The Digital Divide – Barriers to e-learning

FINAL REPORT

presented to

Digital Bridge Unit, Science Technology and Innovation Directorate, DFEEST

by

The Australian Institute for Social Research

THE UNIVERSITY
OF ADELAIDE
AUSTRALIA

April 2006

CONTENTS

TERMS OF REFERENCE AND METHOD

The Digital Bridge Unit commissioned a study to evaluate the barriers to e-learning opportunities for women, people with a disability and indigenous people in metropolitan and regional areas. The study is designed to provide a better understanding of those barriers and recommendations to overcome them and to explore gaps in three factors associated with the Digital Divide –

1   **Connectivity** (infrastructure and affordable access to the Internet)
2   **Capability** (skills, confidence and recognition of value in using the Internet)
3   **Content** (relevant, useful and accessible information and services online)

A number of research questions have been designed to guide the study, including the following –

⇒ How are different sections of the population disadvantaged by inadequate connection to the Internet?

⇒ What determines individual disconnectivity?

⇒ Does access to community IT centres enable those without alternative access to take advantage of online learning opportunities?

⇒ Are the relevant training opportunities available online, and do they deliver the required outcomes?

The study has three main components –

o   A search and review of existing literature and analysis of trends.
o   Qualitative research involving key stakeholder interviews.
o   Analysis and reporting on the findings emerging from the literature review and qualitative research.

The method used to explore the issue of barriers to e-learning combined a review of research with interviews with selected VTE stakeholders identified for their knowledge of e-learning applications – either in their sector (as was the case with the ACPET representative)- or at the delivery level (which was the case for most). Some of those interviewed were selected because of their experience in working with students with a disability or with indigenous students. The majority of those interviewed are working in the TAFE sector – either in the metropolitan area or rurally.

This report draws together the findings that have emerged from these three components.

1   Contextual issues

1.1   Defining the *Digital Divide*

As information and communication technologies (ICTs) gain in capacity and usage as part of a shift to an 'information economy', their importance to individual life chances intensifies. The gap between those who are able to access and apply those technologies and those who are not is often described as the 'digital divide'. Internationally and nationally, definitions of the term are consistent -

> '… *the gap between individuals, households, business and geographic areas at different socio-economic levels with regard both to their opportunities to access information and communication technologies, and to their use of the internet for a wide variety of purposes.*' (OECD, 2001: 5)

> '… *the division of the world between those who have access to new information and communications technology and those who do not.*' (Asian Development Bank, 2002: 1)

Beyond these somewhat narrow technology-focused definitions, there are others who recognise the social consequences of the divide, with many analysts regarding it as a symptom of wider social inequalities, rather than a problem in itself. (ANTA, 2002: 28)

> *Digital divide is a term increasingly used to describe the social implications of unequal access by some sectors of the community to information and communications technology and to the acquisition of necessary skills.* (National Office for the Information Economy: 2001)

> …*dot com and not.com now define a new social order of individual economic power and individual economic alienation.* (Graham, 2000: 21)

Placed in context, being able to access ICTs is a privilege enjoyed by a minority of the global population, but for those living in societies where opportunity depends on being able to bridge the digital divide, the deprivation compares to lack of food, shelter and basic survival sources (Kofi Anan BBC Online Network, 1999 #101).[1]

Consequently, it is important to locate the digital divide in its wider social context, and to acknowledge it as reflecting underlying social and economic inequality, while having the potential to further entrench existing inequity and social exclusion. For this outcome to be prevented or at least contained, it is essential that the barriers sustaining the divide are understood and addressed. The move to an information economy can be accepted as bringing in its wake the problem of digital divide, or can be treated by policy makers as an opportunity to promote equity and inclusion.

The analysis of the Digital Opportunity Task Force of the G8 Heads of State, (established by G8 leaders following adoption of the *Charter on the Global Information Society* in 2000), identifies four key challenges –

---

[1] Cited in ANTA (2002: 8)

a) the digital divide is threatening to exacerbate existing social and economic inequalities between countries and communities;
b) the problem cannot be addressed in isolation from its structural causes of socioeconomic inequality and exclusion;
c) novel forms of partnership and collaboration are needed to address the problem;
d) there is a need for a multi-layered approach to the problem by all stakeholders[2].

Specifically applied to the vocational and technical education (VTE) sector, the digital divide describes inequity between learners in access to and participation in online delivery of VTE programs -

> *… the disparity in skill readiness and ability to access computers and the Internet together with the ability to effectively use this technology to enable full participation in vocational education and training.'* (ANTA, 2002: 5)

It is also evident that the impact of ICTs in the VTE sector is both positive and negative in terms of outcomes for learners.

> *Virtual learning sites have no walls but what might appear to be liberating for some learners is a deepening divide for others.* (ANTA, 2002: 25)

This impact is occurring in parallel with broader change in the VTE sector that includes major policy shift at the national level (for example, the introduction of a competency-based nationally recognised training system, increasing collaboration between industry and VTE providers and a changing relationship between work and vocationally directed study that highlights the importance of student choice, flexibility of delivery, lifelong learning and accompanying changes in the relationship between provider and consumer). In a study of demand for online VTE learning in Australia, Peters and Lloyd (2003) note that the profile and behaviour of students is changing with the following salient characteristics identified by them –

o students are older;
o increasing numbers complete modules rather than full courses as learning is purchased 'just in time' for work or career reasons;
o current online users of VTE are described as 'time-poor', choosing the training they need (usually for vocational purposes) first and the mode of delivery second.
o *'Online learners want training that is just enough and just for them.'* (page 10)

It is important that this context is understood, particularly in addressing factors of Content and Capability *(see Sections 2.2 and 2.3).*

1.1.1 Project Framework

The nature of the digital divide is often attributed to these three factors –

1 access to hardware and bandwidth infrastructure (the **'connectivity'** factor)
2 skills training (the **'capability'** factor)

---

[2] Digital Opportunity Task Force (2001: 10-13), cited in Kearns, 2003: 49

3   the availability of appropriate content (Servon: 2001) - including appropriateness that relates to language, culture and location (the **'content'** factor).

These three dimensions have been used to structure this report (although it should be noted that there is a degree of overlap between the Content and Capability factors in that the design and provision of program content will reflect capability on the part of the VTE system). While the focus of the review is on barriers known to specifically affect VTE learners who are female, or with a disability, or of Aboriginal or Torres Strait Islander background, a broader equity perspective has also been applied because of the common experiences of disadvantage shared across equity target groups. The chart below summarises the review framework.

Figure 1: Project Framework
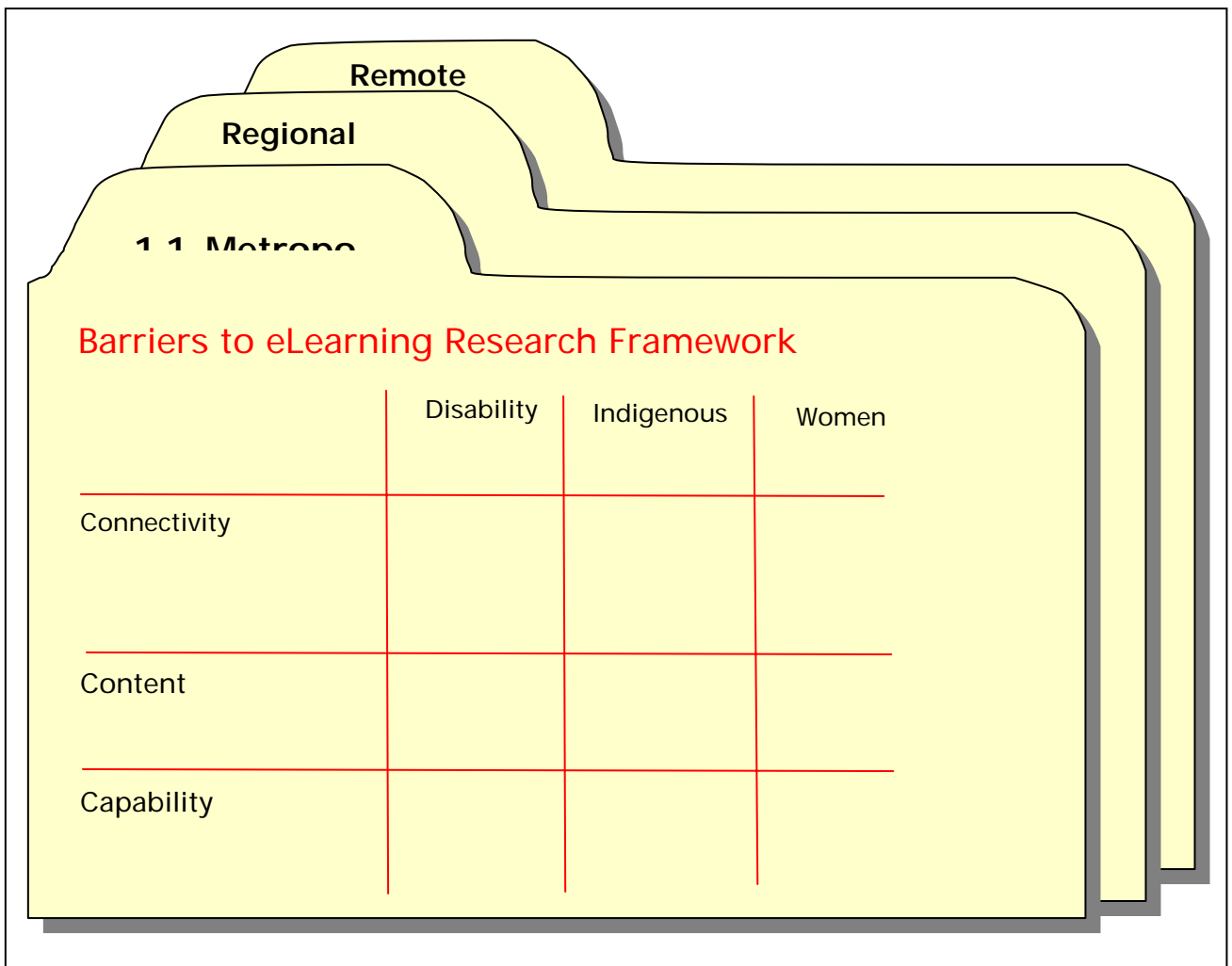
1.1.2 Definitions

There is a lack of rigour in the research literature regarding the definition and application of the terms 'e-learning', 'online learning' and 'online delivery' (Brennan *et al*, 2001: 13, Hill *et al*, 2003). For example, 'on-line learning' is often used interchangeably with the term 'e-learning'. One definition that is frequently cited is that developed by the University of Illinois (1999) which identifies three broad categories of online delivery –

> $\Rightarrow$ Computers supporting teaching and learning
> $\Rightarrow$ A mixture of computer support and online delivery
> $\Rightarrow$ Computer technology alone delivers education and training.

In other words, online delivery involves computer technology which *'… enhances, extends and replaces traditional teaching and training practices.'* (Brennan *et al*, 2001: 13).

Some writers (for example, Kilpatrick and Bound, 2003 and Hill *et al*, 2003) distinguish between online learning and delivery, describing online learning as a learning process that uses online delivery, which can encompass a range of delivery modes that include web and email.

Based on the various research studies overviewed for this project, e-learning is simply defined as the use of online delivery for educational purposes. It is important to note that this brings the demand for pedagogy that is designed to maximise the potential of online delivery and does not assume that traditional delivery methods are transferable to electronic learning environments. ***This is discussed further in Section 2.3.1.***

1.1.3   E-learning – a demand or supply driven process?

The interview findings indicate that it is difficult to separate demand from supply factors in relation to e-learning. However, there is a discernible trend for demand to grow as supply becomes more available and awareness about online delivery options becomes widespread. Increase in demand is reported as relatively recent – that is, in the past two years or so.

In terms of supply, greater availability of dialup internet access and overall improvement in connectivity is seen as being a key driver. Demand is less easily defined. Registered Training Organisations (RTOs) interviewed describe demand from learners as varying, often by age (with younger learners being far more likely to seek e-learning opportunities) and sometimes by location (some RTOs have experienced higher levels of demand from people living in rural and remote areas). Students employed in the corporate sector whose organizations are seeking more efficient methods of upskilling their staff are usually more likely to want online delivery options. Most of those interviewed see demand as being particularly driven by those who are 'time-poor' or face physical access barriers, including distance.

The question of demand from RTOs themselves is not easily described, nor is there a discernible difference based on sector (public or private VTE). Overall, there appears to be a trend for demand to come from students rather than teachers. RTOs in older age

groups are reported as often being less interested in pursuing e-learning and more reliant on traditional delivery methods.

Within both the public and private sectors there are clearly discernible 'pockets' of innovation with small numbers of individuals acting as pathfinders in e-learning and enhancing their own learning through supportive networks that have evolved in the past few years. These networks are described as filling a significant gap in formal opportunities for keeping pace with change and are sought out when experts on specific issues are needed.

The private RTO sector shows interesting diversity in its response to e-learning and challenges to traditional delivery approaches. Some organizations are described as quite resistant arguing that they cannot afford the investment required to establish e-learning opportunities (in terms of IT infrastructure as well as IT staff). These tend to be smaller size organizations. Others (usually larger RTOs) regard e-learning as a major business opportunity that is essential for their long term sustainability.

1.1.4 Digital literacy

Learners with low levels of literacy and numeracy face significant challenges in participating in VTE programs regardless of delivery mode. Research findings indicate that the increasing use of ICTs has brought with it the need for learners to be 'multi-literate' beyond basic literacy and numeracy. New communication technologies bring new relationships between text and visual information and new ways of absorbing information (Cope and Kalantzis, 1998: 29), intensifying the impact of existing disadvantage.

> *Bigger language, literacy and numeracy demands make the vulnerable groups of students even more acutely vulnerable.* (Brennan *et al*, 2001: 42)

The concept of 'digital literacy' is also important, and because of the speed of ICT-related change, this affects opportunities for lifelong learning (Candy, 2003: 23-25). A number of definitions have been developed to describe digital literacy. That offered by the Information and Communications Technologies Literacy Panel (2002) has five elements in a hierarchy of progressive cognitive complexity (cited in Candy, 2003: 28). These are:

o   Access (knowing about and how to collect and retrieve information)
o   Manage (applying an existing organisational or classification scheme)
o   Integrate (interpreting and representing information)
o   Evaluate (making judgements about the quality, relevance, usefulness or efficiency of information)
o   Create (generating information by adapting, applying, designing, inventing or authoring information).

Digital literacy as an equity tool requires intervention at government level, through formal education systems such as VTE. While individuals can, and do, acquire this expertise informally, their capacity to do so varies and will be more efficient if supported by formal learning opportunities that match the continuing development of ICT infrastructure.

1.2   Quantifying the Digital Divide

1.2.1 Connectivity in the wider Australian community

ABS analysis of 2001 Census data indicates that some **6.1 million** Australians over the age of 15 use a computer at home, while more than **6.9 million** use computers and the internet, either at home or work, or elsewhere (ABS: 2002).

However, this is unevenly distributed across the population with some groups showing disproportionate engagement – namely, men earning more than $75 000 annually, younger adults, employed people and those living in a metropolitan area (NOIE: 2001). The presence of children aged 10 or older in a household increases the likelihood o the home being connected to the internet.

Research by NATSEM (the National Centre for Social and Economic Modelling) undertaken for Telstra in 2000 (cited in Kearns & Grant, 2004: 30) identified considerable inequities in use of new technologies, with level of income and educational qualification being major variables. Research confirms a strong correlation between the digital divide and economic disparities in the community. (Kearns & Grant, 2002: 32; NOIE, Education Dept of Western Australia, 2001).

Researchers identify the following groups as being under-represented in terms of connectivity and use of ICTs –

o   People who **earn low incomes** (take up rate for high income households is 3.2 times greater than that of low income households. In March 2000, 70% of people in the top income levels, compared with 22% of those in the lower income groups, had access to ICTs).

o   Those who **do not have tertiary level education** (people with a tertiary qualification are 2.3 times more likely to have internet access at home than those with a primary or secondary level of education).

o   **Women** (males are 1.3 times more likely than females to have access to the internet at home).

o   People who **live in rural and remote areas** (metropolitan areas have a connection rate that 1.3 times that of non metropolitan areas. 40% of adults in metropolitan areas are connected compared with 30% in non metropolitan areas).

o   People of **Aboriginal or Torres Strait Islander** heritage.

o   People with a **disability.**

o   People of **non English speaking background.**

o   **Unemployed** people.

o   Those who are **aged over 55**. People under 55 are twice as likely to have home internet access than those 55 and over).

(NOIE: 2000; ANTA: 2002; NATSEM: 2000).

It is difficult to quantify the extent of online delivery of education and training in Australia, beyond listing courses that are provided by institutions (and what is provided is relatively small). There is no national collection of data on courses delivered online in Australia and thus little data on the number, let alone the profile of students participating online.

> *In spite of the variety of offerings, the proliferation of access to the internet and increasing patterns of usage, the formal, officially credentialed number of online offerings by schools, universities, TAFE and industry still remains relatively small.* (Brennan *et al,* 2001: 22).

Data collection is compromised by varying definitions of the term 'online delivery' and lack of uniform national data collection on this issue. Nevertheless, large amounts of resources are known to be invested by public and private providers in developing the infrastructure for online delivery (Brennan *et al,* 2001: 19- 20). Our interviews identified a growing trend for this to be occurring in line with increasing consumer demand *(see Section 1.1.3).*

It is clear from the research that it is also difficult to quantify the costs of delivering online and to undertake a comparative analysis of those costs against traditional modes of delivery (Brennan *et al,* 2003: 14).

One study (Veenker: 2001) found that 29% of TAFE students, compared with 13.2% of university students, did not use ICTs at their institution.

1.3   Benefits from bridging the Divide

Education and training represent a critical variable in socio-economic success, and depending on the way in which those skills are taught, e-learning can affect individual life chances, acting as a promoter of equity when these are taught effectively, and compounding disadvantage when they are not taught with individual need in mind. Labour market trends indicate that there will be significant growth in work based on advanced skills that include ICT-related competency (DEWR, 2005).

Flexible delivery of VTE is regarded as a significant means of accelerating Australia's transition to the information economy (Kilpatrick & Bound, 2003: 10; Education Network Australia VTE Advisory Group: 2000). In the process, the importance of lifelong learning for all age groups has been seen as increasingly critical in making this transition effectively (Kearns: 2004).

Available research has found few clear examples of ICT contributing to improved student **outcomes**, with the most significant results indicating that outcomes were no different from those achieved in traditional settings (Brennan *et al*, 2001: 36). However, there are many documented examples of positive learning outcomes and benefits that have resulted from the use of ICT that illustrate the **potential** of online learning and delivery. Our interviews have highlighted the importance of appropriate pedagogy in achieving positive outcomes, but examples given reflect isolated good practice rather than system-wide trends.

Among the advantages often cited for online delivery of learning are its flexibility (in time and location), provision for self-paced learning and its cost effectiveness (eg saving time and money in commuting and child care for parents who are studying). By using the medium of ICT, any training program also fosters skill development in computer and associated technologies – offering '*…opportunities for literacy that reach beyond course content.*' (Gatta, 2003: 7)

Other benefits identified by researchers include:

o   improved quality of learning
o   enhanced productivity of learning
o   increased access to learning
o   improved student attitudes to learning
o   opportunities to interact internationally and gain a global understanding of complex issues
o   enhanced communication between part-time students and their teachers through the use of computer-based conferencing and email
o   encouragement of students to self-regulate their learning
o   study opportunities that remove the need to travel or move away from home or are otherwise not affordable
o   development of computer literacy skills while using computer-based delivery
o   further development of skills in problem solving and self-reliance (in those students who respond well to online learning)
o   active involvement of students in the learning process (due to interactivity)
o   opportunity for students to communicate with many others for the purpose of learning
o   access to databases and homepages and other resources not easily accessible without web-based technology (Brennan *et al*, 2001: 40, Kilpatrick & Bound, 2003: 7, Choy *et al,* 2002: 4).

Those interviewed supported the research literature in the benefits they identified in relation to e-learning, and distinguished between benefits for individuals and benefits for organisations.

Organisations were seen as benefiting most from the ability to update learning quickly, to keep pace with change, and to be more efficient in the use of staff time and resources.

Individuals were described as benefiting in a number of ways –

o   greater student control over the learning process,
o   increased flexibility about when and where to study,
o   the opportunity to share knowledge with other learners
o   the development of IT-related skills
o   the ability to keep pace with ICT related change through the use of online delivery
o   encouragement of independent learning skills
o   increased access to learning opportunities by overcoming barriers of distance, or where there are 'thin market', physical or functional incapacity, and
o   enhanced ability to balance multiple life and work responsibilities.

From a learning perspective, e-learning was regarded by most of those interviewed as stimulating an effective learning environment (providing issues of appropriate content

and pedagogy are addressed) and new forms of learning (eg interactive and interdependent between groups of learners).

2 Barriers sustaining the Divide

The degree to which these potential benefits can be realised depends on how effectively barriers can be bridged or removed. The Chart below summarises the barriers identified most commonly by researchers (as reviewed by Kilpatrick & Bound, 2003: 7) within the framework of Connectivity, Content and Capability. As can be seen the most frequently identified barriers relate to capability, which of course, influences content.

Type of barrier		
Connectivity–related	Content–related	Capability–related
Cost of hardware and software	Learning processes hindered by subject content that does not easily translate online	Inadequate induction for students and teachers
Lack of appropriate infrastructure (especially away from urban centres)		Inadequate or lack of support for students
Poor design and layout of web platforms		Inadequate or lack of interaction between students, or between students and teachers
		Limited support and professional development for teachers
		Lack of a supportive institutional learning culture

The *Strategy 2000, Access and Equity in Online Learning Project,* found that the greatest barrier to online learning for equity target groups was access to technology, followed by the costs of equipment and connection, and by the lack of plain English usage in manuals (ANTA, 2002: 33).

Although Sections 2.1 to 2.3 review the literature in relation to the separate issues of connectivity, capability and content, it is important to acknowledge their interactive impact and the subsequent need to address all three as part of an integrated strategy. Research with the pharmacy industry (see box below) illustrates this point.

As part of the *Australian Flexible Learning Framework* initiative, barriers to e-learning were studied in the pharmacy industry's preparation of trainee staff (Mallett *et al*, 2003). This identified a number of training delivery lessons that have applicability across a range of industries, and include the following –

o   Those teaching and assessing need appropriate professional development.
o   A blended model of delivery that combines face to face contact with e-learning methods is essential.
o   Content needs to be carefully selected, avoiding reliance on text-heavy approaches.
o   Learner support must be provided for to assist in the maintenance of motivation and meeting of deadlines and to facilitate interaction with other learners.
o   A help desk needs to be provided for technology-related problems.
o   The e-learning model should be developed collaboratively between training providers and industry so that it is tailored to industry need.

Research reviewed and practitioners interviewed for this report consistently highlights a range of challenges that need to be addressed in order for e-learning to be effective. These are discussed in relation to connectivity, content and capability issues.

2.1   Connectivity-related barriers

The greatest deterrents to high quality online learning for students have been found to involve problems with technology and access to the internet (Cashion & Palmieri: 2002). This can include bandwidth, fast and affordable internet access, speed of software and access to up to date equipment.

Connectivity issues are most commonly explored in the literature in relation to VTE learners living in rural and remote locations due to the concentration of technology infrastructure in metropolitan areas. Such barriers involve an undersupply of infrastructure and relatively high costs of connectivity (Veenker: 2001).

Research undertaken by Brennan *et al* (2003) explored the factors that influence the uptake and effectiveness of online learning in regional Australia, with a particular focus on the benefits and barriers of this delivery mode. The main benefits identified by learners were convenience and flexibility, choice, challenges and the opportunity to develop their computer-related skills (*ibid,* page 7). The main barriers they identified were mainly technology-related and indicated the need for improved telephone infrastructure. In addition, changes were sought in the delivery system that included better preparation of learners, assessment of their readiness to study online and their ICT skills and greater support throughout the course.

Research by Kilpatrick and Bound (2003: 6) found that the further away students were from their RTO, the less likely was their experience of online learning to be positive (2003: 33). At the same time, (compared to metropolitan students) they were more reliant on online delivery and required greater support and the provision of opportunities to interact with their teachers.

For lower socioeconomic groups, connectivity-related costs are intensified thus compounding the disadvantage of distance. If they are indigenous the combination of a 'triple jeopardy of inequity' is a common experience.

Inadequate access co-exists with poor levels of information literacy leading to a lack of confidence in using ICTs, and a self-perpetuating pattern of exclusion. Consequently, while connectivity is a critical factor it must be viewed both in terms of its direct impact and its combined impact with other factors.

For most of the training providers interviewed, connectivity is described as improving constantly and specific concerns tended to be associated with the TAFE system. Some TAFE stakeholders argue that TAFE information technology systems are not supportive for widespread e-learning, and were particularly critical of the particular platform used within TAFE arguing that it creates bottlenecks. Others use this platform and while acknowledging some difficulties, regard it as both appropriate and workable. Some TAFE RTOs stated that their students cannot always access the internal Internet when they choose, with slow servers being a notable problem. None of the private RTOs interviewed identified such constraints.

Bandwidth was regarded as an issue by some but others argued that too much is made of this and it can be overcome. From the interviewer's perspective, much would seem to be dependent on individual provider attitude, confidence and knowledge.

2.2 Capability–related barriers in the VTE system

Capability has both a demand and a supply perspective – that is, it needs to be viewed in terms of the individual learner (their skills, knowledge, attitudes and experience), and the VTE system (at all levels – from policy, to management at the RTO level and delivery by RTO teachers). Most of the research is concentrated on VTE system capability.

The impact of capability-related barriers depends on how they combine with other factors - for example, learning institution policy and infrastructure, learner style, and teacher capability (Berge: 1998). Particular barriers include:

- ⇒ attitudes by teaching staff, particularly fear of replacement of people with computers
- ⇒ broader faculty culture
- ⇒ resistance to change
- ⇒ inadequate timeframes provided to develop and implement online courses
- ⇒ individual learners' capacity for independent study
- ⇒ access to library resources
- ⇒ the cost of materials and infrastructure
- ⇒ lack of policy leadership
- ⇒ failure to provide technological assistance and other supports to learners.

The importance of attitudes (on the part of both VTE providers and learners) should not be overlooked. Berge's research (1998) identified that the most significant of barriers relate to –

> *'… beliefs, values, expectations, language, motivation and norms in place in the organisation ….indicating reluctance or inability to deal with the cultural changes often engendered by online teaching.'*

From the learner perspective, literacy and IT skills and aptitude for self-direction, being confident and motivated to participate in online learning have also been identified as potential barriers to effective online learning. The level of technical support available has a significant influence on the impact of these learner-based attributes (Cashion & Palmieri: 2002). This issue was confirmed by our interviews, with an acknowledgement that most RTOs are not able to provide such support (beyond Help Desks) but recognise that some groups of learners, particularly those who are economically and/or socially disadvantaged, and/or lacking in technological aptitude, are particularly disadvantaged.

From the provider perspective, researchers and those interviewed have found barriers emerging from teachers' ability to use technology in ways that support a student-centred approach to teaching and the institutional structure in which they work (due to most being designed around a face to face, traditional delivery approach). (NCVER: 2002).

The way training organisations structure and support their human resources critically affects their capacity to deliver e-learning. A key finding of research is the need for professional development to enable RTOs to maximise online learning and delivery (Guthrie: 2003; Sawyer: 2004).

There was a trend for those interviewed to argue that more professional development is needed to ensure i) computer literacy and ii) understanding of the pedagogy required for effective e-learning.

Addressing capability was described as being challenging due to the absence of a specific course covering all aspects of e-learning, and the need for constant updating of knowledge and skills in line with the pace of change. Attitudinal barriers can block capability, while low levels of capability do little to build positive attitudes. Some stakeholders described a mutually reinforcing pattern where lack of knowledge underpins and is compounded by fear.

The interviews explored the issue of opportunities for RTO professional development, both formal and informal. This was seen as a major issue with such opportunities seen as being extremely limited. TAFE in South Australia once had a funded professional development position for teaching e-learning delivery for one of its campuses but this is no longer the case. A course provided through TAFE SA South's fee for service unit – *adelaideiglobal* – delivers a Graduate Certificate in E-Learning that is apparently South Australia's only course aimed at teaching how to design and deliver e-learning.

The availability of professional development relies mainly on **Learnscope** *(see Section 3.2)* projects and e-learning networks. Although widely acknowledged as a valuable strategy in addressing capability, **Learnscope** was described by several of those interviewed as being individually too small and collectively uncoordinated to provide the systemic approach needed. The interviews identified that there are no external incentives to participate in professional development as an individual but many disincentives (eg no Teacher Release Time).

Related barriers identified by stakeholders interviewed include relatively low levels of awareness of the potential benefits of e-learning, misinformation about aspects of e-learning (for example, perceived costs associated with e-learning) and low levels of computer literacy among some learner groups, (for example, older learners).

Apart from having technical capacity to deliver online learning, it is also critical that RTOs understanding the importance of and are able to foster 'learning-conducive' relationships with students (Sawyer, 2004: 4). Sometimes the flexibility needed is more likely to be found in smaller RTO organisations but these face viability and sustainability challenges that are better managed by larger RTOs (Sawyer, 2004: 28-29). Flexible learning and delivery brings with it the demand for a change in both learners and teachers.

> *'… there are changes in the way both teachers and learners work and use their time. …. Teachers have to embed new management practices while students have to manage their time in a highly self-regulated way. The price of flexibility is work re-organisation for teachers and independence for students.* (Brennan, 2003: 66)

Several studies have identified the importance of appropriate industrial relations frameworks that reflect the varying hours and work conditions of effective online delivery of training (Kilpatrick & Bound, 2003: 36). These are designed to reflect traditional delivery modes, with permanent employment, predetermined hours and input and a 'one size fits all' model of learning.

Capability is not only an issue at delivery level, but is also a systemic issue. Several of those interviewed expressed frustration with systems designed around traditional learning delivery methods. Examples given included employment contracts based on face to face contact hours with students and expectations of RTO-learner interaction occurring within usual business hours rather than at any time over a 24/7 period. Those interviewed point out that is often assumed that one hour's e-learning delivery equates to one hour's face to face delivery, or that reduced face to face contact time equates to reduced cost when the opposite is more likely to be the case.

Industrial issues associated with systemic inflexibility were a related challenge for most of those seeking to provide e-learning. Some stakeholders believe that there is a need for unions supporting RTOs to be educated about these issues. Traditional industrial relations systems were described as being inappropriate but the system, especially the public system, is designed with the needs of traditional delivery, rather than e-learning approaches, in mind and creates a major impediment. Systemic issues associated with TAFE employment involving award conditions of long standing that are difficult to shift were identified by some of those interviewed. This was contrasted with the private sector which was seen as more flexible because of its wider use of contracting of staff.

2.3   Content–related barriers in the VTE system

It can be difficult to separate content from capability factors as the former relies on the latter. This is illustrated in Section 2.2.1 which examines the importance of appropriate pedagogy for using ICTs to achieve learning outcomes.

Participation in training is limited by poor literacy skills (Sawyer, 2004: 7). Low levels of literacy and numeracy skills are usually addressed as a demand rather than supply

side intervention – focusing on building the learner's capacity through remedial programs. However, it is also important to consider the supply of VTE learning by providing delivery that does not rely on written communication and text-based models.

Control of training design and delivery has been identified in the literature as a key issue in overcoming access barriers, particularly for indigenous learners. The project team led by Sawyer (2004) identified that it was important for the community to set its training agenda so that the focus was driven by them rather than by RTOs. However, the capacity to deliver community-centred training was found to be inhibited by VTE funding models which are designed around full time course enrolment. One of the project findings involved a recommended shift to funding for short courses, based on Australian Qualifications Training Framework (AQTF) competencies and targeted to community needs.

Community and learner-centred training represents the ultimate in flexible learning but research and interview feedback identifies the need for a fundamental change in the current design of VTE funding and design of programs which remains menu-driven. Choice is too often confined to selecting from a pre-defined course menu and RTOs are restricted in being able to deliver from that menu.

2.3.1 Pedagogy – achieving 'fit' between technology and learning

Online learning brings new challenges to the pedagogy[3] or expertise of teaching. Much of the criticism of online delivery arises from inappropriate use of this technology to support learners, reflecting a failure to appreciate the need for an appropriate pedagogical approach (Ladyshewsky: 2005). Too often the technology that supports online learning is used as an end in itself, rather than as a means of enabling effective learning.

Despite the inherent flexibility of online delivery, unless its pedagogy is addressed, it can itself present a barrier to learning instead of removing many of the barriers inherent in offline or traditional learning.

> *The new technologies certainly have the potential to generate new processes of teaching and learning, but so few of the possibilities have yet to be recognised …. In the enthusiasm for the technology, the hard questions about teaching and learning have often been overlooked. Technology seems to be driving pedagogy … and there is a shortage of literature that addresses the specific issue of a coherent web pedagogy.* (Brennan *et al*, 2001: 24).

These views are also echoed by Jasinkski (1998) who undertook a major study of pedagogy online. Among her findings were the following –

> *Technology does not cause learning. As an instructional medium online technologies will not in themselves improve or cause changes in learning. What improves learning is well-designed instruction….*

---

[3] *'Pedagogy is a set of processes which are influenced by the orientation of the teacher, the needs of the students and the extent to which materials and media act as determinants or otherwise of teacher behaviour. These processes are circumscribed by larger cultural, economic, political and social infrastructures which influence the style of teaching and affect the success of the learning.'* (Brennan, 2003: 58)

However, at this stage of development, the effort put into exploring technologies to 'keep the cutting edge' is at the expense of equal investment in the underpinning educational design. Jasinkski (1998: 1).

Another major study on this issue, by the University of Illinois, drew similar conclusions, emphasising the need to develop pedagogy appropriate to the delivery medium –

> *High quality online teaching is not just a matter of transferring class notes or a videotaped lecture to the Internet; new paradigms of content delivery are needed.* (University of Illinois, 1999: 1)

Consequently, a key contributor to the digital divide is the lack of understanding of learning processes and the impact of ICT on those processes, and the need for specific pedagogy that blends both. Wiles and Core (2002: 1232) explain the problem well –

> *… in practice there is little convincing evidence that technology has been integrated with a sound appreciation of how people learn and when technology can enhance learning. Rather, e-learning tends to be bolted on to courses but not really designed as an integral part of student learning.*

Brennan's review of the relatively new field of literature about online pedagogy identifies dominant themes that reflect concerns with the mechanics of design, questions of access, technological issues and the need for skills development of both teachers and learners (2003: 59). Based on her research with teachers and learners in VTE, she concludes that online delivery needs to be configured to enable students to –

o Reduce their reliance on text
o Explore and value their intellectual, social and cultural backgrounds
o Develop their knowledge beyond the transmission and assessment of content
o Reflect on their own learning
o Be part of an inclusive learning environment
o Communicate extensively with their peers and their teachers
o Become self-regulated and engaged with their own learning
o Develop a group identity which connects them with their learning and with the broader social environment. (2003: 68-69)

Equity focused research on the application of online learning highlights the importance of *'blended'* approaches to delivery - that is, combining online delivery with face to face meetings, creating a learning community, enabling teachers to immediately assess and respond flexibly to individual difficulties and changing need (Gatta, 2003: 34).

Finally, the inconsistency and gaps in online delivery pedagogy has been identified by several researchers as reflecting an absence of clear thinking about the purposes for using ICTs in the learning process.

> *Currently e-learning … is being conducted for many reasons and often without a clear specification of its educational objectives. …Institutions are often lacking a clear rationale for why they are developing and providing e-learning.* (Mandinach 2005: 1815)

Learners from equity groups have been found to need more face to face support than other students, yet online learning is often delivered with less human interaction and without paying attention to the need for this input. (Veenker: 2001). Support encompasses both technical as well as learning-related assistance, with both being critical to addressing the digital divide (McNickle, 2001: 3). There is strong evidence in the literature indicating that students in marginalised groups need a range of supports to make the transition to online learning (ANTA, 2002: 7). Our interviews reinforced this finding but also indicated that such support was inadequately resourced and therefore varied widely from one RTO organisation to another.

The need for support of learners has been highlighted by numerous authors (cited in a literature review undertaken by Choy *et al*, 2002: 4) and identifies its importance in enhancing completion rates for students learning through flexible delivery mode (Choy *et al*, 2002: 15). Many of the identified needs of support affect all learner groups, not just equity target groups (ANTA, 2002: 7). It is important to recognise that most interventions designed to assist specific groups of learners will be of benefit to all learners because of the individualised approach to delivery involved and the supporting policies that underpin those interventions. Ironically, e-learning has a much greater capacity to individualise learning processes than do traditional methods of delivery.

Although equity targets are typically identified as distinct groups sharing a particular disadvantage, (and VTE data collection reinforces this) the impact of that disadvantage will depend on how it interacts with other types of disadvantage experienced by individual students. Students with a disability are defined as an equity target group, but the degree to which this represents a disadvantage will depend on a range of interacting factors, including type and severity of disability, prior educational attainment and workforce engagement, personal supports, resilience, income level and so on. Further information is needed about multiple disadvantage, beyond the existing equity group definitions and VTE data collection needs to reflect this, for example, by including information about socio-economic status, prior history of employment or unemployment and prior educational attainment levels (Volkoff and Golding: 2000).

NCVER research (John: 2004) has confirmed that a student's likelihood of success in VTE is reduced by being a member of an equity target group and even further reduced by membership of multiple equity groups. Successful outcomes were found to be significantly reduced for people who are of indigenous background, have a disability, are unemployed, are young (aged 19 or less) or of non English speaking background. Female students, while having an equal or higher likelihood of success than male students in general, and in relation to all equity target groups, were also found to be more likely than their male counterparts to withdraw from VTE studies.

Issues of content were identified by those interviewed as a major challenge affecting the success or otherwise of e-learning. Reinforcing findings by researchers, most emphasised that design issues and delivery/pedagogy challenges are crucial and traditional approaches cannot be assumed to transfer to the e-learning environment. They see an increasing understanding of this issue being reflected in the increasing user-friendliness of courses delivered on-line. Many argued that if the content is appropriately designed, and delivered with the appropriate pedagogy, the need for learner support is diminished.

Those interviewed were asked to comment on how they manage the tension between good design and cost efficient delivery. Most described the costs as being dependent on existing available content and its appropriateness for e-learning. One stakeholder, who is generating a significant amount of e-learning opportunity and associated resource materials, argues that there is no tension to be managed because creative adaptation of existing resources is possible. For example, there are numerous AFLF (Australian Flexible Learning Framework) resources to draw upon and toolboxes can be customised without infringing copyright.

For most RTOs, costs are typically front end, relating to the development of new courses and resources, but once established need only updating, and become more cost-efficient over time. This would of course be affected by the size of the RTO organization. While it can be cheaper to develop a paper-based course, this can be more expensive over time in reprinting course guides that may only have minor modifications.

Only a minority of those interviewed identified the importance of developing culturally sensitive content and associated learning materials. One example of good practice in this area has been developed by TAFE SA Regional's Spencer Campus (see box).

<div style="border:1px solid red; padding:1em;">

Interactive Ochre – Educational Infotainment

An Australian Flexible Learning Framework funded initiative, *Interactive Ochre* was designed to prepare vocational professionals to work more effectively with indigenous people. Using entertaining multimedia resources, *Interactive Ochre* is an interactive CD-Rom that provides an Aboriginal perspective on cultural awareness training. It focuses on the topic 'Working with Aboriginal People' and one of five units of a Cultural Awareness Induction Program developed by the Aboriginal Education Unit at the Spencer campus.

The application is versatile in that it can be used by independent learners at their computers or by cultural mentors during face to face presentations. Graphics and songs are used to engage the learner and pop up text boxes ('hotspots') clarify the messages in the lyrics and link the learner to the content document. *Interactive Ochre* is designed makes significant use of technical innovation in educational animation with hotspots being accessible at any time according to learner choice. The resource was developed in close consultation with indigenous groups and is therefore based on a strong evidence base.

</div>

2.4   Barriers affecting specific VTE target groups

The inequities of access to ICT are widely recognised with VTE policy giving recognition to specific groups as being particularly disadvantaged[4] – people of Aboriginal and Torres Strait Islander background, people with a disability, women, people living in rural and remote locations and people from non English speaking

---

[4] *Flexible Learning for the Information Economy: A Framework for National Collaboration in Vocational Education and Training 2000-2004*, ANTA; *Bridging Pathways (ANTA: 2000a), Partners in a Learning Culture, (ANTA: 2000b)*

backgrounds. Before discussing research findings on these three groups, it is important to take into account a further barrier to online learning involving cultural hegemony, because this will combine with other identified sources of disadvantage – particularly for Aboriginal and Torres Strait Islander background people.

The majority of websites are in English although fewer than one in ten people in the world speak English. It can be assumed that linguistic dominance is accompanied by cultural dominance given the interdependence of culture and language. This issue has been identified by a number of researchers in Australia and internationally, with particular reference to indigenous learners. One of the supporting papers to Australia's National Strategy for Vocational Education and Training 1998-2003, *Achieving Equitable Outcomes*, made this point –

> *Lack of culturally appropriate learning is considered to be a major cause of unsuccessful completions. Inadequate teacher and provider sensitivity to cultural differences … as well as language difficulties all contribute.* (cited in ANTA, 2002: 8)

For students whose first language is not English, participation in VTE requires additional input on their part and the VTE delivery system to ensure equity of outcomes. Language issues can be exacerbated if they are accompanied by literacy limitations (a particular concern for indigenous learners) and cultural barriers. Contextual material supporting some VTE courses is typically reflective of 'mainstream' culture (Sawyer, 2004: 7).

> *Given that English is a foreign language to many of the students (as it is not routinely spoken within their daily life or homes) the delivery of new information in English is a significant issue in the effectiveness of training. Consequently, … it is very difficult to … expect positive outcomes in a timeframe comparable to the mainstream. When this issue is further compounded by … other issues relating to literacy, the social context of life in a remote Indigenous community and the training attitudes that prevail, the limited outcomes achieved now are more understandable.*

Consequently, any application of ICT to the learning situation must be embedded in a culturally and linguistically relevant context.

> *'The literacy demands and cultural homogeneity of many online courses and modules raises questions about the adequacy of the skills of students from a range of backgrounds and groups. Fundamental issues such as the cultural appropriateness of questioning, conversational conventions, language acuity and delay, and student attitudes towards interaction with authority take on a heightened importance in an online environment. In face to face classrooms, diversity is an asset. In an online environment it may be a distinct disadvantage.'* (Brennan, 2003:)

The cultural uniformity of the internet is a barrier in itself with little understanding evident by those who design and those who use it for educational purposes of the need to understand the significance of cultural differences. Schofield (1999) identifies the importance of acknowledging the role of culture in the various uses of the internet – for example, search behaviour, with some search engines being unappealing to some cultural groups. She expects that culturally specific engines will emerge to fill the current gap.

The interviews sought feedback about inequities in access to e-learning opportunities and the identification of specific groups who were particularly disadvantaged. Of the

three groups isolated for attention in our report (women, indigenous and people with a disability), women were not regarded as facing any special disadvantages that are gender-based. People with a disability were described as having great potential to benefit but often needing specific support to do so, and this in turn, was dependent on RTO resources (and therefore, could not be guaranteed). Other groups identified as having significant potential to benefit from e-learning were people in rural and remote areas and parents at home with young children.

Indigenous learners were described by those stakeholders able to comment as facing significant challenges arising from the need to ensure culturally inclusive teaching methods and resources, and from the challenge of building bottom-up ownership by indigenous communities of e-learning. In many instances, indigenous-related challenges were seen as being compounded by rural and remote location barriers. The *Learnscope* initiative has identified indigenous learners as a priority group but at the time of interviewing there had not yet been a successful *Learnscope* indigenous project.

A number of other groups were identified as facing particular barriers to e-learning opportunities. These included older learners who were described as often lacking the confidence and computer literacy required, and learners in trades areas who often have teachers who are resistant to e-learning. In addition, some of the skills involved in trades-related subjects were described as not lending easily to online delivery.

The amount of support available to learners varies widely within and across the public and private VTE sectors. There were few examples given of technological support, other than a free Help Desk. IT support costs were widely regarded as beyond the scope of most RTOs and the trend was for learners to have this responsibility.

Some stakeholders were able to identify examples of **good practice** in e-learning that would benefit disadvantaged groups of learners. These include the following:

o   FLAG (*Flexible Learning Advisory Group*) is sponsoring 14 projects in South Australia that are focused on fostering innovation (for example, the use of m-learning or mobile learning as a learning strategy.

o   Creative use of Toolboxes – there are evidently many examples of effective use of these for e-learning in the VTE sector. There are isolated examples of good practice in developing e-learning resources for indigenous learners, including those being developed at the Spencer campus of TAFE in Whyalla.

o   Within the South Australian TAFE system there is a Professional Development initiative that involves embedding e-learning in TAFE practice.

o   Various software developments were identified because of the opportunities they provide for people to connect and share information. One stakeholder identified the advantage brought in promoting 'the 'socialisation of learning'. This practitioner argues that people don't learn in isolation and that ' Social Software' (for example, the Centra platform which enables learners to collaborate in a virtual classroom) facilitates this process.

o   Providing bandwidth is appropriate, the use of audio conferencing was identified as a further example of good practice.

2.4.1 People of Aboriginal and Torres Strait Islander background

Data from the 2001 Census show that Australians with poor language skills, those living in a remote area and indigenous Australians are less likely to use a home computer or access the internet than other Australians (Lloyd and Bill: 2004). However, Lloyd and Bill's analysis also found that being indigenous was one of the most important negative determinants of computer and internet usage.

Daly (2005) provides an analysis of 2001 Census of Population and Housing data that highlight the low levels of computer and internet usage by indigenous Australians[5]. While 30 per cent of non indigenous Australians had this access less than 10 per cent of indigenous Australians did so, with access declining with distance from major urban centres.

The Northern Adelaide Social Inclusion Survey (2005) identified that fewer people of Aboriginal or Torres Strait Islander background had access to the internet in the northern Adelaide region – **52%** compared with 62% of all respondents to the survey.

A significant feature of the digital divide is a person's place of residence, and those living in regional and remote Australia experience clearly identifiable disadvantage in access to ICT infrastructure. Because indigenous people are more likely to live in these locations than in cities, they experience a 'double jeopardy' in terms of internet and computer access and usage, especially for home-based usage. Their gap relative to non indigenous Australians is halved when all computer usage is taken into account (Daly, 2005: 5-6). **Consequently, the potential role in reducing the digital divide for community based facilities that promote internet and computer usage is an important strategy.**

This finding reflects a combination of factors of inequity – distance and remote location, together with well documented determinants of income and education. Education and income levels are known to be lower for indigenous Australians[6] and a larger proportion than non indigenous Australians live outside the capital cities in locations where internet infrastructure is less reliable and more costly.

Participation in education and VTE programs is lower for indigenous people, with lower completion rates in secondary school and post school programs, including traineeships and apprenticeships (ANTA: 2000b). These patterns reflect a wider range of inequity including poorer living standards, health and housing. The Digital Divide adds to this list, but with appropriate intervention, does not need to be seen as

---

[5] This was the first Australian Census to seek information about access to computers and the internet.

[6] Altmann, J., Biddle, N & Hunter, B (2004) 'Indigenous socioeconomic change 1971-2001: a historical perspective', *CAEPR Discussion Paper No 266,* Centre for Aboriginal Economic Policy Research, Aust National University, Canberra

> **Good Practice Example: a Pedagogy Model for an Indigenous Community in a Remote Location**
>
> The model developed by Sawyer (2004) used constructivist[7] theory and audio technology in order to enhance literacy and VTE learning outcomes. The experiential background of the Titjikala community formed the context for learning, in contrast to the 'mainstream' culture reflected in standard VTE programs. Information technology provided a critical aid to the learning process, with an emphasis on video conferencing because of its reliance on oral and visual, rather than text-based, communication and its provision of a face-to-face learning exchange.
>
> The project trialled three different video conferencing approaches (broadband Interact Distance Learning, point-to-point or computer-based high bandwidth, and point-to-point low bandwidth conferencing. The main barriers identified were technical and involved teaching institutions lacking adequate bandwidth or software, firewalls blocking communication and teachers needing time and support to use the technologies. These barriers were seen as able to be addressed but limited by the time taken for educational bureaucracies to make the required changes.
>
> Most VTE learning resources were found to be text-based and the project had initiated the development within the community's own networks of more appropriate resources. Similarly, available Toolbox resources were often inappropriate because of the level of literacy required to use them and the level of computer skills assumed. A significant customisation was identified as being needed, and this included specially developed Equity Toolboxes whose literacy and English language reliance together with the cultural context of their content scenarios were found to be inappropriate for indigenous students.
>
> The project's report describes the Community Training Plan which includes a funding submission to build a training centre that would provide an 'electronic classroom', enabling access to information and communication technology for the community. This would be used for primarily for learning, as well as business processes, financial transactions and internet research and information finding.

2.4.2 People with a disability

Participation in vocational education and training (VTE) has the potential to increase the employability of learners with a disability because it can provide accredited skills and a means to develop individual capacity. However, national VTE data indicate that

---

[7] That is, learning is based on the learner's experiences and thus reflects the learner's own construction of reality. A philosophy of learning based on the idea that learners '*… construct new knowledge as they integrate new experiences … it acknowledges that students develop their own styles and preferences for learning using a variety of different resources.*' (Brennan *et al*, 2001: 50). Constructivist strategies are regarded as very suitable to ICT based delivery.

these graduates are less likely to achieve employment compared with graduates without a disability, and that their employment outcomes have been declining. Educational attainment levels of VTE graduates with a disability show that they have a lower level of prior educational attainment than those with no disability, are more highly represented in lower Australian Qualifications Framework (AQF) levels than those with no disability, and are less represented in higher AQF levels than those with no disability. (Kate Barnett & Associates: 2003; Barnett: 2004)[8].

Information and communication technologies offer considerable scope to overcome barriers associated with some forms of disability, as long as course content and delivery are designed according to individual need, and accompanied by tailored support. Without such specific attention, ICTs can serve to perpetuate disability-based exclusion.

Research by Andrews and Smith (1992) found that **72%** of students with disabilities require support to participate in online delivery, while Anderson (1996) found that about one-third of students with special needs would have dropped out of their course had it not been for the assistance of student support services (both studies cited in ANTA, 2002: 23). A significant part of Australia's national strategy for VTE learners with a disability (*Bridging Pathways*, ANTA: 2000a) is devoted to the issue of support.

> *With computer technology came a series of specific tools that could extend the experience of those people with some kind of disability who had been denied regular media access. These tools are called assistive technologies …. However, these devices hit a technological obstacle: the very way in which online services and products were designed and constructed, prevented or made difficult, the effective use of the devices* (Lamshed *et al*, 2003: 6).

Australia's *Disability Discrimination Act (DDA) 1992* makes it unlawful to discriminate on the basis of disability but it is not specific about online accessibility and has not been amended to reflect the WAI Guidelines *(see box below).* In addition, the onus is on the person affected to complain, through the Human Rights and Equal Opportunity Commission (HREOC) which limits the effectiveness of the legislation.

In 1999 the World Wide Web Consortium (W3C) agreed on a set of guidelines for online products and services. *The Web Accessibility Initiative (WAI) Web Content Accessibility Guidelines 1.0*, specified a number of checkpoints that had to be met to achieved accessibility. Most countries have adopted these as the standards around which to design and construct online products and services.

Low levels of compliance with accessibility standards mean that much online learning is difficult for people with a disability to access. Although all States and Territories are reported to be actively promoting accessibility conformance for web sites under their auspice, researchers have found that in practice, many TAFE and private RTOs are not conforming (Lamshed *et al*, 2003: 2). Some learning materials were also found to have

---

[8] Based on an analysis of Australian Vocational Education and Training Management Information Statistical Standard (AVETMISS) data held by the National Centre for Vocational Education Research (NCVER) and disability-related data held by the Australian Bureau of Statistics (ABS).

not met accessibility requirements. This was found to be due to a number of reasons, but notably, a lack of policy for implementing the WAI guidelines at the provider level and insufficient professional development.

CIPD (2003) identifies these Content-related barriers which are consistent with web standard W3C WAI 2001 –

o   Colours used uniquely for emphasis (creating difficulties for visually impaired and colour blind people)
o   Video or audio without accompanying transcripts and descriptions (affecting visually and hearing impaired learners)
o   Lack of compliance with HTML coding standards (limiting access for people relying on screen readers, visually impaired and people with cognitive disabilities like dyslexia)
o   Time limited responses, including real-time chat (impacting on motor impaired and people with cognitive disabilities)
o   Moving and flashing images and text (creating problems for people with cognitive disabilities like ADHD, and conditions like epilepsy)
o   Inappropriate use of language
o   Lack of provision of mouse-input alternatives.

The additional costs that disability brings, together with the likelihood of reliance on income support due to significant employment barriers, means that many people with a disability are also financially disadvantaged. As with indigenous learners, the barriers faced involve a combination of Connectivity, Content and Capability factors.

The Northern Adelaide Social Inclusion Survey (2005) identified that fewer people unable to work due to a disability had access to the internet in the northern Adelaide region – **40%** compared with 62% of all respondents to the survey. This represented a lower level of access than that for women or people of Aboriginal or Torres Strait Islander background.

2.4.3 Women learners

Given the extreme differences that exist within the equity target of women, it is difficult to identify clear gender-based patterns of disadvantage in relation to online learning. Much depends on the combination of life circumstances of the individual. Not surprisingly, gender differences in capacity to benefit from online learning have not identified that women have a reduced capacity or that their academic achievement is reduced as a result of online learning methods (Arbaugh: 2000; Ladyshewsky: 2004). However, women are more likely to show a preference for collaborative and interactive application of these methods (Arbaugh: 2000). A study of online learning found that there are more women than men learners (Cashion & Palmieri: 2002).

Barriers for women learners will be associated with features of how they live their lives, for example, because of family and child rearing responsibilities, and consequent limited access to technological training at convenient times. Women learners have been found to be more likely to experience limited information literacy as a result (Veenker:

2001). While data show a slight disadvantage in terms of connectivity relative to men, it would appear that Content and Capability related factors will be most significant in determining equity for women learners. Connectivity factors will be associated most with economic levels and location and the way in which these combine with other social and personal factors.

The Northern Adelaide Social Inclusion Survey (2005) identified that fewer women than men had access to the internet in the northern Adelaide region – **58%** of women, compared with 67% of men and 62% of all respondents to the survey.

A study undertaken by Rutgers University Centre for Women and Work (Gatta: 2003) explored the impact of online learning on a group of single mothers who were earning less than 250% of the US poverty level. This was a group who were excluded from traditional modes of learning and for whom the online alternative offered significant promise.

The project provided them with computers, Internet access, online courses and a range of support. As such, it addressed a number of its learners' needs simultaneously – lack of affordable and accessible childcare, lack of access to computers and associated technology at home (the project provided lap tops and technical support), transport difficulties, low income, low levels of confidence and the need for employment-related skill development. Consequently, this project went beyond providing learning opportunities and focused on other factors that represent building blocks of the digital divide.

As a result, the women themselves and their families increased their computer-related literacy. The women were found to have successfully increased their skills and the training provided online was also cost-effective relative to onsite training. In addition, participants reported an increase in self confidence due to their learning experiences (*ibid:* page 25).

3   Bridging the Digital Divide

The Australian Department of Education Science and Training funded a project to study policy for ICTs in education and training systems in Australia (Kearns & Grant: 2002). This work was extended by Kearns (2003) in his review of government policy nationally and internationally, which identified three stages of development for an information and knowledge economy.

Stage 1 is described as the provision of computers in learning centres with accompanying professional development of teachers and curriculum development. Stage II involves integrating the role of ICTs into education processes, while Stage III realises the full potential of ICTs by transforming the way people learn. This final stage blurs the boundaries between schools and learning centres (including VTE), community groups, and employers so that learning occurs on a range of sites other than formal education centres, and is built on a range of partnerships. In part, such partnerships work across the education and training sectors, but go beyond these to the broader community.

Kearns concluded that policy in most countries, including Australia, had progressed through two of three stages of development, with some on the threshold of the third stage which involves a transformation of the way people learn in a learning and knowledge society (2003: 42-43).

Stages I and II of the transition draw attention to the need to address all three types of barrier to online learning – Connectivity, Content and Capability. Good practice examples of the type of intervention that can bridge the Divide have been provided in the foregoing sections of this literature review report. The remaining sections overview research that has focused on other bridge-building strategies.

3.1   Addressing preconditions and readiness for online learning

Research has identified that certain preconditions need to be achieved in order to obtain positive outcomes for learners from online delivery. These are Content-related and precede design and early stages of delivery –

o   creating a sense of ownership and community among learners
o   using flexible learning strategies that suit individual learner need
o   reliable and regular backup of the technological, intellectual and social kind
o   meticulously planned materials with capacity to move and grow
o   students having some knowledge and confidence with the technology
o   students being independent learners with well developed levels of intrinsic motivation
o   regular evaluation of students' progress (Brennan *et al,* 2001: 41[9]).

A study by Warner, Choy & Christie (1998)[10] found that 70% of VTE learners were considered not to have the required level of self-directed readiness skills to benefit from online delivery. Harper *et al* (2000) found that many learners experienced difficulties because of a lack of capacity for the online delivery requirement of self-directed learning and that they needed support to overcome this.

> *The assumption that students come to the interface with adequate skills to even fire up the box is quite wrong-headed thinking. They come with all sorts of backgrounds and experiences which attach themselves to their encounters with new learning generally, and technology specifically …. (Brennan et al, 2001: 35)*

> *… it is imperative that the learner is sufficiently comfortable with technology so that it becomes an enabling device rather than a barrier to commencing their course. (ANTA, 2002: 26)*

---

[9] Based on Brennan et al's review of the literature, with particular reference to Misko, J (2000) *Getting to grips with self-paced learning,* NCVER, Adelaide
Cochenour, J & Reynolds, C (1998) 'Integrating computer technologies in distance learning as part of teacher preparation and inservice: guidelines for success', *Site 98: Society for Information Technology and Teacher Education International Conference,* Washington DC, March 1998.
[10] Cited in ANTA, 2002: 20

3.2   Learner–centred design and delivery

There is some research that indicates more successful learning outcomes when online learning programs are planned and negotiated in collaboration with local communities (Kilpatrick & Bound: 2003: 8). Daly (2005: 8-9) cites a number of key government commissioned reports into ICT access and regional location, especially those which have focused on the compounded disadvantages faced by indigenous Australians, that recommend the use of community facilities where private households are unable to supply computer-based services. Daly identifies community online access centres, providing public multi terminal access to information and communication technologies, as a positive approach particularly when indigenous communities are involved in their development and operation. These centres can also play a critical role in community development, and need to be integrated into a range of community activities in order to be successful.

Community online access centres require skilled people to staff and support them but also offer the opportunity to provide online training to people in remote areas who have limited access to formal education services. The scope for collaboration with RTOs is enormous as well as an essential success factor. TAFE is proving to be a key player in such partnered delivery (Daly, *op cit*: 10).

A study that focused on the combined impact of the range of disadvantages experienced by indigenous people and remote location was undertaken for ANTA (Australian National Training Authority) as part of the *Australian Flexible Learning Framework* initiative (Sawyer: 2004). The project worked with a traditionally oriented indigenous community communicating with a local indigenous language[11] for whom the usual VTE delivery model was inappropriate and required the design and development of inclusive and innovative approaches. Solutions were explored that involved a holistic approach to the multiple needs and challenges involved.

The Victorian government's *Connecting Communities* strategy exemplifies the importance of community development and capacity building in bridging the digital divide. It has numerous interrelated elements that focus on schools, libraries, skill development and community based action and is favourably reviewed by Kearns and Grant (2002: 32-33). They also pay tribute to the Western Australian government approach to the issue, which promotes a community focused strategy. It connects skill, community and learning objectives as part of the development of a learning culture that keeps pace with rapid change (*ibid*: 33). Queensland is also acknowledged for taking a similar approach that combines community development with skill development.

> *To assist community involvement, institutions are to be encouraged to develop ongoing relationships with local and regional organisations to meet the needs of the local community more adequately. In this context there appears to be a role for client-focused training brokers … to assist clients to establish self-sustaining relationships between client (individual and organisation) and provider.* (Kilpatrick & Bound, 2003: 34)

---

[11] The Titjikala community who live 120 km south of Alice Springs.

<div style="border:1px solid red; padding:1em;">

Good Practice Examples

Capricornia Online

Capricornia Online[12] is based on a partnership between Rockhampton City Council and Central Queensland University and illustrates the potential of the internet in building online learning communities that extend learning opportunities to the wider community, and strengthening communities in the process.

Learning Towns and Community Learning Partnerships[13] in Victoria

The Victorian program 'Learning Towns' promotes lifelong learning in communities and demonstrates the importance of partnerships in building communities. 'Community Learning Partnerships' are working arrangements that bring together those with an interest in achieving learning outcomes for adults, and are auspiced by Adult Community Education organisations. The Partnerships will take forward the work initiated by Learning Towns.

</div>

The interviews sought feedback about initiatives and strategies that enable e-learning takeup and address the barriers and challenges involved. Those most frequently identified are focused on building capability to provide e-learning opportunities. These include the national *Learnscope* initiative (part of the *Australian Flexible Learning Framework*), the *E-dayz* Conference in South Australia and various informal networks (national and local) that support e-learning provision. These three inputs are somewhat interrelated and rely on bottom-up rather than top-down approaches to building capability.

Learnscope is a national professional development program designed to support e-learning and is provided in a variety of ways to meet different RTO time and learning needs. A wide range of projects have resulted from this program. One private RTO interviewed received funding to deliver on line and to make staff more aware of the opportunities inherent in e-learning. Without this input, the RTO had no other way of learning to do this, and little motivation to do so and expected that many RTOs would be in a similar situation.

The *E-Dayz Conference* began as a mechanism to showcase *Learnscope* funded initiatives and has grown into an annual statewide conference that is an important tool in building RTO capacity.

Informal networks (such as, the *EDNA Online* group) are also described as playing a very important role in connecting individual RTOs to learning and support and assisting them in keeping pace with the speed of change in e-learning provision. Networks enable ready access to experts in particular areas and a sharing of

---

[12] Cited in Kearns (2004: 33)
[13] Cited in Kearns (2004: 34-35)

accumulated knowledge. The *e-learning Networks Project* has its own site under the EDNA group banner and its own project manager. RTOs can apply for funding to establish a network of special interest related to e-learning. The SA *Learnscope* Coordinator regards the support of such networks as one of her important roles.

These three initiatives can be expected to also have the effect of addressing content-related challenges. There were no strategies identified by those interviewed for addressing the third type of barrier, involving connectivity. Some stakeholders identified the *Centra Symposium* platform as playing an important role. This provides a "virtual classroom" medium. Client software is downloaded by students on their own machines, allowing them to access real-time and recorded interactive sessions led by the RTO. It includes audio and video components, all in real-time. 300 licenses have recently been purchased by DFEEST, and 1700 licenses are available currently to schools across the SA public school system. *Centra* is a proprietary platform developed in the US receiving a good deal of exposure in SA, but there are others on the market, including *Elluminate,* and various open source solutions.

Although there were no examples of interventions that address systemic barriers, reference was made to the *Australian Flexible Learning Framework* project that is examining systemic impediments to e-learning in the VTE sector.

Although outside of the VTE system, the transition of the School of the Air in South Australia from high frequency radio and telephone delivery within a traditional learning mode to an internet based, virtual classroom providing e-learning opportunities, provides a good practice model whose lessons are transferable. Two of the model's defining features, which also contribute significantly to its success, involve the achievement of buy-in from learners and buy-in from the community.

<div style="border:1px solid red">

South Australian School of the Air: e-learning model

School of the Air (SOTA) is South Australia's distance education program for students living in rural and remote locations and is part of the Department of Education and Children's Services (DECS) Open Access College. The reliance on high frequency radio and telephone lessons had long been recognised as bringing a number of educational limitations including poor quality communication, lack of opportunity for students to work with their peers on joint projects and a consequent restricted capacity to promote students' social skills. Through a combination of fortunate circumstances, special funding initiatives were drawn on to develop a pilot initiative that would develop an alternative and more positive approach to distance education.

Two key sources of funding became available simultaneously. The first came from the Commonwealth Networking the Nation Board to pilot the delivery of distance education by satellite and internet. The second funding source came from the Telstra Roll-out that enabled people in isolated parts of Australia located in the Telstra extended phone charge zones to obtain improved communication through the installation of two-way satellite dishes. In South Australia, this zone extends northward from Port Augusta. Additional in-kind funding was provided by DECS.

Using satellite connectivity[14] and appropriate computer hardware that was leased at mimimal charge to participating families, the new model uses a software that is an

</div>

---

[14] The system can work without satellite with as little as 28.8kbps speed modem.

internationally recognised leader in products of this type. Participating parents, teachers and supervisors all received training (with Teacher Release Time) that includes some sessions that brings teachers together. These were teachers selected for their flexibility and willingness to adapt to a new system. Peripheral hardware includes a webcam and multimedia headsets. Voice Over Internet Protocol was used for communication, together with a range of multimedia learning resources (including an, interactive white board so that students can see and share their work). In preparing for the transition, parents were also given information and opportunities to explore doubts or misgivings about the new approach to their children's distance education.

Any reservations held by parents or the local community have apparently dissipated in the face of the positive response from students who are described as being far more engaged with the new system and learning in a more effective way. The new learning style is less passive and more interactive and students are very responsive to the technologies involved. At the beginning of the day, all students participate in an on-line assembly, via the software platform and then pursue individual lessons for their year level.

Community support has been strengthened because of the wider usage of the hardware and associated systems for local community activities. As a result, there has been community-wide buy in for the new education system. Independent evaluation of the pilot found strong support for the software platform by students, parents and teachers, and the evaluation has been very positive (Essential Equity: 2004). Following the trial in 2002, the new model was adopted in April 2003 for all Reception to Year 7 SOTA students.

Spin-off benefits include the application of the system for students with a disability who cannot attend school (for example, those with cystic fibrosis), indigenous students living in remote areas (work is in progress to adapt to the system to traditional customs) and since 2005, all governments schools in both city and country areas are being included in this e-learning model. Teachers who once faced significant time in travel, and their schools faced associated travel costs, now find that this burden is alleviated. Another significant benefit has been the increase in self confidence and group learning skills of students because of the new system's use of Breakout rooms. Many parents reported to the evaluators that they had been surprised by the children's cooperation with their peers and the capacities developed by them in negotiation and delegation for group earning tasks.

The SOTA model has received an international Silver Award in Excellence for e-learning.

Based on their experience, the stakeholders interviewed were asked to identify key lessons for progressing e-learning. The lesson most commonly identified, reflecting the research literature, was the importance of pedagogy to ensure effective learning outcomes. A Blended delivery approach, combining face to face with online methods, was seen as essential.

The second major lesson highlighted the importance of incentives being established to encourage them to engage in e-learning, to break the cycle of negative attitudes-limited understanding-lack of commitment to e-learning. While increasing demand from learners will act as an incentive, the process can be curtailed by providing learning and

other opportunities for RTOs. The importance of professional development was emphasised by many of those interviewed, together with a removal of systemic blockages to the provision of e-learning. Some also pointed to the need to identify 'Champions' who can promote e-learning where incentives for uptake are low – for example, in the trades areas.

3.3   Collaboration and partnership approaches

The importance of collaborative approaches to overcoming the Digital Divide is evident throughout the literature reviewed. The importance of and rationale for such strategies is articulated well by Peter Kearns–

> *Innovation and creativity will be required in bringing stakeholders together so that "joined-up policies" and multi-layered action can be achieved through partnerships, in particular at the local level. This will require the convergence of whole-of-government and whole-of-community strategies.* (2003: 50)

Kearns' conclusion in overviewing available Australian partnerships is that they are **embryonic** rather than functioning. He notes that initiatives like the *Australian Learning Communities* project have the potential to provide a framework for the partnering needed but that learning communities have not yet reached a point where they can provide the exchange required to bridge the divide. Kearns compares development in Australia to initiatives like the *Canadian Smart Communities* where ICTs are linked to community development thereby facilitating partnerships that build digital bridges. He notes the potential for the VTE sector to play a key role in these strategies, in collaboration with community partners like libraries, schools, employers, local government, community organisations and advocates for those who are excluded (2003: 50).

Kilpatrick & Bound (2003: 44) also identify a number of benefits from partnerships between providers and industry in developing and delivering online learning programs.

> *The effectiveness of online delivery organised from a central state provider, and supported by delivery from a regional registered training organisation must be questioned. Such an arrangement sets up barriers to inclusion of local content, and therefore local relevance. VTE which focuses on meeting individual and/or community and/or social needs, as opposed to VTE which is delivered off the shelf, is more likely to benefit individuals and communities.[15]*

They cite research[16] that has identified the potential for professional learning communities as a mechanism to pool and increase national expertise for e-learning and online delivery.

---

[15] Citing research from the Centre for Research and Learning in Regional Australia (1999) *Managing change through VET: the role of vocational education and training in regional Australia*, ANTA, Brisbane

[16] Fullan, M (2000) 'The three stories of educational reform', *Phi Delta Kappan*, 8 (8) p 581 Hargreaves, A *et al* (2001) *Learning to change: reshaping professional practice and improving organisational productivity in the vocational education and training sector – resources for practitioners*, ANTA, Brisbane

> *Commentators on educational change and educational leadership commonly agree that if we want to produce deep change in education institutions we need to provide forms of collegiality that lead to the development of communities of practice. (*Kilpatrick and Bound, 2003: 41)

A feature of Australian policy development has been a building of partnerships to manage ICT and its impact, including strengthening collaboration between States, Territories and Commonwealth, exemplified in the national action plan for ICT for all sectors of education – *Learning for the Knowledge Society*, and a major collaborative project for schools known as *The Le@rning Federation* (Kearns & Grant, 2002: 2). A strong commitment to lifelong learning is evident in much Australian policy but in contrast to many members of the European Union whose policy reflects a broad social vision, Australian policy has an economic emphasis (Kearns & Grant, 2002: 2). In most instances, such policy is seen as failing to address access and equity issues, particularly in relation to ICT skills and digital literacy, with the exception of some States (Kearns & Grant, 2002: 3).

> *Considerable progress has been made in developing policy frameworks and partnership arrangements to further the use of ICT in the sectors of the formal education system, and mainstreaming of policy for ICT in education has become general across Australian education systems. There has been a strengthening of Commonwealth and State collaboration in addressing the challenge of the information era. However, access to affordable bandwidth remains a problem in the school and VTE sectors, and less priority has been given until recently to the needs of adults lacking ICT skills.* (Kearns & Grant, 2002: 3).

3.4   Structural change to achieve capability at the VTE system level

It is important to locate e-learning and flexible delivery in the context of broader change in the VTE sector and the associated requirement for structural and attitudinal accommodation of that change. The degree to which this occurs affects the impact of the Digital Divide on learners.

> *The advent of flexible delivery, along with other major initiatives in the national training system, has occurred within a climate of broader workplace change. So rapid has been the pace of change in the sector generally, that it is not surprising that human resource management policy and practice have not been able to accommodate adequately the diverse needs of the new workplace environment.* (McNickle & Cameron, 2003: 7)

Research identifies the need for change to occur at all levels of the VTE system – from policy nationally and at the level of training organisations, to management and to delivery. The degree of change being suggested indicates the need for structural change in the way delivery is configured, fundamental shifts in attitudes to learning and delivery, and the development of new relationships between learners and teachers. It includes industrial relations change to reflect new requirements of teachers delivering flexibly and around the needs of learners, and it involves professional development to develop the skills and knowledge to deliver online in an effective way. This professional development will need to include training in working with diversity and in providing for the needs of equity target groups. It also requires a significant injection of support for those who are affected negatively by the Digital Divide.

An NCVER funded study by McNickle and Cameron (2003) investigated, through interviews and a survey of middle and senior management, changes in human

resources practices resulting from the introduction of flexible delivery in the VTE system. Many of their findings point to substantial constraints arising from rigid industrial awards that reflect traditional rather than flexible delivery. Existing job designs and descriptions were found to be incapable of reflecting the expertise needed to deliver in a flexible learning environment and the whole-of-organisation approach needed for flexible delivery had yet to be achieved. Although some changes have been initiated in human resource practices, these have not been sufficient to remove the constraints to flexible delivery in the VTE system.

Government funding and TAFE efficiency is measured in face-to-face teaching hours, places upward pressure on class sizes and restricts time for flexible delivery. While McNickle and Cameron found a significant reliance on individual teacher goodwill as occurring in the face of such constraints, it can be expected that other teachers show resistance in the absence of systemic commitment to flexible delivery.

> *… the direction in policy making is towards a comprehensive coordinated approach to the digital divide …. To the extent that initiatives consistent with a coordinated approach are already being taken in a number of States/Territories there is an opportunity for the Commonwealth to consider national support across the traditional sectoral boundaries of education.'* (Kearns & Grant, 2002: 33)

The importance of VTE policy personnel and managers of delivery organisations is also critical. Sawyer (2004: 28) discusses the difficulties of engineering change in educational settings without management support.

> *A part of this difficulty is due to the inability of an educational institution to provide the necessary resources and support that are required to allow their staff to undertake the changes needed. A large part of this is due to systemic constraints and funding models that seem to encourage an educational institution to think and act in certain ways, ways that unfortunately appear to be in conflict with the needs of their community-based clients.*

A key message emerging from NCVER managed research in support of the Australian Flexible Learning Framework is that vision and leadership are critical to the effective implementation of online learning.

> *This … requires some fundamental changes to policies, as well as practices and funding approaches …. This involves fostering vision and effective leadership across the sector – not just improved management …..*
> *…. Enabling policy is needed – not one which is top down – but one which empowers grassroots organisations to collaborate, to transform and to innovate.* (Guthrie, 2003: 10)

> *… we must accept that students are more diverse, that they will require more flexibility and choice than ever, and, … we must design our course portfolios and delivery methods to address 'mass customisation' in which one size will not fit all. Our thinking ... needs to be recast in terms of offering students flexibility and choice which recognises their individual needs, whilst still quality assuring learning outcomes. The technology of e-learning extends beyond the classroom and into every process and system in our institutions. (Wiles & Core, 2002: 1233).*

4   Conclusion

Technological and social change are mutually reinforcing phenomena and for this reason, the opportunities and challenges brought by ICTs need to be located in their wider social context. Both forms of change are occurring in parallel with broader change in the VTE sector, but are also shaping the future directions of the sector.

With appropriate policy intervention, the Digital Divide can be reconfigured to be an instrument of positive change – a Digital Bridge - providing a means of overcoming disadvantage, or it can be a mechanism of entrenching inequity. It can be a support for community capacity building or a means of widening divisions in communities. The VTE sector, and the effectiveness with which it marries ICTs and learning methodologies, can significantly affect these directions.

Available research has found few clear examples of online delivery contributing to improved student outcomes, with the most significant results indicating that outcomes were no different from those achieved in traditional settings However, there are many documented examples of positive learning outcomes and benefits that illustrate the **potential** of online learning and delivery.

In reviewing the issues of connectivity, content and capability it is useful to take into account both demand (learner-based) and supply (provider-based) issues. For example, 'digital literacy' affects both learners in terms of their readiness for e-learning and providers in terms of their pedagogical expertise. It is important that VTE learning opportunities reflect the continuing development of ICT infrastructure in terms of VTE funding (acknowledging that not all learning is face to face), industrial conditions and the design and delivery of programs.

Connectivity, capability and content, have an interactive impact and there is a need to address all three as part of an integrated strategy. For example, inadequate access to computers and the internet co-exists with poor levels of information literacy leading to a lack of confidence in using ICTs, and a self-perpetuating pattern of exclusion. The impact of capability-related barriers depends on how they combine with other factors - for example, learning institution policy and infrastructure, learner style, and teacher capability. It can be difficult to separate content from capability factors as the former relies on the latter.

From the learner perspective, literacy and IT skills and aptitude for self-direction, being confident and motivated to participate in online learning have been identified as potential barriers to effective online learning. The level of technical support available has a significant influence on the impact of these learner-based attributes. From the provider perspective, barriers have been found to involve teachers' ability to use technology in ways that support a student-centred approach to teaching and the institutional structure in which they work (due to most being designed around a face to face, traditional delivery approach). The way training organisations structure and support their human resources critically affects their capacity to deliver e-learning. A key finding of research is the need for professional development to enable RTOs to maximise online learning and delivery.

Research identifies the need for change to occur at all levels of the VTE system – from policy nationally and at the level of training organisations, to management and to delivery. The degree of change being suggested indicates the need for structural

change in the way delivery is configured, fundamental shifts in attitudes to learning and delivery, and the development of new relationships between learners and teachers. It includes industrial relations change to reflect new requirements of teachers delivering flexibly and around the needs of learners, and it involves professional development to develop the skills and knowledge to deliver online in an effective way. This professional development will need to include training in working with diversity and in providing for the needs of equity target groups.

Despite the inherent flexibility of online delivery, unless its pedagogy is addressed, it can itself present a barrier to learning instead of removing many of the barriers inherent in offline or traditional learning. Consequently, a key contributor to the digital divide is the lack of understanding of learning processes and the impact of ICT on those processes, and the need for specific pedagogy that blends both.

Research on the application of online learning highlights the importance of *'blended'* approaches to delivery - that is, combining online delivery with face to face meetings, creating a learning community, enabling teachers to immediately assess and respond flexibly to individual difficulties and changing need.

Learners from equity groups have been found to need more face to face support than other students, yet online learning is often delivered with less human interaction and without paying attention to the need for this input. Support encompasses both technical as well as learning-related assistance, with both being critical to addressing the digital divide. There is strong evidence in the literature indicating that students in marginalised groups need a range of supports to make the transition to online learning.

Many of the identified needs of support affect all learner groups, not just equity target groups. It is important to recognise that most interventions designed to assist specific groups of learners will be of benefit to all learners because of the individualised approach to delivery involved and the supporting policies that underpin those interventions.

While the focus of this report is on barriers known to specifically affect VTE learners who are female, or with a disability, or of Aboriginal or Torres Strait Islander background, it is clear from the research that the interaction of these factors with other life circumstances must also be taken into account in assessing barriers to e-learning. For example, students with a disability are defined as an equity target group, but the degree to which this represents a disadvantage will depend on a range of interacting factors, including type and severity of disability, prior educational attainment and workforce engagement, personal supports, resilience, income level and so on.

Data from the 2001 Census show that Australians with poor language skills, those living in a remote area and indigenous Australians are less likely to use a home computer or access the internet than other Australians. Being indigenous has been identified as one of the most important negative determinants of computer and internet usage. Education and income levels are known to be lower for indigenous Australians and a larger proportion than non indigenous Australians live outside the capital cities in locations where internet infrastructure is less reliable and more costly. Because indigenous people are more likely to live in these locations than in cities, they experience a 'double jeopardy' in terms of internet and computer access and usage, especially for home-based usage. Participation in education and VTE programs is lower for indigenous people, with lower completion rates in secondary school and post

school programs, including traineeships and apprenticeships. These patterns reflect a wider range of inequity including poorer living standards, health and housing.

Educational attainment levels of VTE graduates with a disability show that they have a lower level of prior educational attainment than those with no disability, are more highly represented in lower Australian Qualifications Framework (AQF) levels than those with no disability, and are less represented in higher AQF levels than those with no disability. Information and communication technologies offer considerable scope to overcome barriers associated with some forms of disability, as long as course content and delivery are designed according to individual need, and accompanied by tailored support. Low levels of compliance with accessibility standards mean that much online learning is difficult for people with a disability to access. Although all States and Territories are reported to be actively promoting accessibility conformance for web sites under their auspice, researchers have found that in practice, many TAFE and private RTOs are not conforming.

The additional costs that disability brings, together with the likelihood of reliance on income support due to significant employment barriers, means that many people with a disability are also financially disadvantaged. As with indigenous learners, the barriers faced involve a combination of Connectivity, Content and Capability factors.

Given the extreme differences that exist within the equity target of women, it is difficult to identify clear gender-based patterns of disadvantage in relation to online learning. Much depends on the combination of life circumstances of the individual. One study of online learning found that there are more women than men learners. Not surprisingly, gender differences in capacity to benefit from online learning have not identified that women have a reduced capacity or that their academic achievement is reduced as a result of online learning methods. However, women have been found to be more likely to show a preference for collaborative and interactive application of these methods.

Barriers for women learners will be associated with features of how they live their lives, for example, because of family and child rearing responsibilities, and consequent limited access to technological training at convenient times. While data show a slight disadvantage in terms of connectivity relative to men, it would appear that Content and Capability related factors will be most significant in determining equity for women learners.

The importance of collaborative approaches to overcoming the Digital Divide is evident throughout the literature reviewed. There is some research that indicates more successful learning outcomes when online learning programs are planned and negotiated in collaboration with local communities. A number of key government commissioned reports into ICT access and regional location, especially those which have focused on the compounded disadvantages faced by indigenous Australians, recommend the use of community facilities where private households are unable to supply computer-based services. Community online access centres, providing public multi terminal access to information and communication technologies, have been identified as a positive approach particularly when indigenous communities are involved in their development and operation. These centres can also play a critical role in community development, and need to be integrated into a range of community activities in order to be successful.

Bibliography

Arbaugh, J (2000) 'An exploratory study of the effects of gender on student learning and class participation in an internet-based MBA course', *Management Learning*, 31 (4), 503-519

Australian Bureau of Statistics (2002) *Census of Population and Housing: Selected social and housing characteristics, Australia, 2001,* ABS Australia, Cat. No. 2015.0, Canberra

ANTA (2000a) *Bridging Pathways: the National Strategy for Increasing Opportunities for People with a Disability in Vocational Education and Training*, 2000-2005, ANTA, Brisbane

ANTA (2000b) *Partners in a Learning Culture: Australia's national Aboriginal and Torres Strait Islander Strategy for Strategy for Vocational Education and Training*, 2000-2005, ANTA, Brisbane

Australian National Training Authority (2002) *Literature Review: Digital Divide – access and equity in online learning,* Australian Flexible Learning Framework initiative, ANTA, Brisbane (updated September 2003)

Asian Development Bank (2002) *Digital Divide: determinants and policies with special reference to Asia,* ERD Working Paper Series No 27, Economic and Research Dept., Asian Development Bank, Philippines

Banks, G (2003) *Indigenous disadvantage: assessing the policy impacts*, Presentation to the Conference *Pursuing Opportunity and Prosperity*, Melbourne Institute of Applied and Economic Social Research/The Australian, Melbourne, November 13th 2003

Barnett, K (2004) 'VET-ability: the capacity of the Australian VET system to be inclusive for people with a disability' IN Bowman, K (ed) *Equity in vocational education and training: research findings,* NCVER, Adelaide

Berge, Z (1998) 'Barriers to online teaching in post secondary institutions: can policy fix it?', *Online Journal of Distance Learning Administration*, 1998, 1 (2) http://www.westga.edu/~distance/Berge12.html

Brennan, R (2003) 'One size doesn't fit all', IN Guthrie, H (ed) (2003) *Online learning: research findings.* NCVER and ANTA (55-68)

Brennan, R., Horton, C., McNickle, C., Osborne, J & Scholten, K (2003) *Online learning on location.* NCVER and ANTA, an initiative of the Australian Flexible Learning Framework for the National VET System 2000-2004

Brennan, R., McFadden, M & Law, E (2001) *All that glitters is not gold: online delivery of education and training*, Australian National Training Authority, Brisbane

Candy, P (2003) 'Does digital literacy mean more than clicking your fingers?' IN Guthrie, H (ed) (2003) *Online learning: research findings.* NCVER and ANTA (21-40)

Cashion, J & Palmieri, P (2002) *The secret is the teacher: the learner's view of online learning,* NCVER, Adelaide

Chambers, D (2004) 'From recruitment to graduation: a whole-of-institution approach to supporting online students,' *Online Journal of Distance Learning Administration,* 7 (4) http://www.westga.edu/~distance/ojdla/winter74/chambers74.htm

Chartered Institute of Personnel and Development (CIPD) *Inclusive learning for all*, www.cipd.co.uk

Choy, S., McNickle, C & Clayton, B (2002) *Learner expectations and experiences: an examination of students views of support in online learning,* NCVER, Adelaide and ANTA, Brisbane

Cope, B & Kalantzis, M (1998) 'Multiliteracies: meeting the communications challenge in TAFE', *Australian TAFE Teacher*, 32, 2

Core, Jane and Wiles, Kathy (2002) *Strategising e learning in Information Society and Education*, Proceedings of ICTE 2002, 1232-1236 http://www.formatex.org/papersicte2002.htm

Daly, A (2005) *Bridging the Digital Divide: the role of community online access centres in indigenous communities*, Discussion Paper 273/2005Centre for Aboriginal Economic Policy Research, Australian National University, Canberra

Department of Education of Western Australia (2001) *Education to community: proposed corporate strategy*, Perth

Department for Education and Skills (2001) *Transforming the way we learn: a vision for the future of ICT in schools*, DfES, London (cited in Kearns, 2003)

Department of Employment and Workplace Relations (2005) *Workforce Tomorrow: Adapting to a more diverse Australian labour market*, Australian Government, Canberra

Digital Opportunity Task Force (2001) *Digital opportunities for all: meeting the challenge,* cited in Kearns (2003)

Education Network Australia VET Advisory Group (2000) *Flexible learning for the information economy: a framework for national collaboration in vocational education and training 2000-2004, Strategy 2000,* ANTA, Brisbane

Essential Equity (2004) *An evaluation of the Satellite Internet Access Project for School of the Air: Final Report*, Open Access College, Dept of Education and Children's Services, Adelaide

Gatta, M (2003) *Findings from the Field: Early findings of the New Jersey Online Learning Project for Single Working-Poor Mothers*, A Report of the Rutgers University Centre for Women and Work

Graham, C (2000) *Dot.com or Not.com? Implications for career and enterprise education in the Digital Economy.* Open Learning 2000, Brisbane, Learning Network Queensland

Guthrie, H (ed) (2003) *Online learning: research findings.* NCVER and ANTA, an initiative of the Australian Flexible Learning Framework for the National VET System 2000-2004

Harper, B., Hedberg, J., Bennett, S & Lockyer, L (2000) The online experience: a review of the state of Australian on-line education and training practices, NCVER, Adelaide

Hill, R et al (2003) *Researching the size and scope of online usage in the vocational education and training sector,* NCVER and ANTA, an initiative of the Australian Flexible Learning Framework for the National VET System 2000-2004

Hopkins, L., Thomas, J., Meredyth, D & Ewing, S (date unknown) *Social capital and community building through an electronic network,* Institute for Social Research, Swinburne University

Jasinkski, M (1998) *Teaching and learning styles that facilitate online learning: documentation project, Project Report,* Douglas Mawson Institute of TAFE, Adelaide

John, D (2004) 'Quantifying the impact of equity overlap in VET', IN Bowman, K (ed) *Equity in vocational education and training: research findings,* NCVER, Adelaide

Kate Barnett & Associates (2003) *Improving Employment Outcomes for VET Graduates with a Disability,* Australian National Training Authority, Brisbane

Kearns, P (2003) 'The partnership challenge' IN Guthrie, H (ed) (2003) *Online learning: research findings.* NCVER and ANTA (41-52)

Kearns, P (2004) *Towards a learning revolution in Australia: a consultation paper on future directions for lifelong learning,* Adult Learning Australia, Canberra

Kearns, P & Grant, J (2002) *The enabling pillars: learning, technology, community, partnership: a report on Australian policies for information and communication technologies in education and training,* Global Learning Services, Canberra

Kilpatrick, S & Bound, S (2003) *Learning online: benefits and barriers in regional Australia, Volume I*, NCVER and ANTA, an initiative of the Australian Flexible Learning Framework for the National VET System 2000-2004

Ladyshewsky, R (2004) *Online learning versus face to face learning: what is the difference?*, Curtin University of Technology, Graduate School of Business, Teaching and Learning Forum 2004, http://lsn.curtin.edu.au/tlf/tlf 2004/ladyshewsky.html

Lamshed, R., Berry, M & Armstrong, L (2003) *Keys to access: accessibility conformance in VET,* Australian National Training Authority. An initiative of the Australian Flexible Learning Framework for the National VET System 2000-2004

Lloyd, R & Bill, A (2004) *Australia Online: How Australians are using computers and the internet,* Australian Census Analytic Program, ABS, Canberra

Mallett, R., Howard, A & Thompson, E (2003) *Barriers to e-learning in the community pharmacy sector,* an initiative of the Australian Flexible Learning Framework for the National VET System 2000-2004, Australian National Training Authority, Brisbane

Mandinach, E (2005) 'The development of effective evaluation methods for e-learning: a concept paper and action plan', Teachers College Record, 107, 8, August 2005, 1814-1835

McNickle, C (2001) *Online support services: what's happening?* Paper presented to the Networking 2001 Conference, Brisbane, October 2001

McNickle, C & Cameron, N (2003) *The impact of flexible delivery on human resource practices: survey of TAFE managers,* NCVER and ANTA, an initiative of the Australian Flexible Learning Framework for the National VET System 2000-2004

National Office for the Information Economy (NOIE) (2000) *Access and Equity*, Commonwealth of Australia, www.noie.gov.au

National Office for the Information Economy (2001) *Digital Divide*, Commonwealth of Australia, June 6th 2001, www.noie.gov.au

NCVER (2002) *At a Glance: Flexibility through online learning*, ANTA

OECD (2001) *Understanding the digital divide,* OECD, Paris

Peters, C & Lloyd, C (2003) *Differentiating needs: customer demand for online training,* NCVER and ANTA, an initiative of the Australian Flexible Learning Framework for the National VET System 2000-2004

Phipps, J 'E-Journaling: achieving interactive education online', *Educause Quarterly,* 2005, 1, 62-65

Sawyer, G (2004) *New Practices in Flexible Learning - Closing the Digital Divide: increasing education and training opportunities for indigenous students in remote areas.* Project Report to the Flexible Learning Advisory Group, Australian National Training Authority, December 2004

Schofield, K (1999) *Reimposing our will on the Information Economy*, Networking 99 Conference, Online

Servon, L (2001) *Bridging the Digital Divide: Technology, community and public policy,* Blackwell Publishing, Oxford

Sims, R (1999) 'Interactivity on stage: strategies for learner-designer communication', *Aust Jl Educational Technology*, 15 (3), 257-272

University of Illinois (1999) *Teaching at an internet distance: the pedagogy of online teaching and learning.* Available at www.vpaa.uillinois.edu/tid/report

Veenker, P (2001) *Diversity, lifelong learning and the knowledge society.* Northern Territory University Teaching and Learning Conference, Northern Territory, July 2001

Appendix: Stakeholders interviewed

Roger Edmonds
Manager, E-Schooling Service
Learning Technologies Section, DECS

Craig Harrison
General Manager, Personnel Employment
(Chair, Bridging Pathways SA and Deputy Chair, former ADTAC)

Margaret Granger
Lecturer Professional Development Teaching and Learning
TAFE SA Regional, Port Lincoln Campus

Ivor Hay
Manager, E-Business
Science, Technology & Innovation Directorate (DFEEST)

Jeff Hunter
Indigenous e-learning programs
TAFE SA Regional, Port Lincoln Campus

Marlene Manto
State Coordinator, *Learnscope*
TAFE SA North, Torrens Valley Campus

Garry Smith
Managing Director,
The Learning Laboratory

Catriona Ward
E-learning Consultant, *adelaideiglobal*,
TAFE SA South, Adelaide Campus

Darren Wise
Executive Director, ACPET (South Australia)