CHAPTER 4
Emerging Trends and Issues: The Nature of the Digital Divide in Learning

Synthesis by the OECD Secretariat

INTRODUCTION

Ample illustrations of the digital divide in learning were put forward during the Roundtable. Such illustrations show that there is no single, clearly-defined divide, but rather a series of gaps, brought about by a variety of factors which often come together, many of which do not have their roots in the technology itself. There are those, however, who take exception to the term digital divide, seeing it as negative and unhelpful, and fearing that such emphasis will undermine the potential of ICT to open new horizons in accessing knowledge and information; the hope appears to be that enthusiastic affirmation of the benefits of ICT will be enough to ensure its widespread adoption. Others again see the term digital divide as coined to create alarmism about a supposed ICT skills shortage, a marketing ploy to boost the sector.

Such scepticism about the notion of the digital divide was not the view of the Roundtable, as participants acknowledged the complexity of the related issues and their interpretation. However, given the existence of manifold "divides", how real is the risk that the term digital divide is a loose attention-seeking expression of limited practical value? Questions were raised about the

distinctiveness of the *digital* aspects of learning inequalities, as opposed to other more familiar and perennial social aspects. Should learning's digital divide be regarded as a critical new problem, or as but the latest manifestation of longstanding familiar problems – and no less important for that? Does it show elements of both these positions? Acknowledging the existence of the digital divide does not imply that the causes are themselves merely technological, as the following Roundtable quotation indicates:

> "With the remarkable advancements in information and communication technology (ICT), there is now a genuine concern about the *digital divide*, the gap between the ICT *haves* and the ICT *have-nots*. There is a good justification for this concern and the figures show it at every level. But narrowing the divide – publishing a newspaper in every village, placing a radio and TV in every household, putting a computer in every classroom, and wiring every building to the Internet – does not automatically solve the problem. The most serious divide is in the *extent and quality of human knowledge and learning*. It is not digital, it is educational."
>
> *Wadi D. Haddad*

This chapter presents insights from the Roundtable discussions and submissions on the diverse dimensions of the digital divide, as an addition to the main contributions presented in the previous two chapters. It points to a more thorough analytical understanding, but given the nature of this source material, it makes no pretence to offer comprehensive coverage. What can best be done in response to the digital divide through different policy strategies and programmes forms the focus of the next section of this report.

LEARNING AND THE DIGITAL DIVIDE – DIMENSIONS AND ISSUES

As expressed by a participant, the digital divide in learning and education is in fact "a whole landscape of problems". One typology offered to gain a better grasp of this landscape looks at the patterns (and problems) of ICT access and use for education and learning, in relation to the following sections of the population:

- Those with special needs or physical disability
- The socially and economically deprived
- Linguistic and ethnic minorities
- Groups suffering social exclusion
- The geographically remote
- Older citizens, for whom new technology has arrived late in life
- The technologically-alienated or apathetic *Robin Ritzema, U.K. Representative*

Other categories emerged during the Roundtable discussion, not all of which relate to particular population groups. Some refer to gaps between educational settings and others to whole countries and regions, a range that is reflected in the points which follow.

Formal education – Gaps in investment levels

Perhaps the most obvious manifestations of the learning digital divide are the ICT gaps that exist *within formal education*, between one school or school district and another, in terms of the equipment, materials, connectivity, professional competence, and integration of ICT within the teaching/learning environment. Many participants suggested that these represent only the most basic indicators – the actual educational use of ICT and changes in student competence being more fundamental – but major differences are apparent. Whilst the OECD 1999 summary analysis (see below) and many national surveys seek to chart these aspects, hard data are insufficiently available and much depends on anecdotal evidence only. It will be important to develop convincing frameworks for the gathering of data and analysis of the educational digital divide.

"The figures [students per computer] show wide variations at both levels, but the greatest range in primary. Where figures over two years are available, the rise in computer intensity is marked; at the extreme, Ireland has halved the number of students per computer in a single year. The most ICT-intensive countries in education are the United States, Finland, New Zealand and Sweden. They have 7 pupils or fewer per computer in secondary education and 13 in primary education. The United Kingdom, Denmark, Ireland and Norway have good access to ICT (…) The age and quality of computers in schools is crucial: only if they have sound cards and CD-ROM drives, for example, can students use up-to-date and efficient multimedia software including access to the Internet. Data on the proportion that have this multimedia capacity are only available in some countries, but show that despite rapid progress, a large number are out of date in this sense." (OECD, 1999)

Evidently some of the key inequalities in educational ICT investment are associated with differences between countries, levels of education, quality of ICT equipment (and the educational uses it permits), and Internet connectivity. However, as the OECD extract also mentions, there are problems of gathering a meaningful picture of developments when the pace of change quickly outdates the available summary statistics.

There is an important role for schools and other educational institutions to ensure equality of access to ICT, and thereby to raise *technological literacy* throughout the student population – a basic learning aim. It has to be noted that many aspects of the digital divide are determined by ICT access and use outside the formal system, but as a number of participants recognised, schools and other educational institutions can play a compensatory equalising role. There are aspects of the divide which are profoundly social rather than technological.

There was lively exchange on the potential for distance learning to overcome forms of cultural or social separation, other than the barrier of geographical distance. Some maintained that this represents a very promising way in which ICT can help to address various social divides in learning, others that distance learning is just as prone to unequal access and participation as the more conventional programmes. Reference to tertiary education arose in the context of lifelong learning, though there was little Roundtable discussion of the digital divide as found in this phase of education, and few data are known to exist. Nonetheless, there is no reason why access to ICT and its use in learning should be any less relevant in the higher reaches of the formal education system than for schools.

ICT use – Learners and teachers

It is important to gain a more robust understanding of gaps in educational ICT investment. Several participants stressed, however, that the simple indicators of equipment levels commonly used may be quite misleading. What matters, it was suggested, is the actual *use* made of ICT. A related caution concerned the need to distinguish between accessing information and engaging in constructive learning, the goal being the latter and not simply the former. Learning through ICT is evidently not possible in the absence of such things as computers, CD-ROMs, e-mail and connectivity, but whereas these form the *necessary* conditions, they are not themselves *sufficient*.

The relevant questions concern not just whether ICT is regularly used in educational settings, but how it is used. For instance, New Zealand research

reported at the Roundtable suggested differences in how ICT is adopted by teachers and students: high socio-economic status schools tend to use it for advanced applications and thinking, whereas other schools are more likely to focus their application on basic-skill development, or – worse still – on diversionary activities such as computer games. It seems that the different approaches to learning adopted by different types of school are explicable in terms of the social intake of the student population. One Roundtable participant described how the exemplary use of ICT by students for multi-disciplinary research and problem-solving is essentially an inductive process. As such it may run sharply up against the deductive and rule-driven assumptions of many education systems and schools.

Much more evidence could be compiled from different countries and types of schools, on the nature and social distribution of the use of ICT in education. How far do privileged educational institutions use ICT to reinforce their advantages? Alternatively, have actual cases been charted where the imaginative educational use of ICT has helped to overcome a range of outstanding problems in order to bridge divides? It is to be expected that evidence could be found in support of both positions, suggesting that while educational inequalities may often be compounded by ICT, it can act as a liberating force. Given wide differences in use and application, the interpretation of evidence will need great care.

The existence of divides in ICT use leads immediately to issues about teachers – their preparedness for the integration of the new technologies in the classroom, and the extent to which they actually do so. It will be important to gain a clearer picture of these factors. Which teachers in which schools already use ICT on a regular basis, and for what tasks? Which teachers never do? How does the picture vary according to level and type of education – primary or secondary, public or private? What is the effect of the age and gender of the teacher, of subject specialism, of country? What sort of professional development have teachers been involved in, and how closely does this professional development shape subsequent applications in the classroom? On all these questions, there is a dearth of reliable information.

As evidence becomes available it will need to be understood in context. In those schools and systems where the classroom deployment of ICT is encouraged, differences in actual practice may closely reflect teacher characteristics. In other cases, it may be misleading to assume that the lack of exploitation of ICT is principally to do with teachers' own capacities and interests, being perhaps a

consequence of other constraints within the system. A further question raised during the Roundtable discussion is whether there is any evidence of significant gaps opening up between teacher and student, in relation to the cognitive processes of ICT use, with students (but not teachers) characterised as belonging to the "Nintendo generation". Are such generation differences more difficult to traverse than those of earlier times, or are they simply their latest manifestation? These questions remain open for the present.

ICT skills – Different population groups

Thus far in this chapter, the gaps described in relation to the digital divide have been outlined in terms of *inputs* (investments in hardware, software, and teacher preparedness) and *processes* (ICT use in schools and classrooms). The obvious further dimension to be charted concerns *outcomes* – the differences across many different groups in society in terms of ICT skills, confidence and competence acquired. Whilst the necessary investments must first be in place, it then becomes vitally important to empower people to make use of them, as another Roundtable quotation indicates:

> It is necessary but not sufficient to provide avenues to information and knowledge. What is more important is to **empower people with appropriate educational, cognitive and behavioural skills and tools** to:
> - access the information avenues efficiently, effectively and wisely;
> - acquire knowledge and internalise it;
> - apply knowledge to better understand the changing world, to develop their capabilities, to live and work in dignity, to participate in development, to improve the quality of their lives, and to make informed decisions; and
> - upgrade their knowledge continuously and systematically.
>
> *Wadi D. Haddad*

Other skills and competence could no doubt be put forward to define literacy, to incorporate the important technological dimension in today's world. Whatever the precise specification, however, the point here is that when attention focuses on outcomes, it gives an added dimension to the digital divide. Once the shift is made from inputs and processes to outcomes, then the factors that go to explain inter-group differences come into focus, not all being within the education system itself. The view was expressed during the Roundtable that much research

interest is directed at the technology, but little at the attitudes, values and experiences of the user groups, their material circumstances and prospects.

Gender is clearly one important dimension in relation to the digital divide, along with the interactions between gender and other social and cultural variables, such as poverty and ethnicity. Women in many societies are much less likely overall than men to have effective access to ICT, but men also may be severely disadvantaged. The Roundtable heard that in New Zealand, adult males in their 40s and 50s with insufficient skills and poor qualifications form just such a group, among whom disadvantages have accumulated and become acute.

In the New Zealand example, the technology learning gaps might equally have been described as *inter-generational*. The problems encountered by older workers left behind by technological change are familiar, as are issues relating to the semi-retired and the retired. Such issues are only partly defined by the difficulties of labour market marginalisation. For the elderly a range of other factors – personal, health, community involvement – may be of still greater importance, as ICT is coming to play a pervasive and critical role in society. There are indications that familiarity with and use of ICT is greater among the retired population than might have been expected, but as with other groups the interaction of various dimensions – gender, income level. education, ethnicity – needs to be carefully disentangled.

Ethnicity and cultural communities represent an essential focus for further analysis of the digital divide. Such communities, possessing their own specific characteristics, are found across OECD and non-OECD countries. It cannot be assumed that they share any common experience relating to ICT use and learning. Sometimes ethnic groups will display the familiar patterns of educational disadvantage, reinforced by social and economic problems. In other cases advantages are in evidence. One participant referred to Mexican parents and students in the United States, for whom home use of computer and Internet has led to positive effects on learning and enhanced motivation. It would be useful to compile similar examples from ethnic and cultural minority communities in other countries. One Roundtable conclusion from such examples was the need to recognise the importance of informal learning, in negotiating the different contours of the digital divide. This is the focus of the next section.

Gaps in informal learning – Homes, workplaces and communities

Educational policies that aim to bridge the digital divide risk leaving untouched some of the most influential aspects – notably the *home differences* in

computer and Internet access that are charted elsewhere in this volume. Different viewpoints and scenarios were suggested relating to home/school relationships. At one extreme most student home-computer use was seen as devoted to game-playing, though even here it might be argued that a range of technology skills is being honed, perhaps for profitable application later. A contrasting view was that many relatively privileged students are already active in out-of-school electronic networks, thereby furthering their own education and hence their advantage. The latter view clearly implies much greater concern about the need to bridge home-related inequalities.

A further contrast was offered in terms of broad scenarios put forward as possible futures. In one, the school is portrayed as being in terminal decline compared with the home and home learning. On this scenario, home-based ICT differences will become more fundamental determinants of the digital divide. The contrasting scenario has schools maintaining and indeed enhancing their relative community importance, but this was seen as contingent on greater levels of educational investment than many countries have yet been willing to afford.

There are broader *non-formal learning* digital divides than those defined in terms of individual households. Some work and community settings can be described as "technology-rich", others as "technology-poor". important divides exist between well-resourced and poor communities, even when they are in close proximity, a striking example being the so-called *Silicon Valley* in California. Another related example mentioned by several participants is the gap that can exist between urban and rural communities, though this is a gap that has forced into existence some of the most innovative examples of ICT use for distance learning.

The workplace deserves particular attention as an important locus for the reinforcement of many inequalities. Certain professional settings and career routes bring with them exposure to advanced technology in the routines of working life, while others are simply "technology poor". Thus advantages may be accumulated or barriers compounded. Exposure to and use of professionally relevant technology develops competences that serve to open further doors in the job market, while other work settings offer scant access to transferable technology skills. Even when education policies have succeeded in giving individuals a solid basis in ICT competence, such individuals risk losing that foundation in non-technological environments – the "use it or lose it" principle.

The Roundtable heard of the Office of Learning Technologies (OLT), set up by Human Resources Development Canada,[15] to contribute to the development of a lifelong learning culture and expand innovative learning opportunities through technologies. OLT distinguishes between the more formal technology learning that is organised through training and that which occurs as part of working and the normal functioning of an enterprise. It confirms the problematic status of small firms regarding skills development, and is interested in the hierarchical inequities between management and other levels of the workforce in their technology learning. Studies of this kind are an essential aspect of building up an information base on the digital divides of learning in diverse non-formal settings. The significance of informal learning was emphasised by a Roundtable participant:

> "(…) most learning happens outside educational institutions, and well away from the control of teachers. Recent research by Eraut in the UK has confirmed that most of the most important learning which industrial workers undertake happens in and around the workplace, not on training courses or under formal supervision. Notions of 'instruction' and 'classroom' are simply irrelevant, and we need to think much more radically. I would argue that 'curriculum' continues to exist, but it has at its core not how learning processes are organised by teachers in classrooms, but how the processes of the workplace and the community are organised to make learning natural and inevitable."
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> *Stephen McNair*

National and international disparities

There are the very wide *national disparities*, between the richest countries of the world (notably the United States to which most of the existing data relate), and other countries with much lower or minimal technology use in education, homes, enterprises and communities. The OECD *Information Technology Outlook* (OECD, 2000, p. 36), for instance, provides data up to 1997 that permit the gaps to be measured in terms of expenditure on ICT as a percentage of gross domestic product. Whilst the percentage stands at nearly 9% in New Zealand, and is relatively high in Sweden, Australia, the United States, Switzerland, the

15. See http://olt-bta.hrdc-drhc.gc.ca.

United Kingdom, Canada and Japan, it falls to less than 4% in Mexico, Poland, and Turkey. As with other manifestations of the digital divide, the tendency appears to be that the most privileged are able to enhance their advantage.

ICT developments have been an integral part of the globalisation process, as major time and location constraints have been removed in the processing and communication of data and the exchange of services. In consequence there is an international dimension to the digital divide, including a gulf between North and South, which leaves poorer countries disadvantaged. However, as with other manifestations of a divide, ICT which exacerbates inequalities may yet be the very vehicle for redressing them. One participant expressed it thus:

> "The new worldwide economy produced by economic developments and advances in ICT is (…) high speed, knowledge driven (…) competitive. Countries have to meet the competitiveness challenge (…) The good news is that, with the potential of human development and advanced technologies, developing countries can leapfrog. The bad news is that this process is not automatic. On the contrary, unless conscious efforts are made, countries are likely to be marginalised."
>
> *Wadi D. Haddad*

Apart from concern with economic issues, worries were expressed during the Roundtable about the homogenising impact of globalisation and the risk this poses to cultural diversity. A repeatedly-expressed concern related to *linguistic gaps*, given the software and Internet dominance of the English language. Such concerns do provide tangible targets for policy, however, as shown by the Portuguese example (see Chapter 9).

Issues arising

From examination of these different dimensions, the basic question remains as to whether or not learning has a digital divide. On one side, it can be maintained that ICT simply gives another expression to the profound, longstanding divisions of social class, ethnicity, gender and geography. On the other, ICT is seen to be of such importance to society and the economy, that low technological literacy has come to represent one of the most important forms of exclusion. A synthesis of both viewpoints is needed.

First, there is clearly a need to understand how the digital divide is manifested among different groups and communities, rather than regard it as a specifically "technological" issue. There is a need to understand the ways in which ICT can exacerbate or alleviate a variety of existing inequalities. Technological competence has become a fundamental aspect of literacy and citizenship in the 21st century, making its lack a determining factor of exclusion. Those with little or no ICT competence are denied access to powerful new forms of learning and information sources, a double exclusion. The more deeply immersed we are in the technology, the more we take it for granted, making the divide still greater for those who are excluded. It follows that, without careful analysis, many aspects of this divide will remain undetected, including those relating to private computer and Internet use. The significance of the digital divide *per se* should not be under-estimated.

It was observed that, when the technology does not work well, it can be especially de-motivating for those with least. This is either to argue for high levels of technical support for non-traditional learners, or to warn against over-reliance on ICT for tackling the learning problems of the disadvantaged. A number of interventions supported the point articulated in Chapter 2, that many technologies other than the most "cutting edge" should be deployed in expanding access to learning, including both radio and television.

A dynamic perspective is needed to address the dimensions of the digital divide, which was referred to as a moving target, where new problems come into view as others are resolved. Profound issues of philosophy and approach are raised. One speaker asked whether ICT will contribute to widespread new approaches to learning that are less bureaucratic and less homogeneous. Another called for schooling to give much greater attention to knowledge *creation* rather than knowledge *transmission*: the new technologies can make a fundamental difference to the quality of learning when they are integral to the former rather than simply vehicles for the latter. For other speakers, the very possibility of ICT to promote equitable opportunities is an element of its democratic appeal. Profound issues are clearly at stake.

There is growing interest in the power of ICT to provide a medium for cultural exchange, within which diversity is promoted. The G8 meeting (the eight major industrialised democracies) in Okinawa, July 2000[16] agreed to

16. See http://www.g8kyushu-okinawa.go.jp.

establish a *Dot (Digital Opportunites Task) Force*, to find how international cooperation might help to bridge the digital divide. Among the tasks to be undertaken was giving positive encouragement to the use of ICT with indigenous language. The promotion and celebration of cultural diversity is itself seen to be a motivator in the use of ICT for economic development, so that *digital diversity* becomes a way of bridging an aspect of the digital divide:

> The dot force will find ways for "(…) encouraging the production of locally relevant and informative content including the development of the content in various mother tongues."
>
> Okinawa Charter on Global Information Society, para. 19

> "Experience shows that diversity can arouse interest, engender initiative and be a positive factor in communities seeking to improve their economies, particularly when assisted by the extraordinary means of the IT society. We shall strive to promote the digitalisation of cultural heritage (…)"
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> G8 Communiqué Okinawa 2000, para. 41

It might indeed be maintained that of all the different manifestations of the digital divide – in commerce, the media, public administration and the like – perhaps the most important concerns education and learning. The fundamental role of ICT in contemporary life is in relation to knowledge, competence and expertise, which is not at all the same as identifying the key variables to be narrowly *technological*. ICT is a *means* and not an *end*:

> "I suspect the real access issue is going to be a different kind of access – as the price of technology declines, the problem will not be access to hardware and software, but access to the knowledge needed to know how to use it – to make technology used and useful."
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> *Robert D. Muller, U.S. Department of Education*