OCCASIONAL PAPER 49

Defining the 'Digital Divide': Developing a Theoretical Understanding of Inequalities in the Information Age

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Acknowledgements

About the Adults Learning @ Home Project

This is a 27 month research project funded by the Economic and Social Research Council between 2001-2003. The project team are Neil Selwyn, John Furlong, Stephen Gorard and Louise Madden.

This project explores adults' use (and non-use) of information and communications technologies in domestic and community settings and, in particular, examines the impact of new technologies on individuals' participation in formal and informal learning. In doing so the project seeks to increase our understanding of an integral part of the current education policy agenda; the use of information and communications technology (ICT) in facilitating individual access to learning and thereby increasing equalities of educational opportunity amongst the UK adult population.

Drawing on the research team's recent work concerning patterns of participation in lifelong learning, home use of ICT for learning among children and technology-based adult education, the project has been designed around an innovative blend of large-scale quantitative and in-depth qualitative research techniques. The project is being carried out in four diverse communities in the West of England and South Wales and is initially based around a household survey of 1100 adults aiming to provide a comprehensive picture of patterns of access to both technology and learning. Findings from these baseline data are then being elaborated upon via 100 in-depth interviews with a stratified sample of 'high' and 'low' ICT-using adults. Finally, a carefully selected sample of case-study individuals are being studied in detail over a twelve month long period to examine their use of technology for learning both at home and community sites. This combination of methods will therefore allow the project to form rich and detailed answers to the following five areas of questioning:

- What are the established patterns of lifelong learning that can be documented amongst particular adult populations?
- Who, amongst those populations, has access to what forms of ICT within home and wider community sites?
- What do adults within those populations use ICT for and how does it fit into their lives more generally?
- How do adults learn to use ICT effectively for formal and informal learning activities?
- What are adults actually learning through their engagement with ICT environments?

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> "The digital divide is the most pressing civil rights issue of the new Millenium" (Trevor Evans, Toshiba UK - 2001).

Introduction

The use of information and communications technology (ICT) is seen by many commentators to underpin the social and economic progression of nation-states throughout the first stages of the twenty-first century. A whole host of analysts have presented convincing arguments over the past two decades as to how new computer and telecommunications technologies will transform countries into 'knowledge economies' and 'network societies' (Reich 1991, Castells 1996, 1997, 1998). This often evangelical zeal has been taken up with equal determination by governments of (over)developed countries around the world. The ability to use ICT has been heralded by politicians to be "the indispensable grammar of modern life" and a fundamental aspect of citizenship in the prevailing information age (Wills 1999, p.10). Spurred on by the apparent inevitability of the information society, many governments in industrialised countries are beginning to initiate ICT-based programmes aiming to ensure that their citizens do not get 'left behind' and are able to 'win' in the new global era (Central Office of Information 1998, Information Infrastructure Task Force 1993).

The transformative nature of ICT has also been welcomed within the academic community as offering an unprecedented opportunity to overcome existing social divisions and inequalities. It is assumed by many academic commentators that ICT can 'empower' individuals (D'Allesandro & Dosa 2001), increase levels of social interaction and civic involvement (Katz *et al* 2001) as well as facilitate easy and widespread access to education and other public and government services. As Servon & Nelson (2001, p.279) conclude, "access to information technology and the ability to use it [have] increasingly become part of the toolkit necessary to participate and prosper in an information-based society".

However such 'techno-enthusiasm' has been tempered of late by concerns over potentially divisive aspects of the information age. In particular, issues of inequalities of access to both technology and information have begun to prompt concern about emerging 'digital divides' between social groups. If individuals or groups of individuals are excluded from using ICT, it is argued, then they will be excluded from many of the benefits that ICT can bring. As the then Minister for Learning and Technology reasoned:

> "The very technology that has the power to empower us all also has the potential to increase the problems of social exclusion unless we act to bridge the digital divide ... The Government is determined to help bring us all into the information age" (Michael Wills MP in DfEE 2000a).

General concerns about 'information inequalities' have therefore come to the fore in public and political debate over the last decade (e.g. Thomas 1996, Hansard 1997). Questions concerning *who* is 'connected' to information and technology have grown in prominence and now form an important element to the 'information age' policy agenda in industrialised, 'technologically advanced' countries such as the USA and UK. As such the notion of the 'digital divide' has been furiously promoted by what Strover (2002) terms an 'unusual alliance' of academics, IT industry executives, politicians and social welfare organisations all pursuing the ideal of widespread use of ICT - albeit for very different reasons. Yet, whilst substantial policies are being put into place to combat the 'digital divide', much of the surrounding debate remains conceptually over-simplified and theoretically under-developed. As Ba (2001, p.4) recently concluded, "little has been done … to develop comprehensive theoretical frameworks and to research evaluation agendas aimed at understanding the nature of quality access [to ICT]".

From this background, the present paper presents a theoretical examination of the 'digital divide', tracing its origins in the centre-left social inclusion policy agenda of the 1980s and 1990s to its current status of political 'hot topic'. The paper then moves on to consider four theoretical and conceptual limitations to conventional notions of the 'digital divide' in terms of individuals with and without 'access' to 'ICT'. Having established a more sophisticated hierarchical model of the digital divide the paper concludes by developing a set of research themes and questions for future examination of inequalities in people's access to and use of ICT.

Defining the 'Digital Divide'

In many ways the digital divide can be seen as a practical embodiment of the wider theme of 'social inclusion' recently prominent in policy making throughout centre-left governments in Western nations. Throughout the 1990s, countries such as the UK, France and the Clinton/Gore era USA witnessed a subtle shift towards a 'socially inclusive' policy agenda. Indeed, the issues of combating 'social exclusion' and establishing an 'inclusive society' now forms a bedrock of academic and political discourse in many countries. Yet, one of the most intriguing aspects of recent social policy formation in countries such as the UK has been the convergence of the 'information society' and 'inclusive society' discourses into ongoing debates over the potential of ICTs to either exacerbate or alleviate social exclusion (see Selwyn 2002).

In recent years the issue of social exclusion has been augmented (and could argue usurped) by vocal concerns from all sides of the political spectrum over 'digital exclusion' and the 'digital divide'. Although the notion of 'digital exclusion' first emerged with regard to the technological disparity between developed and developing nations, within Western advanced capitalist societies the international focus of these debates quickly gravitated towards the issue of technological inequalities *within* individual countries. The 1990s therefore saw the initiation of mainstream political discussion over 'information haves' and 'information have-nots' (Wresch 1996), 'information and communication poverty' (Balnaves *et al.* 1991) and, most popularly, the 'digital divide' (US Department of Commerce 1995, Jurich 2000, Parker 2000, BECTa 2001). In so doing, the prevailing view has broadly settled on combating a perceived dichotomous divide between those citizens who are 'connected' and those citizens who remain 'disconnected' from

technology, information and, it follows, modern/post-modern society. As the US Department of Commerce (2000) recently outlined, these divisions are portrayed in simple and stark terms:

> "[some individuals] have the most powerful computers, the best telephone service and fastest Internet service, as well as a wealth of content and training relevant to their lives … Another group of people don't have access to the newest and best computers, the most reliable telephone service or the fastest or most convenient Internet services. The difference between these two groups is … the Digital Divide".

This dichotomous portrayal of 'haves' and 'have nots' has been reinforced by a host of official statistics and academic studies over the last decade. Studies inform us, for example, that individual citizens' access to ICT is unevenly distributed both social and spatially (Warf 2001), with inequalities in terms of access to ICT strongly patterned along the lines of socio-economic status, income, gender, level of education, age, geography and ethnicity (e.g. BRMB 1999, National Statistics 2000, 2001, MORI 1999, DTI 2000b, Foley 2000, RSGB 2001). Although the magnitude of these figures vary, the emerging trends are that even within 'technologically developed' regions such as the USA, western Europe and south-east Asia, specific social groups are significantly less likely to have ready access to ICT. For example, in terms of socio-economic status, such inequalities of opportunity appear marked and enduring with more 'deprived' individuals significantly less likely to have access to a range of technologies. As well as differences in terms of socio-economic status and income, access to technologies such as home computers, the Internet and digital television appears to be patterned in terms of gender (with higher proportions of males than female reporting access to ICTs such as the Internet), age (with access to all three technologies inversely correlated to age) and composition of household (with two adult & one/two child households most likely to have access). Access to ICT also appears to be spatially differentiated within countries towards more economically 'prosperous' regions. The digital divide, it would seem, is a marked feature of any 'information society'.

(Re)considering the Digital Divide

At first glance the digital divide appears to be a simple premise. Political and popular conceptualisations of the digital divide have tended to be strictly dichotomous - you either have 'access' to ICT or you do not, you are either 'connected' or 'not connected', individuals and communities are either on the 'wrong side' or 'right side' of the digital divide (e.g. Hellawell 2001). From this perspective the digital divide is easily defined and, as a result, is easily 'closed', 'bridged' and 'overcome' given a political will to provide for those 'without' (Edwards-Johnson 2000, Devine 2001)[1].

According to this simplified line of thought it follows that the benefits of the 'information age' enjoyed by those segments of the population who have access to ICT and the requisite skills to use it can be augmented by providing public and subsidised access to ICT for those social groups otherwise lacking. This logic, for example,

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[1] This in turn has led to a growing trend towards defining the digital divide in terms which are easily measurable - with a range of authors attempting to develop digital divide 'indexes' and 'metrics' (e.g. Balnaves *et al.* 1991, Garnett & Rudd 2001).

underpins the UK government's current drive to widen access to ICT which has been constructed around the pledge to achieve both 'universal service' and 'universal access' to the Internet by 2005. In practice, the government's Policy Action Team on Information Technology has set the ambitious target that "by 2004, 75 percent of people living in deprived neighbourhoods will have the capabilities to access electronically delivered public services and skills to do so, if they wish and 100 percent by 2008" (DTI 2000). This is to be achieved by establishing networks of community ICT centres and points of access in a variety of existing sites such as schools and community centres, thus providing flexible access to new technologies for those without ICT facilities at home or at work. Such initiatives are being complemented by subsidies for the cost of home technology purchases and basic IT skills training for those on low-incomes. In this way countries such as the UK can progress towards becoming information societies safe in the knowledge that most, if not all, citizens will be on board.

This blend of public provision and promotion of ICT has left many politicians rather complacent about the bridging of the digital divide as a *fait accompli*. For example Vincent Cable, the Liberal Democrat spokesman for Trade and Industry, argued at a recent party conference that:

> "the digital divide is not an absolute, which will be there for ever. Nor is it necessarily wealth-related. Most people will be able to do a quick course at the adult training college and go to the local Internet Café. It is not so much about wealth, but more about age and using adult education imaginatively" (cited in Sarson 2000).

As this quotation illustrates the short-term practical and political allure of a simplified model of the digital divide is obvious. Yet for most readers these sentiments will also raise concern over the dangers of over-relying on such a basic conceptualisation of such a complex social issue. In the longer term, as shall now be outlined, to base our conceptualisation of inequalities in the information age solely in terms of a polemic set of technologically 'rich' and 'poor' individuals is too limited and rudimentary an analysis. We can see from even this brief description how concepts such as 'universal access' and the digital divide, grounded as they are in primarily economic judgements, are 'simplistic, formalistic and thus idealistic' (Burgelman 2000, p.56). As Webster (1995, p.97) continues:

> "to distinguish between the 'information rich' and 'information poor' both avoids precise delineation of who these are and fails to consider the range of different positions ... In short the model lacks sufficient sociological sophistication".

It would therefore seem reasonable that we attempt to move beyond the prevailing notions of a dichotomous 'digital divide' and 'access to ICT' towards a more elaborate and realistic understanding of inequalities in the information age. In doing so, four prominent areas of the digital divide debate need to be reconsidered: i) what is meant by ICT; ii) what is meant by 'access'; iii) what is the relationship between 'access to ICT' and 'use of ICT'; and iv) how can we best consider the consequences of engagement with ICT. These are now discussed in turn in the following sections.

i) Reconsidering what is meant by ICT

An obvious, but often overlooked, consideration is what the 'digital' in digital divide actually refers to. In particular there is a need to construct an adequate and realistic notion of what we mean by 'information and communications technology' when discussing the digital divide. Indeed much social science research, let alone policy-making, in this area has been limited by the rapid development of new technologies - utilising either too narrow a definition of ICT in terms of specific technologies or else too broad a definition in terms of ICT as a homogenous concept. A recent example of this latter tendency was evident in the Economist's (2001, p.10) assertion that "ICT is spreading faster than any other technology in the whole of human history [and] … the poor are catching up".

Even when not treating ICT as a homogeneous concept many politicians and other commentators have been extremely limited in their definition of terms - content to define ICT vaguely in terms of *computer* hardware or, latterly, in terms of access to the Internet. However, we know that people's use of technology extends far beyond the realm of the computer through technologies such as digital television, mobile telephony and games consoles - all constituting important but disparate elements of the contemporary technoculture. Indeed, the term ICT more accurately refers to an updating of the conventional 'information technology' to encompass the rapid convergence of technologies such as computers, telecommunications and broadcasting technologies as well as stressing the communicative and networking capacity of modern-day information technologies. Thus the term ICT is best seen as an umbrella term for a range of technological applications such as computer hardware and software; digital broadcast technologies; telecommunications technologies such as mobile phones as well as electronic information resources such as the world-wide web and CD-ROMs. In theory, therefore, any notion of a 'digital divide' must run separately (and even differently) through all these technologies and applications.

This plurality of technologies is complicated further by the use of the term 'digital' to also refer to the content that is provided via such technologies - the 'soft'ware rather than the 'hard'ware. In other words, the digital divide can also be seen in terms of the information, resources, applications, networks and services that individuals are accessing via new technologies. In one respect a focus on content rather than technological device or platform is a more accurate and useful point of reference for the digital divide debate. World-wide web resources, for example, are accessible through a variety of platforms - from computers to digital television to WAP mobile telephones. Yet here as well we are referring to a wide range of 'information' and services. It is clear that beneath the umbrella term of ICT we are concerned with a heterogeneous range of technologies, types of information and resources - not all necessarily analogous to each other (see Table One).

Devices	e.g. Home computers and personal computers Computer peripherals (e.g. printers, scanners, modems) Video games consoles (not programmable and having no keyboard) Digital television sets and receivers Mobile telephones, Video telephones
Networks	e.g. Telecommunications networks (cable, wireless, microwave) Computer networks (intranets and internet) Networks facilitated by Internet service providers (open access vs. 'walled gardens')
Content	e.g. Computer software Worldwide Web Content

Table One. Different Components of 'ICT'

ii) Reconsidering what is meant by 'access'

These points lead us to a second area of contention - what is meant by 'access'. As it stands in contemporary debate 'access' is a woefully ill-defined term in relation to technology and information. As Wise (1997) observes, in policy terms 'access' tends to refer to making ICTs available to all citizens - in other words 'access' is used solely to refer to the provision of physical artefacts. Yet this notion of 'access' in terms of whether technology is 'available' or not obscures more subtle disparities in the *context* of ICT access. For example, there is a subtle but important differrent between access and ownership. Accessing on-line information and resources from a home-based computer or digital television set is not necessarily equitable to accessing the same materials via an open-access work station in a public library or other community-based ICT centre. Issues of time, cost, quality of the technology and the environment in which it is used, as well as more 'qualitative' concerns of privacy, safety, convivality and 'ease of use' are all crucial mediating factors in people's 'access' to ICT (Davies 1993, Selwyn *et al.* 2000).

It is important here to acknowledge the importance of an individual's 'perceived' (or effective) access in practice over the theoretical (or formal) access to ICT (Wilson 2000). Indeed, any realistic notion of 'access' to ICT must be defined from the individual's perspective. Although in theory the formal provision of ICT facilities in community sites means that all individuals living locally have physical access to that technology, such 'access' is meaningless unless people actually feel able to make use of such opportunities. The logic of this argument can be seen in the increasing numbers of public payphones in UK towns and cities that are currently being converted to offer e-mail facilities alongside conventional telephony. Despite this formal provision it would be a nonsense to claim that every individual in these towns and cities now has effective and meaningful access to e-mail or, indeed, equitable access to e-mail when compared to individuals who use e-mail from their home or place of work.

This instead of either 'having' or 'not having' access to these many different technologies in many different contexts it follows that 'access to ICT' and the 'digital divide' are hierarchical rather than dichotomous concepts. Indeed, as Toulouse (1997) observes,

there are two distinct types of access - whether people have access at all and the hierarchy of access amongst those that do. This theme is extend by Murdock (2002) who argues for the identification of three groups of 'core', 'periperal' and 'excluded' users (see Table Two). Thus, beyond the simple issue of 'access/ no access' to ICT come more complex questions of levels of connectivity in terms of the capability and distribution of the access concerned. On a practical level for example, access to a personal computer does not guarantee a connection to the Internet, anymore than 'access' to the Internet is a guarantee of effectively accessing every available website and on-line resource. Similarly, access to a technology is useless without the requisite skills, knowledge and support to use it effectively. As we can already see, the digital divide is not solely about purchasing power and physical access.

'Core' Users	Continuous and Comprehensive use of ICT for information seeking, communication and origination/production of materials
'Peripheral' Users	Spasmodic and limited use of ICT for information seeking, communication and origination/production of materials
'Excluded' Users	Non existant use of ICT for information seeking, communication and origination/production of materials

Table Two. Levels of ICT Access and Use (from Murdock 2002)

iii) Reconsidering the relationship between access to ICT and use of ICT

It is important, therefore, not to conflate 'access to ICT' with 'use of ICT'. This presumption is at the heart of conventional notions of the digital divide and is reinforced by the determinist belief that access to ICT inevitably leads to use. This can be seen in the popular argument that present ICT-related inequalities are primarily due to the 's-curve' of expansion of technology use in society from present groups of 'early adopters' through to the majority of the population at a later date. Indeed, academics have identified phases of the diffusion of innovations - pointing to an 'inevitable' progression from 'innovators', 'early adopters', 'early majority', 'late majority' to 'laggards' in terms of individual citizens (Rogers 1995) and even 'skaters', 'striders', 'sprinters', 'strollers' and 'starters' in terms of countries and regions (Mendoza 2001). This 'natural' diffusion (or 'trickle down') thesis leads to the view that widespread inequalities in the use of ICT are only a passing phase of technological adoption and that, in the long term, the only people not using ICTs will be 'information *want nots*' - refusniks who for ideological reasons chose not to engage with ICT despite being able to in practice (van Dijk 1999). If this perspective is to be believed the digital divide is merely a temporary stage of societal adoption of ICTs, as Tuomi (2000) surmises:

> "If we study available evidence, the digital divide is closing rapidly. During the last decade millions of people have gained access to computers every year. Never in the human history have there been so many people with access to computers, digital networks and electronic communication technologies".

The danger of this determinist dismissal of the long term significance of the digital divide is that it ignores the complex relationship between access to ICT and use of ICT. Yet in making the crucial distinction between 'access to ICT' and 'use of ICT' we should recognise that access to ICT does not denote use of ICT. Similarly, 'use of ICT' does not necessarily entail 'meaningful use of ICT' or what could be termed as 'engagement' where the 'user' exerts a degree of control and choice over the technology and its content thus leading to a meaning, significance and utility for the individual concerned (Silverstone 1996). Having made these distinctions we can see that an individual's lack of meaningful use of different technologies once having gained suitable conditions of access to them is not necessarily due to technological factors (such as a lack of physical access, skills or operational abilities) or even psychological factors (such as a 'reticence' or anxiety of using technology) as is generally claimed by technologists. Instead, as a range of studies have shown, individuals' engagement with ICTs is based around a complex mixture of social, psychological, economic and, above all, pragmatic reasons. As Heller (1987) argues, at best, technology offers a number of 'options', or 'choices based on particular contingencies', which determine the variable impact of technology on people. Thus individuals' interactions with ICTs are not as simple as the 'user'/ 'non-user' dichotomy constructed by much of the previous literature and certainly not determined solely by issues of physical access to technology.

iv) Reconsidering the consequences of engagement with ICT

These points and caveats withstanding, we should also move on to consider the fundamental yet often unvoiced element of the digital divide debate - the outcome, impact and consequences of accessing and using ICT. Indeed, much contemporary debate over inequalities and ICT has concentrated only on the means rather than the ends of engagement of ICT use. As Wise (1997, p.143) acknowledges:

> "the problem with questions of access if that they reify whatever it is that we are to have access to as something central to our lives without which we would be destitute. They, therefore, redirect debate away from the technologies or services themselves".

To be of any lasting significance any conceptualisation of the digital divide must combine questions of access and use of technology with the impact and consequences of engagement with information and communications technology for individuals. In this way, we are examining to what extent (and why) the consequences of using and engaging with ICTs are not automatic for all. For example, we know that by its very nature some information is specialist and restricted to a few with the requisite intellectual and managerial skills to manipulate and use it (Lyon 1996). Thus the effects of accessing information, resources and services via ICTs can not be uniform for all users. As Balnaves and Caputi (1997, p.92) reason, it follows that where the impact, meaning and consequences of ICT use are limited for individuals then we cannot except sustained levels of engagement:

> "The concept of the information age, predicated upon technology and the media, deals with the transformation of society. However, without improvements in

quality of life there would seem to be little point in adopting online multimedia services" (Balnaves and Caputi 1997, p.92).

In particular, this notion of meaning can be seen as being at the heart of the digital divide debate. For example, Balnaves and Caputi (1997) point towards understanding the *relevance* of access to technology and information from the point of view of the individual, and, in particular, the relevance of the consequences or potential consequences of engagement with ICT for people. On the one hand relevance can refer to activities which are merely 'fun' and pleasurable. But, on the other hand, the consequences of meaningfully engaging with ICT can also be seen in terms of the effect on individuals' and communities' 'social quality' - i.e. socio-economic security, social inclusion, social cohesion and empowerment (i.e. Berman & Phillips 2001). Perhaps the most useful framework to utilise here is the various dimensions of participation in society that can be seen as constituting 'inclusion' (e.g. Berghman 1995, Oppenheim 1998, Walker 1997). These can be grouped as: *production activity* (engaging in an economically or socially valued activity, such as paid work, education/training and looking after a family); *political activity* (engaging in some collective effort to improve or protect the social and physical environment); *social activity* (engaging in significant social interaction with family or friends and identifying with a cultural group or community); *consumption activity* (being able to consume at least a minimum level of the services and goods which are considered normal for the society); and *savings activity* (accumulating savings, pensions entitlements or owning property). Thus the impact of ICTs could be seen in these terms which reflect the extent to which technology use enables individuals to *participate* and be part of society, i.e. the extent to which "ICTs enhance our abilities to fulfil active roles in society, or being without them constitute[s] a barrier to that end" (Hadden 2000, p.389).

Towards a Reconsideration of the Digital Divide

Stages of the Digital Divide

With all these factors in mind we can now begin to reconstruct the digital divide in more sophisticated terms; as a hierarchy of access to various forms of technology in various contexts, resulting in differing levels of engagement and consequences. On the one hand, we are concerned with inequalities of opportunity to access and use different forms of ICT. On the other hand we are also concerned with different inequalities of outcome resulting either directly or non-directly from engagement with these technologies. Thus it makes little sense to talk of a single dichotomous division as these inequalities of opportunity and outcome run along multiple lines. The different elements that need to be taken into consideration and factors that make up the digital divide are shown in Table Three. Here the progression from formal/theoretical access to effective/perceived access is followed by basic use of ICT which then may, or may not, lead to meaningful engagement with ICTs, information and services. This process culminates in the potential short-term outcomes and longer-term consequences of this engagement with ICTs.

Formal/ Theoretical 'Access' to ICTs and content	Formal provision of ICTs in home, community and work settings that is theoretically available to individuals
Effective 'Access' to ICTs and content	Provision of ICTs in home, community and work settings that individuals feel able to access.
Use of ICTs	Contact with ICTs in any form. May or may not be 'meaningful' use. May or may not lead to medium/long term consequences.
Engagement with ICTs and content	'Meaningful' Use of ICTs. Use where the user exercises a degree of control and choice over technology and content. Use could be considered to be useful, fruitful, significant and have relevance to the individual.
Outcomes - Actual and Perceived	Immediate/Short Term Consequences of ICT use
Consequences - Actual and Perceived	Medium/Long term Consequences of ICT use in terms of participating in society. Could be seen in terms of: *production activity* *political activity* *social activity* *consumption activity* *savings activity*

Table Three. Stages in the Digital Divide

Factors Underlying Inequalities in the Information Age

Having mapped out the different elements of the digital divide, albeit in a crude manner, it is now necessary to begin to develop an understanding of the underlying reasons and shaping forces behind individuals' and groups of individuals' engagement with ICT. Why then do some individuals successfully engage with ICTs from the initial stages of physical access through to longer-term consequences and others not? As we have argued, a whole host of technical *and* non-technical factors, economic *and* non-economic factors are at play. Thus in attempting to construct a framework to understand these mediating factors perhaps the most comprehensive approach is to distinguish between the different mediating forms of capital that underlie differential access to and use of ICTs in society. In adopting this approach we are therefore drawing upon Bourdieu's concept of different forms of capital as:

> "accumulated labour which, when appropriated on a private, i.e. exclusive basis by agents or groups of agents, enables them to appropriate social energy in the form of reified or living labour … It is the principle underlying the immanent regularities of the social world. It is what makes the games of society something other than simples games of chance" (Bourdieu 1997, p.46).

This notion of capital is powerful in that it facilitates a combination of theories of structuration and shaping of social action by social contexts with theories of self-interested individual action, thus allowing the exploration of the achievement of certain ends by individuals and groups from a multi-layered approach. Using this approach we can attempt to identify the effect of different forms of capital in all its different forms on individuals' and groups' ability to make meaningful use of information and communications technologies.

From this perspective perhaps the most immediate and obvious form of capital underlying individuals' engagement with ICT is *economic*. Indeed, in highlighting the other forms of capital inherent in the digital divide we are not trying to underplay the importance of economic capital in the digital divide. On a day-to-day basis the economics of using ICTs is a crucial and on-going mediating factor, with some commentators arguing that the digital divide is primarily about people "tak[ing] individual responsibility for the economics of getting on-line" (Haywood 1998, p.23). As Murdock *et al.* (1996) argue, material resources and economic capacity plays a central role in detirmining (i) whether people use ICTs and then (ii) the nature and subsequent patterns of that use - citing the example of the difficulties of using a word-processor without a printer or adequate monitor. Indeed, as Bourdieu himself asserts, economic capital is "always at the root in the last analysis" (1993, p. 33).

Yet economic capital and material factors cannot account for all stages and levels of engagement to ICT. What an individual or group of individuals can do with ICT is also intertwined with their corresponding levels of *cultural* capital. In Bourdieu's original analysis cultural capital denotes the extent to which individuals have (often unconsciously) absorbed or been socialised into the dominant culture over time. Cultural capital can therefore be embodied (in the form of knowledge), objectified (as in the form of books, paintings, instruments and other artefacts) and institutionalised (in the form of qualifications). Bourdieu's original work concentrated on the effect of cultural capital that individuals possessed in terms of how successful they would be in the educational system. Yet we can also see that there are specific technological forms of cultural capital useful to the 'information age' such as technological skills, competencies and 'know-how' as well as socialisation into the 'technoculture' via family and the household. Such forms of cultural capital can be seen, for example, as the difference between having access or ownership of a technology and engaging with and making meaningful use of that technology - as Bourdieu (1997, p.50) explains:

> "To possess the machines, he [sic] only needs economic capital; to appropriate them and use them in accordance with their specific purpose he must have access to embodied cultural capital; either in person or in proxy".

Thirdly, the success of many people's engagement with ICT is also highly influenced by their *social capital*. Social capital can be seen as social obligations or connections between an individual and networks of other significant individuals (family members, friends), organisations and institutions that can be called upon for mobilisation of their own capital. As Bourdieu (1997, p.51) continues:

> "Social capital is the aggregate of the actual or potential resources which are linked to possession of a durable network of … institutionalised relationships of mutual acquaintance and recognition - or in other words to membership of a group - which provides each of its members with the backing of the collectively-owned capital".

Social capital has therefore been recognised as an important element of individuals' and organisations' ability to access and effectively engage with ICT (Di Maggio & Hargittai 2001, Fountain 1997), with the size and nature of an individual's network of technological connections developing and sustaining an individuals' use of ICT. For example, ICT use is increasingly about being able to draw upon 'expert' sources of advice to help us use ever-powerful computer systems that the vast majority of users will never fully use, let alone understand. As Kitchen (1998, p.112) argues:

> "we are becoming increasingly reliant on the 'computer experts' that each facility now has to employ to guide us through the rapid developments and sort out our daily problems".

Whereas such expert sources of advice are increasingly being made available in remote or virtual forms in the shape of helplines, after-sales support and other IT-industry services, the development (or not) of localised face-to-face social capital is also important. As Murdock *et al*'s (1996) work examining the diffusion of home computing on a UK housing estate has highlighted, people's ability to foster, maintain and draw upon social capital in terms of networks of friends, relatives, neighbours and other significant local sources of technological expertise and material resourcing (in terms of 'borrowing' equipment or 'sharing/copying' software) was a critical factor in people's sustained use of ICT:

> "The maintenance of particular forms of computer use will depend in large parts on access to users who can offer advice, encouragement and practical support. Conversely users who are isolated from or marginal to such networks may find it difficult to acquire competencies and sustain interest over time" (p.273).

These factors have led some authors to point towards the fundamental importance of '*technological capital*' as both a subset and an addition to Bourdieu's cultural, economic and social forms of capital in the information age (Hesketh & Selwyn 1999, Howard 1992). Indeed, many of the differences that the digital divide pertains towards can be traced back to clear differentiation in the technological capital of individuals, organisations and communities - i.e. fundamental differences in the cultural, economic and social resources that individuals and communities can command when engaging with technology and are able to adopt as part of their strategy of reproduction (see Table Four). Possession of technological capital enables individuals to become, for example, producers and

distributors of their own cultural products rather than active or passive consumers of the products of others (Kenway 1995). It can therefore be seen to be a crucial distinction between the 'information used' as opposed to 'information users' (Dordick *et al.* 1988) and is also reflected in the 'three Cs' of competence, concepts and connections that some see to underpin an ability to thrive in the global economy (Kanter 1995).

Economic Capital	'Material exchanges', Material Resourcing, Usable Space for ICT use (in domestic, community and work settings) 'Free' time for ICT use Economic Capacity to Purchase ICT hardware and software
Cultural Capital	*Embodied* Investing time into self improvement of ICT skills, knowledges and competencies in the form of informal learning, Participation in ICT education and training - both formal credentialised and informal non-credentialised *Objectified* Socialisation into technology use and 'techno-culture' via techno-cultural goods, (e.g. Exposure to ICT via magazines, books and other media), family, peers and other agents of socialisation Development of social identity and 'self-image' as ICT user *Institutionalised* Formal credentialised ICT training
Social Capital	Networks of 'technological contacts' and support both immediate and distributed - these can be… *Face-to-face*: family, friends, neighbours, tutors, other 'significant others', membership of groups/ organisations *Remote*: online help facilities, commercial helplines

Table Four. Different Forms of Technological Capital

Key Research Questions

This multi-faceted and graduated model of ICT use outlined in this paper has significant implications for future research in this area. In seeking to examine the digital divide we are interested in the levels and contested nature of individuals' *access* to technology (in particular their effective access as opposed to what is formally available to them in theory), their actual *engagement* with this technology and, importantly, the short-term outcomes and longer term consequences of this engagement. Although this paper has attempted to identify the different stages and elements of the digital divide there is still a need to explore and further clarify the relationships between them. Indeed, in attempting to develop a more sophisticated understanding of the digital divide this paper has succeeded in raising more questions than answers. From this perspective, and in light of the recent political efforts to combat the digital divide, the following questions need to be addressed in detail:

- What types of formal/theoretical access to what technologies do people have at home, at work and in community settings?

- What types of effective/practical access to what technologies do people have at home, at work and in community settings?

- What is the nature and extent of use of technologies facilitated by this access? Under what circumstances does meaningful use/engagement arise? What factors contribute to people becoming/continuing be 'core' users of ICT and others to revert to becoming 'peripheral' users or even 'excluded' non-users?

- What types of social, economic, cultural and 'technological' capital are people able to draw upon when using technology?

- What are the short term outcomes of this engagement with technology for people and communities?

- What are the longer term consequences of this engagement with technology in terms of individuals' participation in society?

- How are people's ICT access, engagement and outcomes patterned according to individual factors such as age, gender, class, geography, ethnicity and disability?

- What other mitigating factors and circumstances can be identified as impacting on people's ICT access, engagement and outcomes?

Conclusion

In all likelihood, the flawed and over-simplified notion of a dichotomous digital divide of 'haves' and 'have nots' will continue in its popularity as a means of framing discussion of social issues in the 'information age'. As such the political and rhetoric appeal of the simplistic 'digital divide' lies in its neat packaging of complex social issues in a form of social exclusion that governments can be seen to do something about, unlike more longstanding and fundamental 'non-digital' divides. Moreover, despite its weaknesses the notion of a dichotomous digital divide also has a value in bringing the issue of information inequalities to the fore in contemporary social debate. As Silverstone (1999, p.21) contends:

> "The theoretically unsubtle has its value. It focuses the mind on the dynamics of structural change. It makes us question. But it misses the nuances of agency and meaning, of the human exercise of power and of our resistance. It misses, too, other sources of change: factors that affect the creation of technologies themselves and factors that mediate our responses to them. Society, economy, politics, culture. Technologies, it must be said, are enabling (and disabling) rather than determining".

But now the realities of an ICT-based society are becoming more apparent than they were a decade ago we need to move the debate onwards. We need to recognise that the crucial issues of the 'digital divide' are not just technological - they are social, economic, cultural and political. The 'cyber-guru' Nicholas Negroponte could not have been more misguided in asserting that in the information age 'all that is solid melts into bits'. Indeed, to imagine a digital world free from the inequalities of the offline world is again indicative of technological naivety rather than foresight. It is of utmost importance that academics, politicians, practitioners and all other stakeholders in the information age adopt a more sophisticated and realistic view of the digital divide and the range of inequalities that currently exist in ICT-based opportunities, uptake, engagement and outcomes.

Yet in proposing this reconceptualisation of the digital divide, and therefore eschewing the more 'techno-utopian' positions outlined at the beginning of the paper, we must be careful not to fall instead into what Mendoza (2001) refers to the 'fatalist instrumentalist approach' of assuming that it is inevitable that "social structures will remain unaltered and digital information technologies will be another factor to strengthen the existing structure of social stratification" (p.30). As Golding has argued on many occasions, although the patterns of uptake and use of new technologies do appear to be falling into existing and deep-rooted patterns of social and economic inequalities and "the abiding fault lines of modernity" (Golding 2000, pp. 179), there is still the potential for change:

> "We are now witnessing the 'mediatization' of the new technologies, as they follow past scenarios of commercialisation, differentiated access, exclusion of the poor, privatisation, deregulation and globalisation. None of this is inevitable. We find ourselves staring at the arrival of a tool that could nourish and enhance the public sphere, or could equally provide another vehicle for the incorporation of progressive politics and ideals into the grubby raw maw of market rapacity" (Golding 1996, p.85).

Whether or not such changes *are* taking place as politicians, technologists and other enthusiastic commentators believe must now form the basis of carefully conceptualised and executed research. We need to move research away from the current predominance of "pundit suppositions, travellers tales and laboratory studies" (Wellman 2001, p.2031) towards robust survey-based and in-depth qualitative work which begins to un-pack the complexities of the digital divide as set out in this paper (DiMaggio *et al* 2001). As Murdock (2002) stresses this will be by no means an easy task. The digital divide is multi-faceted and historical - whilst 'snapshot' research has its place there is a pressing need for longitudinal studies of the development of individual's technological 'careers' as well as developing an understanding of the 'local' context of individual and community technology use. Hopefully this paper has provided an initial starting point for such work to take place.

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The term digital divide refers to the gap between people with effective access to digital and information technology and those with very limited or no access at all. It includes the imbalances in physical access to technology as well as the imbalances in resources and skills needed to effectively participate as a digital citizen. There is considerable literature on information and digital inequality that predates this current label. The concept of a digital divide is more of a new label and less of a unique concept. There are various definitions of the term "digital divide." Bharat Mehra defines it simply as "the troubling gap between those who use computers and the Internet and those who do not."[10]. The term initially referred to gaps in the ownership of, or regular access to, a computer.

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