparities are presumably exacerbated by an uneven distribution of the population in the various income groups.

The Gartner Group (2001) argue that:

> While it is absolutely true that minority groups are at a distinct disadvantage when it comes to having Internet access, the reason for this is not that they are minorities but that they are at a socio-economic disadvantage due to lower education levels and poorer incomes ...
>
> Being on the wrong side of the digital divide is only one symptom of being poor. Lower socio-economic groups also have far lower household incomes, less access to educational opportunities, and have far more limited job opportunities ... one of the keys to increasing the socio-economic status of this country's poorest citizens is to grant them fair and equal access to educational and economic opportunities, and the Internet presents us with an exceptional opportunity to do just that.

Despite these disparities in access the Gartner Group report found little difference in attitudes towards the importance of computing skills to a successful career and the importance of a home computer for children's success in school among the various groups studied (which included blacks, rural communities, elderly people as well as the four socio-economic groups listed above). The report, possibly erroneously, assumes that this result indicates that all sections of the community place an equal value on access to the Internet, and that it is only lack of resources that prevents people from doing so, but this assertion is untested. Further research in a wider variety of minority groups into attitudes towards and barriers preventing use of the Internet is necessary before socio-economic reasons alone are assumed to be the major barrier to participation in the information age.

Barriers to use of the Internet

Among the many known barriers that Gartner assume can be subsumed under socio-economic status are four key issues that need much more research, and which are not dependant on socio-economic status alone. Any attempt to address the digital divide must take these potential barriers into account if it is to succeed. These four key issues are: physical access to ICTs; ICT skills and support; attitudes; and content.

Physical access

The main barriers that are identified under physical access are lack of a robust *telecommunications infrastructure* with sufficient reliable bandwidth for Internet connections, and *cost*, the ability to purchase, rent or travel to utilise without financial hardship, the necessary equipment. Affordable routine access is essential for participation in this new information age. While access is not dependant on home ownership, but can be severely constrained in the workplace, there are also constraints on the type of activity that can be carried out in the public environment of a community access centre or cyber-café.

At present, land-line telephone connectivity is essential to home Internet access. Telephone access is by no means universal. For example, although 1996 census data shows that 96 percent of New Zealanders lived in dwellings with a telephone, this is not uniform across all ethnic and income groups. Up to 75 percent of Maori in households with incomes of less than $15,000 in some depressed rural areas do not have access to a land-line phone at home, although some have access to a mobile telephone (Maharey and Swain, 2001). Even affluent rural communities suffer from geographic isolation, low bandwidth, unreliable connections, and interference from agricultural equipment such as electric fences.

Rapidly developing mobile telephone technology is likely to improve Internet access to some rural communities, but only those in areas which are already better served in terms of land-line services and bandwidth. More remote areas remain outside normal mobile telephone service, and development of mobile services in remote areas is regarded as prohibitively expensive. Satellite services, also promoted as a solution, solve only part of the problem, since although they allow high bandwidth traffic inwards, they are unlikely to support a very high level of outwards connectivity. Other technical solutions on the horizon, such as Internet access through cable TV, is also likely to exclude those in the lowest socio-economic groups. They are already the least likely group to subscribe to cable TV systems. It must also be recognised that all these technical solutions carry costs which must either be borne by consumers, or

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by central government or local authorities and passed on through taxes. In countries where the telecommunications industry is privately owned, the industry is quite open about its reluctance to make a substantial investment in markets which represent a tiny percentage of the revenue stream. Technical problems are likely therefore to continue to inhibit access in rural communities for some time to come, while cost of the equipment and the burden of monthly charges remain an issue with lower socio-economic groups in both rural and urban areas.

Physical access also includes provision of access for people with disabilities. The importance of making the Internet accessible to allow all people in the community full participation in communications systems, education, employment and other economic opportunities, regardless of their physical capacity, is a high priority for many governments (Maharey and Swain, 2001). Indeed, it is often regarded as one of the strengths of the Internet that it opens up channels of communication and access to information for people who have previously been excluded from full participation in the economic and social life of the country. Demand for access to the Internet by people with disabilities is steadily increasing and now seen as a human rights issue. While physical disabilities inhibit keyboard use, visual impairment inhibits screen use, and learning disabilities prevent large numbers of users from participating in the benefits of the Internet and its rich resources. Libraries and Web developers alike, governments and the business community need educating in what are now called "adaptive technologies" which include techniques for basic Web document design that meet the "disabled-enabled" criteria of Bobby – the Web-based validation service maintained by the Centre for Applied Special Technology (CAST)[1] now accepted as a world standard, and required by the USA, UK, and New Zealand and other governments for their own Web sites.

Lack of ICT skills and support

Lack of ICT skills and support is another significant factor in preventing certain groups from using the Internet. People in many of the disadvantaged groups listed above are often prevented from making use of ICTs because of low levels of computing and technology skills, and also, very importantly, literacy skills. Where people in business or professional occupations acquire skills as part of their employment, manual workers and the unemployed are less likely to be exposed to such opportunities. Young people who do not go on to any form of tertiary education are equally disadvantaged. While some skills spread rapidly in communities in which they are seen to have some value (learning to drive, to repair cars, to master sporting skills, to use electronic banking facilities) computer skills may not be highly valued by these groups. The interaction of factors such as: cost, restricting access to equipment; low educational achievement; and cultural, age or gender-based exclusion from literacy and computing skills counteracts against the dissemination of such skills in disadvantaged communities. Educational programmes intended to bring these skills to such groups must overcome a range of such barriers.

Attitudinal barriers

Closely aligned with lack of skill and support are cultural and behavioural attitudes towards the technology – e.g. that computers are for "brainy" people, for males, for the young, are difficult to use or belong to a middle-class "white" culture. Concern over the lack of security of personal information or that computers are "unsafe" for families because of the amount of unsuitable material on the Internet is sometimes expressed. These last two were major reasons given in a recent New Zealand study of rural communities for not using the Internet (Botha *et al.*, 2001, p. 22). Although in developed societies the disparities between Internet access by gender are not large (a recent AC Nielsen survey in New Zealand cites 53 percent males and 47 percent females having access, comparable Nielsen figures for other countries are: Australia 55 percent males; USA 50 percent; Singapore 60 percent and UK 61 percent). Disparities between male and female use of ICTs and therefore access to the Internet are much greater in developing countries. The involvement of women may be as low as 5 percent in some areas (United Nations ECOSOC, 2000). This has serious implications for women's participation in a growing global economy, and also involves a significant wastage of talent which such countries can ill afford.

Attitudinal barriers can also be culturally based. In many cultures which place high value on oral culture, personal communication and strong family and kinship

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networks, the use of computers for communication purposes will not be a high priority. These issues have emerged in focus groups conducted with Maori in relation to use of the Internet for transfer of government information, participants expressing the strong view that personal relationships with government agents are necessary for effective information transfer (Cullen, 2001). Such barriers may apply to many indigenous groups in developed nations, to strongly networked cultural minorities, groups emerging from an oral culture, and non-literate rural communities throughout the world.

Content

One significant reason why some groups choose not to access the Internet is because the content is not relevant or interesting to them. This may apply to specific groups in society, such as the elderly, or women, but more significantly again to cultural or ethnic groups outside the predominantly Western culture of the Internet. In many societies, digitisation of heritage collections is proceeding at a considerable pace and these often include rare and highly-valued records of indigenous peoples – raising of course complex issues of ownership and use, and sanctions concerning access. But equally important is the need for contemporary content that is relevant to these communities. The National Congress of American Indians, Web site lists content and sovereignty as key issues that, along with access, economic investment and education, are essential to the development of the Web as a resource for economic development, and for use in Native American schools as a teaching/learning resource (National Congress of American Indians, 2001). Specific interests of Maori communities in New Zealand centre on land, language and genealogy, and several key reports recently have recommended government initiatives to help Maori communities develop content focused on these topics. Sites that provide access to Maori land records, and which create more Maori content on the Internet, including material in the Maori language, are also needed.

National connectivity and initiatives

What figures are available for national rates of access to the Internet (gleaned from a wide variety of sources) indicate a huge disparity between nations. Patterns of use can easily be seen to reflect cultures, the balance between rural and urban economies, and levels of literacy.

Statistics on world connectivity

Tables I and II are derived from the Nua Web site[2]. Figures include all users, adults and children, who have accessed the Internet in the past three months up to the date given, or where this figure is not available, in the past six months or earlier. The figures include all people who have accessed the Internet and is not specific to Internet account holders. It is acknowledged that in some Asian countries some people prefer to use international ISPs as their service provider. However, the difficulty of obtaining foreign exchange reduces this to a very small percentage of overall users, and should not distort these figures substantially. Where only data on account holders is available this has been multiplied by a factor of three.

Although this data is not the most up-to-date available for all countries listed it is consistent with more recent figures where they are available and comparisons are likely

Table I Asia/Oceania

Country	Date	Number	Percentage of population
Australia	Nov 2000	8.42 million	43.94
Bangladesh	July 2000	30,000	0.02
China	July 2000	16.9 million	1.34
Fiji	July 2000	7,500	0.90
Hong Kong	Nov 2000	3.46 million	48.69
India	Mar 2000	4.5 million	0.45
Indonesia	July 2000	400,000	0.18
Japan	Nov 2000	38.64	30.53
Laos	July 2000	2,000	0.64
Macau	July 2000	40,000	8.98
Malaysia	July 2000	1.5 million	6.88
Nepal	July 2000	35,000	0.14
New Zealand	Nov 2000	1.49 million	39.03
Pakistan	May 2000	1.2 million	0.85
PNG	July 2000	2,000	0.85
Philippines	July 2000	500,000	0.62
Samoa	July 2000	500	0.28
Singapore	Nov 2000	1.85 million	44.58
Taiwan	July 2000	6.4 million	28.84
Thailand	Mar 2000	1 million	1.65
Vietnam	July 2000	100,000	0.13

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Table II Rest of the world

Country	Date	Number	Percentage of population
Canada	Dec 1999	13.28 million	42.8
USA	Nov 2000	153.8 million	55.83
Europe			
UK	Nov 2000	19.98 million	33.58
Sweden	Nov 2000	5 million	56.36
Norway	Oct 2000	2.36 million	52.6
Ireland	Nov 2000	1.04 million	27.5
France	Mar 2000	9 million	15.26
Germany	Nov 2000	20.1 million	24.28
Spain	Nov 2000	5.49 million	13.72
Middle East			
Israel	July 2000	1 million	17.12
Jordan	Mar 2000	87,500	1.92
Lebanon	Mar 2000	227,000	6.39
Africa			
Burundi	Jul 2000	2,000	0.03
Egypt	Mar 2000	440,000	0.65
Mauritius	Jul 2000	55,000	4.66
South Africa	May 2000	1.8 million	4.19

to be valid. Recent figures for China show that although the number of Internet users have increased to 26.5 million, based on estimates from online and telephone surveys, the percentage increase in the past year is substantially less than the previous year (BBC News, 2001). Measured against a population estimated now to be over 1.2 billion (China Population Information Research Centre, 2001), Internet users remain around or less than 1 percent of the population.

With Internet use in the whole of Asia growing at a rate estimated to be at least 45 percent per year, Asia is expected to account for approximately 25 percent of all Internet users in the world by 2003. With this rate of growth, it seems reasonable to assume that nations with what has been described as "moderate levels of development" will have a chance to catch up with post-industrial societies in terms of education, access to information and, to some extent, economic development, where a new level playing field allows them to take advantage of e-commerce and Internet tourism promotion. Developing societies look well poised to take advantage of the technology to enhance their participation in the global economy (Norris, 2000).

In the undeveloped world the situation is rather different. The United Nations Human Development Report for 1999 (UNDP, 1999) predicted that gains in productivity due to the new technology could widen the differences in economic growth between affluent and poorer nations which are unable to invest in the infrastructure, and training needed to support the information society.

A high level United Nations (UN)-sponsored meeting of government ministers and leaders in technology from developed and developing nations around the world met in New York in April 2000, to discuss the role of ICT programmes in development, to share experiences in both the wealthiest and poorest nations and to look for ways in which the poorer nations could extract early and tangible benefits from ICT and globalisation rather than, as they put it, "watch globalisation extract benefits from them". The panel called on all parties to unite to provide access to the Internet for the world's population presently without it by the end of 2004, and proposed as action points for reaching this goal that the UN should proclaim the universal right of access to ICTs such as the Internet as an important new component of the UN principles and conventions on human rights. The UN has so far declined to do so, but the Secretary General's statement subsequent to this report acknowledges the Internet as having a significant role to play in achieving human rights for all people.

The goal of universal access to the Internet was to be achieved by the establishment of an ICT task force, an establishment fund of $500 million to which the private sector and foundations would also be invited to contribute, and the writing off of one percent of debt for each developing country that would allocate the equivalent to ICT development. The UN was to arrange for international financing for ICT development for countries that met certain targets in their carbon-fixing activities.

A total of 12 national reports focus on the very real benefits, and the substantial growth in the sector that planned development of ICTs have brought to a number of countries in Europe, South America and Africa. One notable development is the Small Island Developing States Network which links 42 island nations in the Caribbean, Indian, Atlantic and Pacific Oceans, giving them both vital links with the wider world from which they have traditionally been very isolated, the possibility of joint educational, health and business initiatives as well as some combined

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clout in their attempts to break some of the monopolistic telecommunications practices which keep connectivity charges prohibitively high[3]. Such monopolistic practices have generally been outlawed in developed nations. The irony of globalisation is that the smaller and less developed the nation and the lower the average national income, the higher telecommunications charges seem to be.

Solutions

The global digital divide

There are no quick or easy solutions to the problem of the digital divide, either within nations or between nations. The disadvantaged in both rich and poor nations have too little cash to attract the attention of multinational computer and telecom giants who are more interested in the profits to be made from higher bandwidth and new technologies. However, in the plethora of UN, government and commercial reports concerning the digital divide there are a range of solutions proposed, and some of them specifically address the barriers to Internet use noted earlier: lack of physical access to ICTs; lack of ICT skills and support; negative attitudes; lack of relevant content.

In his report to ECOSOC, the Secretary General of the UN focused on some key points that need to be addressed in order to assist developing nations increase their adoption of the Internet in their own communities and enhance their participation in the global economy. Many of these involve international development initiatives and collaborative efforts between governments, donor organisations, and NGOs. He calls for a more effective transfer of knowledge from the rich northern hemisphere to the south and notes the increasing number of scientific and research publications appearing on the World Wide Web, a development which brings more benefits to the developing south than to researchers in the north who would have other forms of access. The importance of information flows south-south, and south-north should also be recognised and fostered, so that expertise in successful planning and implementation of ICT development projects can be shared and resources are not wasted.

The Secretary General's report notes that lack of physical telecommunications infrastructure is not the key problem in many parts of the developing world where mobile technology is already well developed. Internet access for mobile telephone owners is predicted to reach nearly one billion people by 2003, although, as we noted earlier, this does not guarantee access in areas remote from normal transmission services. However, mobile technology is developing rapidly and these problems may well be resolved in the next few years. A more intractable issue is the fact that 98 percent of Internet Protocol bandwidth globally connects to and from North America. The USA operates as the hub of Internet traffic and countries must make payments for traffic exchange and connectivity to US telecommunications carriers. Not only does this require foreign exchange payments in prohibitively high US dollars which developing countries can barely afford, it reverses the accounting system for telephone traffic where the cash flow is from the developed to the developing world. As more and more users transfer land telephone systems to the Internet, not only do developing nations lose cash income, they must pay increased charges for this connectivity. Careful renegotiation of existing global telecommunications agreements and a restructuring of the World Wide Web, a difficult task when the Web has no formal governance structure, will be needed to address these issues.

At the country level, one of the most important issues raised in the UN report is the success that has been achieved in developing local community access centres, whether these are established in existing community centres, schools, meeting houses, etc., or brought to the community in mobile units, not unlike mobile libraries. Indeed, in some regions they could easily be combined with these. This involves a paradigm shift from the concept of individual connectivity to community connectivity, contrary to the thrust of the Gartner Report which insists on domestic access to ensure maximum advantage of the technology. However, it has to be recognised that for much of the world, individual connectivity is an unachievable, and not necessarily a relevant goal, and that therefore models of community connectivity need to be seriously explored. The Secretary General's report refers to an example cited in the report of the expert panel, of mobile Internet units in Costa Rica, known as LINCOS (little intelligent communities)

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which are multipurpose multimedia mobile units housed in cargo containers and powered by a generator. LINCOS offer Internet access, e-mail, and training in ICT as well as banking facilities, telemedicine, soil testing and FM radio and TV in a small theatrette. Cargo containers have been used for telephone centres in Africa for some years, and container-based Multipurpose Community Telecentres are being set up in several African states on a trial basis as part of an African Information Society Initiative[4]. This is perhaps a solution for the poorest communities across Africa, which has the lowest levels of connectivity in the world, but only where existing literacy levels are adequate for advantage to be taken of the rich resource being offered.

While content development is not often seen as a primary factor in Internet uptake, inappropriate or inaccessible content continues to be a major deterrent. The use of English as the *lingua franca* of the Internet is far more inhibiting than English speakers realise. However, despite its dominance in cyberspace, English is in fact declining in terms of the proportion of speakers world wide, as cultures using other languages grow more rapidly. The development of local content and more widespread use of automatic translation systems are necessary to address this issue. The example of China is often cited, and attention drawn to the fact that only when the Internet in China was developed in Chinese characters did the 95 percent of the population who do not read English show any interest in connecting to the Internet. Usage multiplied immediately ten-fold and continues to grow at the same rate. The same rapid expansion was experienced in Russia after the introduction of Cyrillic letters to the Web interface. If we wish to accelerate the adoption of the Internet as a new technology innovation, relevant content in the vernacular, or language of each community is a key issue in persuading users of the relative advantage of the technology, and reducing the complexity involved in its use.

Solutions within developed nations

Addressing the problem within one of the most wired communities on the globe, the Clinton administration proposed a seven-point scheme to eliminate the digital divide within America:

(1) tax incentives to encourage private sector donation of computers, and sponsorship of community technology centres and training centres;
(2) funds to train all new teachers in the effective use of IT;
(3) funding for community technology centres in low-income rural and urban areas;
(4) public/private partnership to expand home access to the Internet for low-income families;
(5) promotion of innovative use of technology for under-served communities;
(6) subsidies to accelerate private sector extensions of broad-band networks in under-served communities;
(7) funding to help prepare Native Americans for careers in IT.

Not all of these initiatives are suitable for other communities, although they are carefully targeted at what are perceived as the key problems in the USA. Among them are some key points – the solutions at least for developed nations attempting to reach the disadvantaged sectors of the community and assist indigenous peoples to become involved in the ICT economy. They address two of the four basic issues affecting uptake of the new technologies, focusing primarily on physical access, i.e. supplying the hardware and enhancing networks and infrastructure; and ICT skills training in both schools and communities. Certain benefits may flow on from addressing these two fundamental tasks. Once the skills and access to the technology are in place perhaps it is easier to change attitudes and encourage the development of relevant content, created by the groups who find existing content irrelevant or unsympathetic. This has started to happen in North American Indian communities where tribes are building on their newly-acquired skills to develop content for each Indian nation. The same development is taking place in New Zealand where a Maori Internet Society has been formed to promote Maori involvement in the Internet, and a large number of Maori tribes or iwi have their own sites. LIANZA is strongly promoting content as an issue to the New Zealand Government in its National Information Strategy, not only because local content may attract more users from the groups not currently online, but

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because most content on the Internet is currently created in the USA and the UK, and because it is essential that we continue to create our own local material for domestic use as well as to communicate with the world.

Solutions to the problem of broad-band access throughout the community is highly dependant on the telecommunications structure of each country. Deregulation of the industry is perceived to be the best solution, but competition will not necessarily bring higher bandwidths to more remote areas. For example, in New Zealand the leading telco Telecom claims that it can deliver adequate bandwidth (14.4kbs or better) to 95 percent of the country and that it cannot afford to deliver the upgrade to its networks necessary to cater for the remaining highly vocal 47,000 consumers. Its overseas shareholders demand a higher level of profit than this. Competition alone will not resolve this question: legislation, pressure and some subsidy may be necessary and rural communities are already exploring building their own telecommunications networks to get around the problem. In an announcement on 7 May this year from the Cabinet Office, the British Government signalled its intention to speed up the roll-out of broad-band services to rural areas that individual suppliers did not see as commercial, by aggregating public sector procurement of broad-band services (that is, combining demand from schools, libraries, hospitals, etc.) and sharing with industry partners the commercial risk of rolling out broad-band networks in rural areas. A similar New Zealand initiative using local and central government funds will carry out a needs analysis and prepare a business plan to demonstrate the opportunities for telecommunications investment in Otago/ Southland by combining the needs of educational institutions, health services, and local business for broad-band access (New Zealand Infotech, 2001).

A key feature of the Clinton plan is the allocation of $100 million to establish 1,000 community technology centres. This initiative parallels the emphasis on community access centres noted by the UN report as having considerable success in isolated or otherwise disadvantaged communities. This model has been strongly promoted in Canada, as the Community Access Program (CAP)[5] and many other countries have observed and learned and decided to follow suit. CAP, administered by Industry Canada, was designed to provide Canadians, wherever they live, with affordable public access to the Internet and the skills to use it. It is a combined effort of federal and provincial governments, schools, libraries, business, and community agencies. The programme, which began in small rural communities in 1994, is now extended to larger urban communities and offers beginners courses in basic computing and Internet skills, including creating Web pages, as well as advanced industrial skills and advice on how to identify and enrol in online education programmes.

Community access centres can also be based in schools, churches, job-training centres, or community centres. In New Zealand some are based on marae – traditional Maori community centres focused on an elaborately carved meeting house which is used for formal meetings, and communal accommodation of visitors, the centre of Maori community life (Botha *et al.*, 2001). A different, but very successful community training model, SeniorNet, has also been developed in New Zealand. This is a loose network of local societies each of which is formed in its own community and incorporated as a non-profit-making society. Members receive initial training and then pass on skills to other members who pay minimal fees for training and access. Most SeniorNet members eventually acquire and rely on their own Internet access at home, and use the society for training purposes only.

The Botha report also looked at several other community access models analysing the potential of each to address the problems of rural communities in New Zealand. The models identified were: the social service model; the free market model; the extension model (based on existing community services in schools and libraries); the SeniorNet model; and the mobile model (Botha *et al.*, 2001, pp. 25-26). Several examples of free market model community access programmes were identified in both urban and rural areas across North America and Europe, known either as telecentres or telecottages. These are usually based on the concept of a salaried manager, offering access and training within the community on a semi-commercial self-sustaining basis. Few of these have had the major success of the Canadian initiative, and

are often not sustainable beyond the expiry of their initial subsidy. The success of the Canadian model is assumed to be due to visionary leadership, a highly effective national coordinating committee aligned with strong community participation, and a successful strategy that combines financial and training incentives for communities and community leaders, and effective utilisation of technology to maximise resources and minimise bureaucracy (Botha *et al.*, 2001, p. 41).

The Botha report's analysis of the success and failure of a large number of initiatives around the world in sustaining such community access centres reaches the following conclusions:

- financially self-sustaining access centres seem to be unworkable in rural areas—the failure rate in most parts of the world is high;
- coordinating teams promoting such ventures nationally should ideally be independent of any one government agency but should act as a catalyst between government agencies, business and the community;
- community access centres need to be community driven, have high community participation, and focus on community needs rather than the technology;
- training in valued ICT and other skills that people value are essential for community involvement;
- clear incentives are required to foster the development of such centres, and cooperation between community groups and business and schools (Botha *et al.*, 2001, p. 48).

Examining these well-researched conclusions, it seems that we can deduce that unless usage of community access centres is sufficiently high and the products offered are worth consumers paying a commercial fee for, we are back in the situation that those with the most need can pay the least. Subsidies will continue to be necessary to bridge the digital divide, and relevance to community needs will drive uptake.

Web resources

1 http://www.cast.org/bobby
2 http://www.nua.ie
3 http://www.sidsnet.org
4 http://www.bellanet.org/partners/aisi/telepro2.htm
5 http://www.capic.gc.ca

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