Australian *Flexible* **Learning** **Framework**

Supporting Flexible Learning Opportunities

Desert disconnections: e-learning and remote Indigenous peoples

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DESERT KNOWLEDGE
CRC

Desert Disconnections:
e-learning and remote Indigenous peoples

Part of the Australian Flexible Learning Framework
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Key messages

- The desert provides unique challenges for the delivery of post-compulsory education programs for Indigenous peoples. While information and communication technologies (ICTs) offer the potential to transform teaching and learning practices in small, remote Indigenous communities, the rollout of such infrastructure is fraught with a range of problems, including appropriate, reliable and affordable energy supplies, bandwidth and interoperability issues—such as the standardisation of technology services and information formats. These difficulties are further compounded by the range of agencies and other organisations involved across a range of jurisdictions.

- ICT use is increasing. However, much of the ICT infrastructure development on remote desert communities is still targeting basic communications needs. Where community access centres or telecentres are in place, they are being championed by Indigenous organisations, including the Indigenous media sector, and for activities which enhance local information flows, knowledge exchange and cultural activities, and provide basic service access like banking. These activities support a threshold of knowledge, skills and ownership which can enhance flexible learning opportunities. However, at present ICT is not being used much for formal education and training.

- The lack of appropriate resources, technical support, poor English literacy skills and the range of skills of both trainers and learners in adapting resources or troubleshooting hardware or software problems, limits opportunities to use e-learning in remote Indigenous communities. Ongoing financial support is essential, given the poor capacity to pay for such services in many of these small Indigenous communities.

- A key challenge for the vocational education and training (VET) system is to build on the ways in which Indigenous desert peoples are actively embracing ICTs for their own ends and purposes, rather than focusing on using these technologies to distribute predefined and often inappropriate services and resources.

Executive summary

This report explores the extent of the use of ICT to support flexible learning opportunities for Indigenous peoples across desert Australia. It was funded by the Australian Flexible Learning Framework (Framework) and constitutes one aspect of a larger study being undertaken by the Desert Knowledge Co-operative Research Centre (DK CRC) as part of the national VET research and evaluation program managed by the National Centre for Vocational Education Research (NCVER).

The main study aims to map the picture of education and training pathways through VET and Adult and Community Education (ACE) for Indigenous peoples living in the desert. This report summarises the current state of ICT use by Indigenous desert dwellers and highlights the complex array of stakeholders rolling out ICT infrastructure and flexible learning programs across desert Australia.

The Australian desert is characterised by its remoteness, its small and highly dispersed settlements and its large and growing Indigenous population. It comprises 45% of the Australian land mass and includes large parts of the Northern Territory, Western Australia and South Australia, and smaller parts of Queensland and New South Wales. According to the 2001 Australian Bureau of Census (ABS) census there were 33,186 Indigenous people out of a total estimated desert population of 163,405 residents. The majority of the Indigenous desert population resides in 457 discrete Indigenous communities which are detached and isolated even within the region itself. More than two-thirds of these discrete communities have populations of fewer than 50 people.

The number of Indigenous desert people in the labour force apart from Community Development Employment Projects (CDEP) is very low, as is the number who have completed post-compulsory school or vocational qualifications. Approximately 13% of the Indigenous desert population completes Years 11/12 and around four percent hold certificate qualifications. More than 50% speak an Indigenous language as their first language. This raises unique issues for flexible and online learning for these peoples since a great bulk of content is available only in English.

Access to education services—primary, secondary and post-compulsory—is significantly constrained. A little over half of the 125 communities across the desert with populations of 50 or more have access to a primary school within their community. Approximately half of the 332 communities with populations of fewer than 50 have a primary school within 50km of the community. Generally, the higher the level of education, the less access available to discrete desert communities. Of those who are participating in VET, more than half are enrolled in Australian Qualifications Framework (AQF) Certificates I and II and these make up the bulk of those studying in mixed-field enrolments, subject-only enrolments and the creative arts. This perhaps reflects the increased focus in recent years on literacy and numeracy skilling, the background of educational need, given poor outcomes from compulsory schooling, the mismatch between mainstream occupations and skills training, and the nature of work and endeavour on desert communities. Only 1.4% of desert Indigenous students are undertaking study in the field of ICT.

The majority of the larger desert communities were established early-to-mid last century as ration stations or mission settlements. In many ways these settlements can be described as 'artificial', in that they were established by external agencies in response to political and policy agendas (eg, protectionism, assimilation). Their

development was not shaped by the usual drivers underlying settlements in coastal parts of the country, such as proximity to resources, markets or employment. Many of the smaller communities were established as Land Rights legislation enabled people to resettle in their traditional country and escape the escalating overcrowding and dysfunction experienced in the larger settlements.

According to the Community Housing and Infrastructure Survey (CHINS) 2001, all of the 125 communities with populations over 50 have an electricity supply. More than half were connected to the State/Territory grid, with the rest having community diesel generators where maintenance responsibility was most likely to be assumed by the relevant energy authority. By contrast, one in ten smaller communities had no electricity supply, with the remainder utilising solar/hybrid systems or domestic generators. The quality of the available power is a critical issue for sensitive technologies such as computers. The type of power emitted by community or domestic generators can often be of poor quality, and gives rise to hardware problems. The reality of energy services in remote desert communities provides some sobering insights about the potential of new technologies. It is likely that installation of ICTs without consideration of the extra cost of energy supplies or addressing issues of power quality will further compound an already vulnerable base.

Approximately half of all discrete desert communities have access to one public payphone. Access to private phones is negligible. Most regions of desert Australia have no land-based mobile coverage and only a few larger settlements can utilise Code Division Multiple Access (CDMA) technology. Satellite technology is available but affordability—handsets and call costs—is a significant barrier. In some regions of the desert UHF radio repeater technologies are being utilised to address the lack of basic 'lifeline' communications technologies. The basic telecommunications infrastructure to support Internet access is therefore problematic. Indigenous people in desert communities are far less likely to have accessed a computer or the Internet in the past 12 months compared with Australia as a whole.

The economic circumstances of Indigenous peoples, poor private phone access and electricity supply issues have meant that the focus for improving access to ICTs in remote areas has been on establishing community access centres in 'hub' communities. However, only a handful of such centres are up and running, and the extent to which Indigenous governing or media organisations are championing their use for local purposes would seem to be a key determinant of their uptake and effectiveness. The financial sustainability of these access points is arguably dependent on ongoing Government support. Access to ICTs would also appear to differ between the five jurisdictions crossing the desert region of Australia, reflecting differing program and policy regimes. Formal educational programs are at this stage largely peripheral to the type of engagement Indigenous desert peoples are pursuing with new technologies.

There appears to be significant commitment within the VET system to improving educational outcomes for Indigenous peoples. In policy, research, product development and targeted funding programs, Indigenous peoples are seen as a major group for which a wider range of flexible learning practices should be introduced. However, these efforts have had minor impact to date in shaping learning activities with Indigenous desert peoples. While there is evidence that computers and new technologies are being utilised in face-to-face delivery, the uptake of resources, such as Indigenous or Equity Toolboxes, is minimal. The suitability of existing resources to desert contexts and the educational profiles of learners is a significant barrier, as are the skills sets of teachers and trainers to adapt these. The extensive travel and

isolation typical of teaching work in the desert further limits professional development activities for these staff.

There has been significant ICT infrastructure rollout across the desert in the wake of programs such as Networking the Nation, the National Communications Fund and State/Territory-initiated programs such as the Learning and Technology in Schools (LATIS) program in the Northern Territory, the telecentre rollout in Western Australia, and the Linking the Lands Program in north-west South Australia. In many ways these initiatives represent an 'installation' phase, where the emphasis has been on the supply of infrastructure and hardware, rather than on responding to demand or the emergent use and purpose to which the technologies will be put. Many government departments and private organisations have been involved in the rollout, but overall there has been little cross-agency coordination. As the focus moves towards consideration of user needs and demands, questions about the types of infrastructure deployed and their appropriateness to desert contexts and aspirations are appearing. These include interoperability issues—the standardisation of technical services, information formats and business processes—between providers and communities, bandwidth issues, affordability, technical support and the availability of appropriate content.

There is a strong and well-established Indigenous media sector operating across desert Australia. It features radio networks across vast areas of land, a mix of local and other content and a depth of skilled operators who are also versatile in a range of new technologies. In some areas, Indigenous-led organisations such as Pitjantjatjara Yunkunytjatjara Communications (PYComm), Warlpiri Media and Desart, are experimenting with new technologies in order to enhance local information flows in supporting social and kin networks, knowledge exchange and cultural activities, for preserving culture, language and traditional knowledge, and facilitating e-commerce and access to services such as banking. Access to or supporting formal educational activities is seen as a future rather than immediate priority. Indigenous peoples across the desert are engaging with new technologies—but for their own ends. Improving access to ICT infrastructure in remote desert areas to facilitate utilisation of ICTs in the flexible delivery of learning will ultimately depend on how well educational policies and practice can engage with local needs and aspirations, rather than their merely being regarded as tools for distributing predefined services or products.

It is arguable that bedding down the use and knowledge of new media technologies in culturally appropriate ways is the necessary first step in enabling an expanded use of the technologies for purposes such as mainstream education and training. The challenge for the VET system is identifying ways to build on the strength of existing engagement and support, and to build flexible educational practices that allow local and intercultural learning resources and processes to be constructed.

Introduction

This Project, funded by the Australian Flexible Learning Framework (Framework), explores the extent of the use of ICT in vocational education and training (VET) and Adult and Community Education (ACE) activities to support flexible learning opportunities with Indigenous peoples across desert Australia. This report also constitutes one aspect of a larger study which aims to map the picture of education and training pathways through VET and ACE for Indigenous peoples living in the desert. The study is described at http://www.ncver.edu.au/workinprogress/projects/10321.html.

According to the Framework:

> Flexible learning expands choice on what, when, where and how people learn … and supports different styles of learning, including e-learning. E-learning is a broader concept [than online learning] encompassing a wide set of applications and processes which use all available electronic media to deliver vocational education and training more flexibly.
> (Framework 2003a, p3)

The project focuses on a unique geographical area of the Australian continent—the desert—characterised by its remoteness, its small and highly dispersed settlements and its large and growing Indigenous population. It aims to gauge the current extent of e-learning activities occurring with Indigenous learners undertaking VET and ACE programs, particularly after five years of concerted strategic focus on flexible learning by educational authorities and significant State/Territory and Commonwealth investment in ICT infrastructure and its rollout.

The research questions addressed by this report are:

1. What is the picture of ICT use by (and with) Indigenous desert dwellers who are participating in VET or ACE?

2. What are the key issues affecting the utilisation of ICTs in VET and ACE with Indigenous learners across the desert?

The use of e-learning approaches and new technologies is often promoted as a means to address access and equity issues, particularly for people living in geographically remote locations (ANTA 2002; Lucardie 2003). To an extent, the physical realities of the desert mandate flexibility in the delivery of services, including education. Such flexibility currently entails a mix of on-site delivery for short periods of time and/or Abstudy-funded travel to campuses for intensive workshops. Furthermore, the cultural and language diversity of desert residents, combined with endemic poverty and poor health, requires innovation, flexibility and cultural sensitivity in the manner in which learning opportunities and educational pathways are conceived and implemented. This study explores the extent to which ICTs are currently mediating such flexibility and innovation in learning pathways for desert Indigenous peoples.

The report begins with a brief overview of VET policy and research directed towards e-learning and Indigenous peoples. It then profiles the desert region in terms of settlement patterns, infrastructure development and current educational issues for Indigenous dwellers, and highlights the difficulties in translating policy into practice in desert regions. It explores some of the initiatives within the Indigenous media sector and the links between these and the VET system. It concludes with discussions of a preliminary survey undertaken by the research team into e-learning activity across the

desert.

Methodology

A desktop analysis of VET system policies and research relating to Indigenous learners and e-learning was undertaken to provide the broader context in which flexible learning has been and is developing. This analysis is supplemented by an overview of ICT policies and initiatives emanating from a range of Commonwealth and State/Territory portfolios and programs. An analysis of various data sets has also been undertaken in order to scope desert Australia and detail key issues relating to infrastructure and access to ICTs, as well as present profiles of the Indigenous desert population. The data sources include:

- Australian Bureau of Statistics (ABS) 2001 census data (drawn from ABS 2002a, 2002b, 2003a)

- 2002 National Aboriginal and Torres Strait Islander Social Survey (ABS 2004a), also known as the Indigenous Social Survey (ISS)

- National VET statistics complied by the National Centre for Vocational Education Research (drawn from datasets within NCVER 2004)

- Community Housing and Infrastructure Needs Survey (CHINS) (ABS 2002c).

Where possible, data sets were queried according to geographical areas to enable comparisons. In the case of census data the areas are the statistical local areas (SLAs). With the ISS, data are provided for remoteness by levels of jurisdictions, and estimations were made on the basis of the desert region being a subset of remote Australia. For VET statistics supplied by the National Centre for Vocational Education Research (NCVER), postcodes and SLAs were matched to approximate the desert region within each jurisdiction. The desert subset of the CHINS data was created using discrete communities identified within the desert region.

A small phone survey of providers, practitioners and ICT developers in desert regions was also undertaken. Respondents were not randomly sampled but identified through the existing networks of the Desert Knowledge Co-operative Research Centre (DK CRC) partner organisations and affiliates.

The policy context of e-learning and Indigenous learning in the VET system

The following is a brief description of relevant literature and policy that has informed the current status of Indigenous learners in VET. It is important to note that there is a dearth of literature specific to e-learning and Indigenous peoples living in the desert regions of Australia.

Indigenous learners are a central concern of the 2005 Australian Flexible Learning Framework (2005 Framework). A supporting paper to the previous Australian national strategy for VET, *A bridge to the future* (Australian National Training Authority (ANTA) 1998a)*, Achieving equitable outcomes* (ANTA 1998b), sums up the key issues of emerging technologies for Indigenous learners:

> Lack of culturally appropriate learning is considered to be a major cause of unsuccessful completions. Inadequate teacher and provider sensitivity to cultural differences, lack of teacher relations with students and their communities as well as language difficulties all contribute. Distance from providers is also critical in some rural and remote parts of Australia.
>
> <div align="right">(ANTA 1998b, p13)</div>

Under the heading of 'Client Engagement', Indigenous Engagement is identified as a separate goal of the 2005 Framework. Indeed in 2005, 10 individual projects of AUD$50,000 each, designed to increase the uptake of e-learning by Indigenous learners, will be funded. During the 2000-2004 Australian Flexible Learning Framework (Framework), significant funds were devoted to researching the needs of Indigenous learners and the development of e-learning resources aimed at engaging 'equity' groups of learners in the VET system. These equity groups included learners with a disability, those with low levels of literacy and Indigenous learners. The Framework has made it its' business to address the needs (whatever these may be) of Indigenous learners as part of its attempt to meet access and equity principles.

This short review of VET policy looks at some research and papers that ask the following questions:

1. Where has this 'recognition of need' come from?

2. What have been the drivers for this significant commitment of money and professional energy into Indigenous VET learners?

3. How have these policies directly affected the many desert communities for whom VET plays an important part in their development?

Recognising the need for engagement with new technologies

In January 1999 the Aboriginal and Torres Strait Islander Peoples' Training Advisory Council (ATSIPTAC, later to be known as the Australian Indigenous Training Advisory Council [AITAC]) released a discussion paper titled, *Making I.T. our own* (ATSIPTAC 1999). The key Indigenous advisory group to the Australian National Training Authority (ANTA) acknowledged a need for Indigenous people to be engaged with the nascent policies being developed by ANTA and State/Territory Government departments of education to promote the uptake of increased flexible delivery using technology.

The paper synthesised a number of important comments by Indigenous education leaders who were making suggestions to policy-makers on how best to include Indigenous people in new ways of learning brought about by technological changes:

> I.T. can help overcome the tyranny of distance. Remote Aboriginal communities, with the necessary telecommunications infrastructure in place, have potential to gain immediate access to the world's news and views; telecommunications such as video conferencing can be used to link families with their loved ones in hospitals, boarding schools, or detention centres … I.T. can allow cultural and intellectual exchanges with Indigenous brothers and sisters throughout the world; I.T. can help support our schools, medical centres, adult learning institutions gain access to the most up-to-date information in their respective field of studies … I.T. can assist through e-commerce exchanges, which will hasten the delivery of goods and services throughout Australia.

> (Bromley 1998)

Making I.T. our own listed a range of references which had influenced its thinking and included not only speeches by educational leaders like the late Kevin Bromley, but also international and local publications which captured the emerging realisation that new technologies meant a new way of learning, and that Indigenous peoples needed to engage if outcomes were to be both maintained and improved.

One of the more insightful pieces discussing these issues was presented by David Nathan (1997) to a Fulbright symposium held in Darwin in July 1997. Nathan's paper suggests the possibility of Indigenous connection to the Internet and describes how some communities had already used the Internet. It discusses the opportunities presented by the Internet, and the new literacy developing as a consequence of information being able to be delivered digitally.

These realisations were mirrored in broader policy documents around the same time and were consolidated in the Ministerial Council on Education, Employment, Training and Youth Affairs (MCEETYA) Taskforce on Indigenous Education. In its March 2000 report, MCEETYA acknowledged work undertaken in 1998 and 1999 as part of a number of 'strategic results projects', funded under the Australian Government's Indigenous Education Strategic Initiatives Program. In one of these projects, under the title of 'Principle of Participation', enhancing Indigenous learning by access to technology and more flexible methods of delivery were identified as important goals.

- Indigenous student interest and involvement can also be successfully addressed by:
- modifying courses and course delivery, especially customising existing courses so that they were more effective for the target group; and/or developing (or searching out) courses to serve the same function; and developing new forms of mobile delivery to teach on site
- increasing the level and quality of contact between adults (not necessarily teachers) and young Indigenous people by:…
- using ICT as a tool within a developmental learning environment to foster participation.
- (MCEETYA 2000, p98, Appendix 6)

As well as these general issues of access and equity, the rollout of infrastructure from large telecommunications companies and education departments across Indigenous communities also focused policy-makers' attentions on the potential for a new way of delivering learning.

The acknowledgement of Indigenous involvement in all aspects of VET is explicit in ANTA's (2000) *Partners in a learning culture* policy. This broad national strategy identified key areas for improving VET outcomes for Indigenous learners. The strategy has four objectives:

- increasing involvement of Indigenous people in decision-making about policy, planning, resources and delivery

- achieving participation in VET for Indigenous people equal to those of the rest of the Australian community

- achieving increased culturally appropriate, and flexibly delivered training, including use of information technology, for Indigenous people

- developing closer links between VET outcomes for Indigenous people and industry and employment.

The third objective is of relevance to this review in that it identifies the importance of culturally appropriate training and the use of information technology.

- New information technologies offer some potential to improve learning opportunities in remote areas. But new technology will not, by itself, be useful unless individuals and communities are supported to use, and can use, the technology.

- The goal of widespread technological learning for Indigenous Australians will require coordinated strategic and long-term effort. It requires flexible delivery networks and Indigenous training centres, extra professional development for providers of Indigenous training, and partnerships between communities, schools, VET and higher education providers, and industry.

- For Indigenous people, information technology can complement human 'face to face' teaching and learning – but will not replace it.

- (ANTA 2000, p26)

However, the recently released mid-term review of this strategy (ANTA 2004a) notes that combining culturally appropriate training with the use of ICTs has been problematic. Indeed, culturally appropriate training may or may not include the use of new technologies and e-learning methodologies, and resources can often highlight cultural mismatch rather than congruity. Despite significant effort towards the development of national Flexible Learning Toolboxes (Toolboxes) for Indigenous learners and equity groups, there are consistent reports of their irrelevance or incompatibility with the cultures and contexts of remote Indigenous Australia (Hunter 2004; Sawyer 2004).

In a practical sense and in relation to training, it has been the Framework which has produced the most accessible research into e-learning among Indigenous communities, with occasional specific reference to its impact on remote desert peoples. The Framework has devoted substantial research resources, guided by the principles contained within the national Aboriginal and Torres Strait Islander VET Strategy 2000-05 (ANTA 2000), to understanding the impact of the 'digital divide'. In a study undertaken by the Framework, the digital divide is defined as '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 VET' (ANTA 2001, p7). Other studies identify that the lack of such skill readiness and access is related to remoteness, socioeconomic status and educational attainment (Guenther & Kilpatrick 2003; Hollwig & Lloyd 2000). The report, *Literature review: Digital divide* (ANTA 2002 updated in September 2003), identifies issues that are working against the bridging of

this divide in remote Indigenous communities. These are predominantly infrastructure issues and the lack of culturally appropriate Internet resources. A key report from the Framework, as part of its New Practices in Flexible Learning Project, is *Building sustainable practice: Engaging remote Aboriginal communities* by Dorothy Lucardie (2003). This project concentrated on remote community health care training around the Alice Springs region and identified significant issues relevant to any e-learning in desert regions of Australia:

- infrastructure
- access to remote communities
- time
- support
- Aboriginal culture and relationships.
- Participants saw using the Internet as a necessary and useful communication method. For many, English literacy needs and technical problems mean that using the web, email and discussion forums for learning present problems to be overcome. Sustainable practice will need to be incorporated so that use of Internet training will not be seen as a 'one-off' training program.   (Lucardie 2003, p39)

An evaluation of the Framework was undertaken in 2004. While acknowledging that there are no standard or baseline measures against which the impact of the Framework's activities and investments over the past four years can be measured, the report does state that it has been 'an effective agent for change and contributed significantly to the increased uptake of flexible learning in VET over the past four years' (ANTA 2004b, p2). However, the report also acknowledges that the most significant uptake of flexible learning has been in the larger technical and further education (TAFE) institutes and more often than not, in and around the larger cities along Australia's coastline. Despite a focus on access and equity issues within the Framework and an array of individual projects targeting Indigenous Australians and/or practitioners in rural and some remote areas, the uptake of learning through technologies by desert Indigenous Australians is still a challenge. The recommendation of the evaluation report for future targeted investment in activities, products and services for Indigenous peoples, rural and remote learners and learners and communities with limited skills in using technologies, highlights the limited diffusion of flexible learning into the outback to date.

The National Strategy for VET 2004–2010 (ANTA 2003) provides the vision of VET responding to the needs and learning culture of Indigenous Australians and working towards stronger and more sustainable communities and regions. Tapping the potential of new technologies and more flexible approaches and products to support teaching and learning in pursuit of these outcomes is critical to the strategy. How these will be effected is yet to be fully articulated, although the strategy's action plan, 2004–05 (ANTA 2004b) highlights cross-sector collaborations and partnerships as emerging in the Council of Australian Governments' (COAG) 'shared responsibility' pilots, with ten Indigenous communities across the nation. The Northern Territory, South Australia and Western Australia, being jurisdictions covering those regions of the desert where most Indigenous peoples reside, also have flexible learning strategies in place. In a policy and strategic sense, the potential for embedding flexible learning opportunities for Indigenous desert dwellers is evident. How this potential plays out against the changing face of Indigenous affairs and concerns about the efficacy of the types of approaches and policies pursued in the past 30 years or so remains to be seen (Hughes & Warin 2005).

There appears to be significant enthusiasm for utilising new technologies for learning in Indigenous contexts and this is reiterated in the mid-term review of the *Partners in a learning culture* (ANTA 2004a). The issue of how to engage with enthusiasm and find the space to enable local responses to globally dictated 'new' educational endeavours remains complex. A recent investigation into 'digital divide' issues in one remote desert community (Sawyer 2004) highlights that, even where technology and infrastructure issues are addressed, issues of pedagogy, teacher skills and institutional barriers remain. In particular, the report identifies that the pedagogical 'science' of teaching across text-based and oral cultures is undeveloped, and such inadequacies can easily be transported to an e-learning context.

The concerns about pedagogy in the context of Indigenous learning have been around for quite some time (eg, Harris 1990; Hughes & More 1997) and still remain largely unresolved. Other recent research has highlighted similar pedagogical concerns in rural and remote contexts more generally (eg, Framework 2003b; Northern Territory Government 2004). The opportunity to construct skills and intercultural knowledge by developing local content and resources through ICTs is a key opportunity and one being pursued by a number of Indigenous organisations as investment in infrastructure and community-based models of the use and purpose of the technologies emerge. To date these emerging uses largely sit outside formal education activities.

This brief overview of the VET policy and research context reveals the commitment of the system to improving educational outcomes for Indigenous peoples. While acknowledgment of cultural diversity amongst Indigenous peoples underpins policy and practice, it is rarely acknowledged that diversity is also framed by physical, social, economic and historical factors. What follows is a broad, albeit incomplete, profiling of the desert region and the factors that bear on the uptake and use of ICTs by Indigenous peoples. It aims to expand understandings of diversity to include issues of location and dispersion and draw attention to the uniqueness to desert living and desert servicing.

The desert

It has been noted that 'the Indigenous community is not homogenous, but data for national comparisons is collected and analysed as if it were' (Mellor & Corrigan 2004). More recently, a breakdown of data across varying socioeconomic indices have become available for urban, regional and remote areas of Australia, in which Indigenous residents of remote areas are consistently reported as the most disadvantaged. However, disadvantage is not merely an issue of the urban/remote continuum (Golding & Pattison 2004, p.110). Indeed there would appear to be significant differences within and between regions and sub-regions (National Economics 2004) of the States/Territories, which a focus on the desert can elicit, encompassing, as it does, five separate jurisdictions. In terms of uptake of flexible and e-learning practices, this analysis can begin to identify the differing policy and implementation strategies that are facilitating or impeding flexible learning opportunities for desert Indigenous peoples.

In this section we analyse data from the Australian Bureau of Statistics, the Community Housing and Infrastructure Survey (CHINS) and the National Centre for Vocational Education Research (NCVER), as well as national and international literature on the use of ICTs for learning and development. We also examine the complex landscape of ICT infrastructure development occurring across the desert.

Arid lands (deserts) comprise 45% of the Australian land mass. The desert region corresponds with remote and very remote categories of the Remoteness Structure within the Australian Standard Geographic Classification (ASGC) (ABS 2004b; BRS 1999, p.113; Taylor 2002a, 2002b) and includes large parts of the Northern Territory, Western Australia and South Australia, and smaller parts of Queensland and New South Wales. While recognising that issues exist with under-enumeration in remote desert Australia (ABS 2004c; Taylor 2002a)—estimated at 6.5% for Indigenous populations nationally (ABS 2002d)—the 2001 Census of Population and Housing reported 33,186 Indigenous people out of a total estimated population of 163,405 residents across the desert. This proportion is predicted to increase significantly by 2016 (Taylor 2003b). By contrast, the non-Indigenous population in the desert region is decreasing.

The settlement patterns of desert Australia are unique. While the majority of non-Indigenous people reside in the key service centres of Alice Springs, Halls Creek and mining towns, Indigenous people are highly dispersed across the region in small remote communities. There is also significant mobility between communities across the desert, and in and out of major service centres (Peterson 2004; Taylor and Bell 1999). According to an analysis of the 2001 Community Housing and Infrastructure Needs Survey (ABS 2002c; Guenther et al. 2004), there are 457 discrete Indigenous communities within the desert region, with a combined population of 28,053. The majority of Indigenous desert peoples therefore live in settlements that are detached and isolated even within the desert region itself. Furthermore, 72% of these discrete desert communities have a population of fewer than 50. The small size of these communities, the vast distances between them and major service centres, and the reality that vast tracts of land are essentially Indigenous domains in terms of land tenure and population profiles, creates significant issues in terms of aggregating adequate demand for education and training programs.

Figure 1 shows an approximation of the desert region as an overlay (and more heavily shaded) on a map of discrete Indigenous communities according to CHINS.

Figure 1:   Desert region overlay of CHINS communities
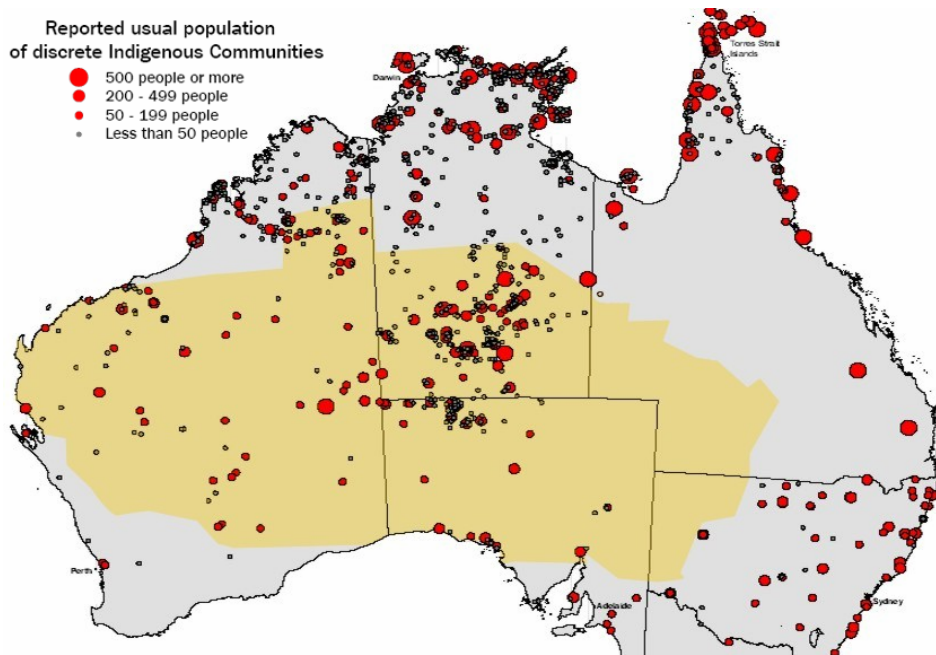
Source: Adapted from ABS (2002c)

Table 1 overleaf, drawn from ABS 2001 census data, gives a profile of Indigenous desert peoples. It shows that the number of Indigenous people in the labour force (other than in the Community Development Employment Program (CDEP)) is very low, as is the level of school attendance and completion of post-compulsory school or vocational qualifications. It highlights that the growth of the Indigenous population within desert Australia has been and continues to be positive, a trend at odds with population trends in many regional areas of the country. More than half of Indigenous desert people speak an Indigenous language as their first language. This raises unique issues in that more than 80% of online content is in English.

It is, however, important to note that the available data neither count nor reflect the suite of activities related to learning and work which occurs at the interface of the customary and modern economies across the desert. For example, it does not reflect the significant levels of voluntary work undertaken by community members (the ISS 2002 estimates around 27% of remote Indigenous peoples undertake voluntary work) or the income substitution activities associated with land management and food harvesting. It is also possible that enterprise activities, such as art and tourism, are masked by CDEP and not captured as private employment, however casual.

Table 1:   General indicators for Indigenous and non-Indigenous population groups in the desert region

	Indigenous	Non-Indigenous	Total population
Population	33186	130219	163405
Population aged 15+	20509	95817	116326
Employment CDEP	4055	343	4428
Employment (other)	3297	61872	65169
% of labour force in CDEP	47.0%	0.5%	5.9%
% of labour force in other employment	37.9%	92.9%	86.6%
% of 15+ population in labour force	42.7%	71.0%	66.0%
% of 15+ population with certificate qualifications	4.0%	22.0%	18.8%
% of 15+ completed Year 11/12	13.3%	47.5%	41.4%
% of total population	20.3%	79.7%	100.0%
Change in population since 1991	24.0%	-2.2%	2.1%
% of Indigenous population that speaks an Indigenous language	54.6%	0.2%	11.6%
% never attended school	11.9%	0.4%	2.5%
Average household size	3.9	2.6	3.1

Notes: Total population excludes overseas visitors.
Source: ABS (2002b, 2003a)

Community profiles

The 2001 CHINS data also enable a closer look at the composition of the 457 discrete Indigenous communities across the desert. The majority of housing infrastructure on discrete communities is owned and managed by Indigenous Housing Organisations (IHOs). Almost one in ten dwellings on these communities is in need of replacement, with a further one in seven in need of major repairs. The average household size is 4.3 people per dwelling—almost double that for non-Indigenous households. Overcrowding and homelessness remain significant issues for Indigenous desert people, with the negative health and wellbeing impacts of this well documented (Collins & Lea 1999; HRSCFCA 2000; SCRGSP 2003).

Access to education services—primary, secondary and post-compulsory—is also significantly constrained. A little over half of the 125 communities across the desert with populations of 50 or more have access to a primary school within their community. Approximately half of the 332 communities with populations fewer than 50 have a primary school within 50km of the community. Generally, the higher the level of education, the less likely is access available for discrete desert communities. For example, only eight of the 125 communities with populations over 50 have access to a senior secondary school. Access to TAFE or other adult education services varies across jurisdictions, but at best, one-quarter of discrete desert communities would have such ongoing access.

According to CHINS 2001 data, the majority of larger desert communities have at least one community facility, usually an administration building. Other facilities may include meeting halls, training centres, childcare centres, arts centres and youth facilities.

Overall, South Australian desert communities are more likely to have such access, and Northern Territory communities least likely.

According to the ABS 2002 Indigenous Social Survey (ABS 2004a) nearly 30% of Indigenous people in remote desert Australia report some difficulty in accessing transport to the places needed. This undoubtedly would have some impact on school attendance rates, given the distances to be travelled to access schools. CHINS also shows that, on average, it takes about two-and-a-half hours to reach a major centre from a desert community, affecting access to specialist services such as doctors and banks, or services being delivered to the community. These realities also point to a persistently moving population, raising issues for attendance and continuity in education activity. A study undertaken by Warchivker, Tjapangati and Wakerman (2000) into mobility patterns in one central Australian community identified that between 25 and 35% of the community was mobile within a one-year period. Twelve per cent of the mobility patterns related to being in hospital, on dialysis or in jail, with other reasons being related to cultural 'business' and study.

Settlements and essential services

The majority of the larger desert communities were established early-to-mid last century as ration stations or mission settlements (Rowse 1998). In many ways these settlements can be described as 'artificial', in that they were established by external agencies in response to political and policy agendas (for example, protectionism, assimilation); that is, their development was not shaped by the usual drivers underlying settlements in coastal parts of the country, such as proximity to resources, markets or employment (Taylor 2003b). Shifting policy agendas of the 1970s and 1980s and the granting of land rights, particularly in the Northern Territory and South Australia, have seen the emergence of an expanding number of small family-based settlements, most commonly known as homelands or outstations. The numbers of small settlements across the desert reflect these homelands movements and indeed the expanding Indigenous population base. They also highlight an increased focus on infrastructure development and technology transfer as key drivers of settlement expansion; ie, new settlements developed as money to sink a bore, buy a generator or erect a shed became available. Considerations of livelihood activities, while often paramount for those returning to the country, rarely informed decision-making in relation to infrastructure expenditure (HREOC 2001).

CHINS 2001 data enable an analysis of essential services such as power and water in discrete desert communities. All of the 125 communities with populations over 50 had an electricity supply. More than half were connected to the State/Territory grid, with the rest having community generators where maintenance responsibility was most likely to be assumed by the relevant energy authority. By contrast, one in ten smaller communities had no electricity supply, with the remainder utilising solar/hybrid systems or domestic generators. Responsibility for maintenance usually resided with a local resource agency (funded through the Aboriginal and Torres Strait Islander Commission [ATSIC]), or assumed by the residents themselves (Altman, Gillespie & Palmer 1998). Two-thirds of desert communities reported up to 19 interruptions to supply over the previous year, with 16% reporting in excess of 20 interruptions. For the purposes of the survey, interruptions were defined as being where the continuous supply of electricity was stopped for one hour or more. Discrete desert communities were twice as likely to use solar/hybrid systems than discrete communities outside the region. However, it should be noted that solar/hybrid systems do not offer a limitless energy supply, with

the size of batteries and panels installed usually determined by available funds which, in turn, determines the extent of possible use.

The quality of the power is also a critical issue for sensitive technologies such as computers. 'Dirty' power refers to the extent of harmonic distortion of voltage and wave forms and is frequently experienced in power systems using diesel generators, such as those in many desert Indigenous communities. Continuous distortion can result in increased down time, increased cost of equipment maintenance or the frequent replacement of failed equipment. Computer circuitry is particularly sensitive to such distortion (University of Missouri 2004). Power quality issues and their impact on ICT infrastructure use and maintenance on Indigenous communities are generally overlooked.

Access to potable water is crucial to any settlement's viability. CHINS 2001 identifies that the majority of discrete communities rely on bore water and access to such, in turn, relies on access to generators or solar pumps to draw water up. More than one-third of discrete communities, with populations over 50, reported experiencing water restrictions in the last 12 months. The main reason reported for water restrictions was equipment breakdown.

Securing reliable essential services and adequate maintenance systems remain critical issues for discrete Indigenous communities. Distances from service suppliers, access to parts, the lack of readily available technical expertise, and the complex myriad of State/Territory, federal, private and local agencies assuming various degrees of responsibilities for varying aspects of essential services infrastructure and maintenance regimes, undoubtedly compound these issues. Furthermore, any consideration of the uptake of e-learning opportunities on discrete desert communities needs to be grounded in a realistic appraisal of the access to and cost of the services on which electronic communication technologies depend—namely energy. It is likely that installation of ICTs without strategic consideration of the expanding cost and maintenance of such infrastructure will further compound an already vulnerable base. The choice between pumping water from the bore, keeping food fresh in the fridge in the face of 40-degree temperatures or turning on a computer is, in reality, not a choice at all.

Communication networks

Approximately half of all discrete desert communities have access to one public payphone. Access to private phones is almost negligible (ACA 2004). A series of reports and reviews such as the *Telecommunications action plan for remote Indigenous communities* (TAPRIC) (DCITA 2002) and the *Regional telecommunications inquiry* (RTI 2002) and the *Payphone policy review* conducted by the Australian Communications Authority (2004) are recommending a range of programs to address the poverty of such access. The ACA review notes:

> Payphones are a lifeline service for small and very small remote Indigenous communities (such as outstations and homelands) and town camps and need to be provided on a wider basis than at present. Payphones on remote Indigenous communities and town camps serve a much wider role that standard payphones and require a different set of features and designs.
> (ACA 2004, p.13)

The review emphasises that one payphone per community is inadequate, that new installations should also enable incoming calls to be received, and mobile payphone designs should be investigated to address the reality of community mobility patterns (ACA 2004, pp.14–18). However, until such initiatives are implemented, the fact remains that Indigenous desert people experience great difficulty in accessing even the most basic communications technology to get help in life-threatening medical emergencies or transport breakdowns. Securing such 'basic' access undoubtedly takes precedence over accessing such media to support flexible learning methodologies. It should also be noted that most regions of desert Australia have no land-based mobile coverage and only few larger settlements can utilise Code Division Multiple Access (CDMA) technology. Satellite technology is available but affordability—handsets and call costs—is a critical barrier. Innovative ways of addressing the issue of communications are however being explored. Funds from the Networking the Nation (NTN) scheme have recently been utilised to establish a UHF radio repeater network across the 120,000 square kilometres of the Ngaanyatjarra lands in far west Western Australia. The network is used to arrange meetings, broadcast social news, report emergencies and check the progress of travellers (Centre for Appropriate Technology 2004, p.5). Basic communications access, so taken for granted along the coastal mainstream of Australia, is only beginning to become available to many Indigenous peoples across desert Australia.

Similar issues are experienced for computer use and Internet access. The 2002 Indigenous Social Survey (ABS 2004a) data indicates that Indigenous people from remote areas of Australia are half as likely to have accessed a computer or the Internet in the past 12 months compared with Australia as a whole.

Figure 2 shows the spatial characteristics of Internet usage across central Australia, with the high rate of usage in some parts of Western Australia more likely to be associated with the mining industry than Indigenous residents.

Figure 2. Population using the Internet in any place (work or home) in the week prior to the 2001 census, percentage
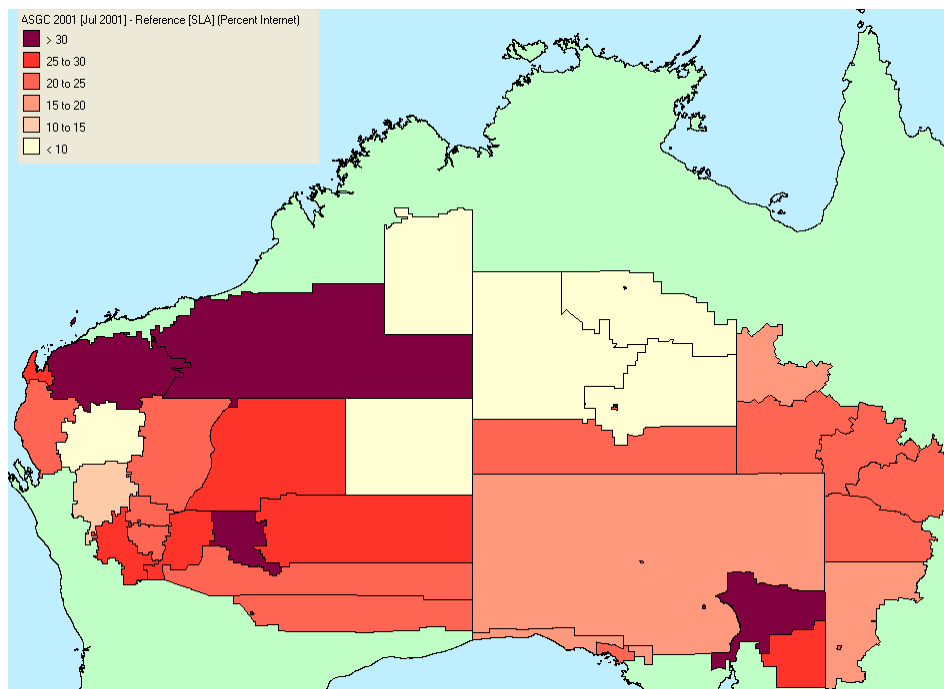

Source: ABS (2002b); map created with ABS (2003a).

An indication of the advanced communication technologies available across desert
Australia is difficult to ascertain. Undoubtedly there has been significant infrastructure
rollout in the wake of programs such as Networking the Nation, the National
Communications Fund and State/Territory-initiated programs such as the Learning and
Technology in Schools (LATIS) in the Northern Territory, the telecentre rollout in
Western Australia, and the Linking the Lands Program in north-west South Australia.
Many other infrastructure development programs were funded through the Rural
Transaction program of the Department of Transport and Regional Affairs, although the
majority of those established on remote Indigenous communities were outside the
desert region and on communities with populations large enough to be financially
viable (DCITA 2003).

Figure 3 indicates the satellite rollout sites across southern and central Northern
Territory as part of the LATIS program undertaken in 2001 and 2002. While the
diagram depicts an extensive infrastructure rollout, the setting-up and use of the
technologies was fraught. The review of secondary education in the Northern Territory
undertaken in 2003 identified that, in some communities, more than two years after the
rollout, computers were just being unpacked from boxes and professional development
for teachers in using the LATIS network system was just beginning (Northern Territory
Government 2004). Skills shortages, high staff turnover and delivering services over
vast areas further compound innovative effort.

Figure 3: LATIS 2001–02 satellite rollout
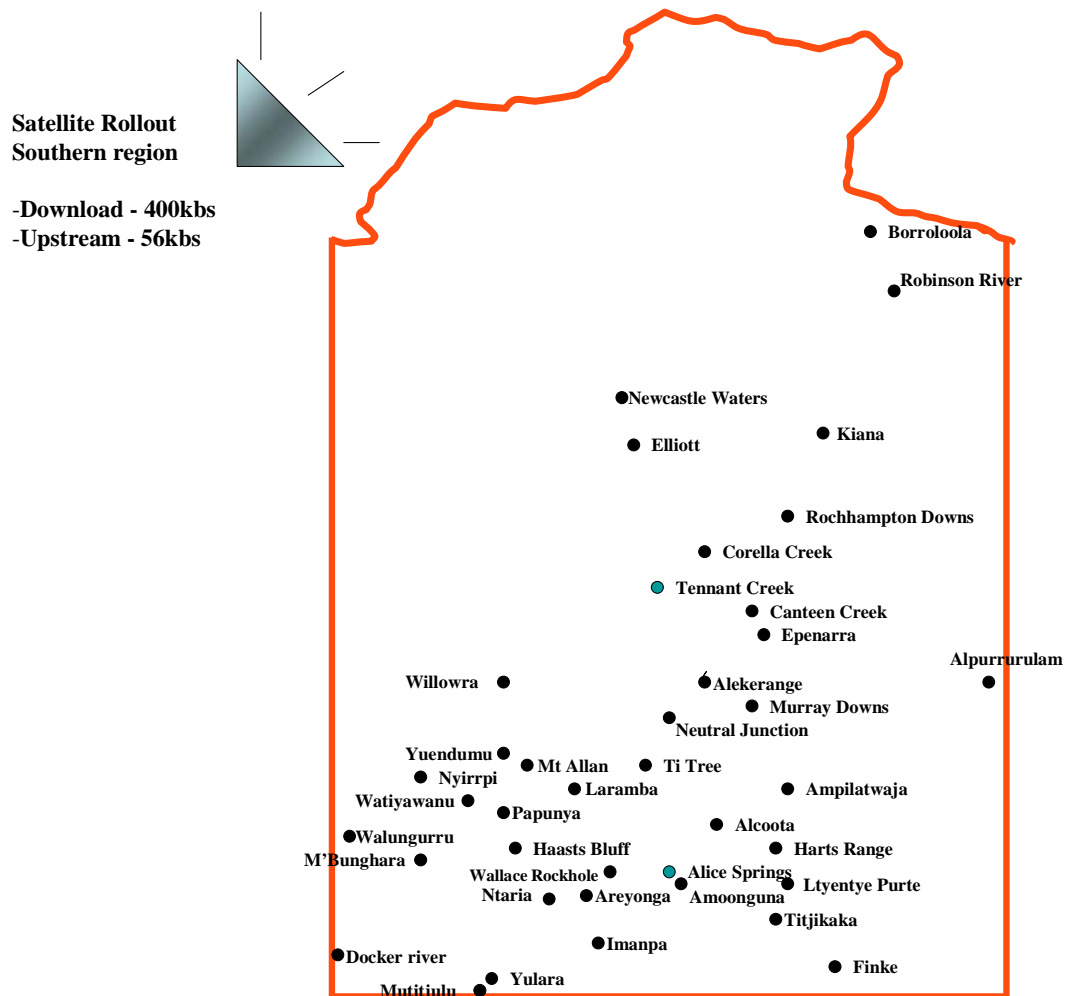
Source: NTDEET (2001)

Communications infrastructure

Like essential services infrastructure development and maintenance on remote Indigenous communications, telecommunications infrastructure development stems from a plethora of Commonwealth and State/Territory programs and a range of funding programs across numerous government departments, and in association with a range of corporations and agencies, both public and private.

A study into Australian ICT policies for education and training has been undertaken by Kearns and Grant (2002), and identified that, while at the national level a 'strategic framework for the information economy has been developed to provide a whole-of-government perspective in national responses to the information economy' (p.2), jurisdictions differ in their approaches to infrastructure development and policy, and sectors of education and training differ in their uptake of new flexible approaches to learning. While cross-government and inter-department coordination of programs is on the agenda, activity remains scattered and fragmented. In particular, the report notes that 'digital divide' issues remain systemic and at risk of being further exacerbated (p.80).

The varying threads of effort in expanding ICT infrastructure, new modes of learning and developing Australians' technological skills and capabilities have in recent times tended to converge on remote Australia. The Telecommunications Action Plan for Remote Indigenous Communities (TAPRIC) and the subsequent Regional Telecommunications Inquiry (RTI) have focused endeavour on the supply of the necessary infrastructure via funding programs and policy regimes. These include expansion of Telstra's 'universal service obligation', the Higher Bandwidth Incentive Scheme and an array of programs encompassing mobile education programs, basic information technology (IT) training and IT support schemes, as well as online content development in Indigenous languages.

Since 1997 there have been 57 Networking the Nation projects benefiting Indigenous communities across desert Australia (DCITA 2002). The bulk of these have been targeted at infrastructure development, including establishing community access centres and terrestrial and satellite networks, as well as telecommunication needs and assessment planning, and some training and awareness activities. It is interesting to note that, while the range of grant recipients has been diverse, few have directly targeted the enhancement of e-learning opportunities for desert Indigenous peoples, or indeed had explicit links to the formal VET system. Furthermore, the ongoing viability of services established under Networking the Nation projects, as well as most other grant programs from a plethora of State/Territory and Commonwealth agencies, has been highlighted as a critical issue. Most projects will require ongoing support after the initial funding ceases and many are at risk of folding, despite the significant investment in infrastructure (DCITA 2003). In a study on the digital divide issues in Roeburne in the Pilbara region of Western Australia, Turk (2002) identifies the negative impact of competitive business-oriented grants-based models. He states that 'Indigenous communities are among those with the greatest needs and are also those with the least availability of skills necessary to apply for grants and to successfully administer the "businesses" that they demand' (p.12).

Kearns and Grant (2002) identify that, like other Organisation for Economic Co-operation and Development (OECD) countries, Australia's response to the challenges of the information society has progressed through a number of phases. These have been an initial rolling-out phase, followed by a mainstreaming phase concerned with integrating ICTs into the work of schools, government agencies and industry. In some ways this progression can be seen as a movement from supply-focused strategies to

more demand-focused ones, where emphasis begins to shift from technical infrastructure issues to the development of e-content, e-practices and user-friendly interfaces to support online service delivery, communication and e-learning opportunities. As noted in a recent discussion paper from the Australian Government Information Management Office, 'access cannot be confined to questions of opportunities to access physical infrastructure nor can it be separated from usability … access is co-produced in the making of the technology' (Dugdale et al. 2004, pp.1–2). Furthermore, evidence from international studies on ICTs and their development highlights the importance of locating the use and potential of ICTs within a sustainable development and poverty reduction framework rather than focusing on merely securing physical access to the technologies per se (Curtain 2003).

In many ways the 'installation' phase is still taking place across remote desert Australia, particularly as the process of transferring the technologies confronts local contexts and cultures. In these settings, issues of affordability, sustainability and the function and purpose to which new technologies will be put, demand focused attention. The establishment of community access centres in 'hub' or larger communities has been identified by TAPRIC as a key strategy to enable equitable access across the desert. However, given the economic profiles of this region, it has also been estimated that each access centre will need to be subsidised to the tune of AUD$80,000 per annum. User-pays strategies tend to run aground where the bulk of the populace are welfare-dependent (DCITA 2003).

There are, however, a wealth of Indigenous media organisations across the country including a number in desert regions such as the Central Australian Aboriginal Media Association (CAAMA) (http://www.caama.com.au) and the Pilbara and Kimberley Aboriginal Media (PAKAM) (http://www.pakam.com.au) and Warlpiri Media (http://www.warlpiri.com.au). Established in the early 1980s through the Remote Community Television Service (RCTS) and the Broadcasting in Remote Communities Scheme (BRACS), these initiatives enabled the development of strong Indigenous media institutions and 'culturally authentic forms of expression' through media (Meadows 2000, p.2). Rather than providing an alternative media service, Indigenous media provides a first level of service that explicitly supports cultural and language maintenance and regeneration, and counters much of the mainstream misrepresentation of Indigenous peoples (Meadows 2000; O'Regan & Batty 1993). It enables local radio and video production in an estimated 50 languages Australia-wide and language-region-based dissemination across the vast tracks of Australia's outback. There are also a significant number of programs and documentaries developed by Indigenous media organisations such as (the now) ATSIC TV and Imparja Television (DCITA 2004).

The rollout of new media technologies—infrastructure and resources—has largely occurred without reference to existing assets and their use, or tapped into the range of local skills and experience developed over the past 20 years. For example, most Indigenous radio networks, such as the Pintubi, Anmatjerre, Warlpiri Radio Network (PAW) which broadcasts across the Warlpiri language areas of the desert, utilise computerised databases from which broadcasters (local volunteers and/or CDEP workers) select and play material. Log-on and telephone requests can also be made. While there is a depth of media skills and experience, the purpose of participating in such activity seems to be more about 'carrying aspects of Warlpiri sociality across an ever expanding social field' (Hinkson 2003, p.13) than playing favourite songs or gaining work experience. In effect this is both cultural maintenance and the cultural construction of new ways of being Warlpiri in the digital age. These skills sets and ways of using technology are rarely, if ever, mentioned when access centres or telecentres

are deployed to remote communities, despite the significant amount of formal VET in broadcasting systems that has occurred across the desert through BRACS (DPC 2003).

Indigenous organisations such as Pitjantjatjara Yunkunytjatjara Communications (PYComm) have also led an expansion from television and radio services to computer-based cultural databases and Internet-based information and news services for the Pitjantjatjara Lands in South Australia. These initiatives build on the forms of cultural expression through media that have been developing over many years and incorporate new technologies to these purposes (see http://www.waru.com.au). It is perhaps arguable that bedding down the use and knowledge of new media technologies in culturally appropriate ways is the necessary first step in enabling an expanded use of the technologies for purposes such as mainstream education and training. This is certainly part of the vision and plan for the Waru site, although formal VET will focus initially on skilling up locally based ICT technicians as a means of both sustaining the service and providing immediate work for people living on the land.

Recent initiatives stemming from TAPRIC and the RTI have allocated around AUD$5 million for IT training and support initiatives through telecentres in Western Australia, the Outback Connect Project in South Australia, Desert in the Northern Territory and the Warlpiri media association PAW project (Coonan 2004). All of these initiatives target Indigenous residents and focus on non-accredited training activities. While a clear example of using funding to expand the existing skills and assets within communities, these initiatives remain largely outside the formal VET system. The question of how much coordination or collaboration between Australian Government departments such as the Department of Education, Science and Training (DEST) and the Department of Communication, Information Technology and the Arts (DCITA), is occurring and how formal training activities can be positioned to enable ongoing pathways from non-accredited activities, particularly for Indigenous media workers, needs to be asked. Skilled and qualified local workers are indeed one step towards the ongoing sustainability of ICT activities in desert regions, even if they need to be supported by external funding.

Digital realities

There is a strong association between per capita income and the use of new ICTs such as computers and the Internet (Curtain 2003, p.4). In Australia it is also clear that those who suffer socioeconomic disadvantage and who are more likely to be dependent on government services are also less likely to have the capacity and ability to use online technologies (Dugdale et al. 2004). This distinction between the information 'haves' and 'have nots', within well-developed post-colonial countries like Australia and the United States, has perhaps the greatest impact in Indigenous communities (ANTA 2001; NTIA 1999). Socioeconomic disadvantage usually correlates with poor educational and employment outcomes and poor health (Haberkorn et al. 2004).

Data from the NCVER (2004) indicate educational activities and outcomes for desert Indigenous adults. Unlike most other sectors of education, Indigenous desert peoples' participation rates in VET are extremely high, although pass rates remain poor. More than half are participating at AQF Certificates I and II, and these make up the bulk of those studying in mixed-field enrolments, subject-only enrolments and the creative arts. This perhaps reflects the increased focus in recent years on literacy and numeracy skilling, the background of educational need, given poor outcomes from compulsory schooling, the mismatch between mainstream occupations and skills training, and the

nature of work and endeavour on remote desert communities. Only 1.4% of desert Indigenous students are undertaking study in the field of ICT.

Evidence from international studies highlights that barriers to the use of ICTs include issues of infrastructure and skills, but also the hard-to-address issues such as gender roles, managerial control over ICT access and sociocultural issues, 'particularly where there is a conflict between local culture and the cultural assumptions within ICT systems' (Curtain 2003, p.5). It is therefore not surprising that the results of a preliminary environmental scan of ICT use across Indigenous desert Australia undertaken by the research team, indicate that there are activities occurring, infrastructure and affordability issues notwithstanding, but that these are concentrated around the following:

- Indigenous history and knowledge-archiving projects such as the Ara Irititja program on the Pitjantjatjara Lands in north-west South Australia (http://www.irititja.com)

- *Plants for People* database development across communities in the Northern Territory and unincorporated areas of South Australia and parts of Western Australia using visual and audio tools and aiming to collate and protect traditional Indigenous knowledge of plants (http://downloads.publish.csiro.au/ecos/ecos_download.cfm?article_id=EC123p22.pdf&issue_id=123&issue_year=2005)

- utilisation of 'new' technologies for 'old' purposes such as inter-community communication networks for social and safety purposes via UHF radio (Centre for Appropriate Technology 2004)

- development of local language-based content around health and lifestyle issues unique to discrete desert communities such as the 'sex, yum ouch' resources developed for and with Indigenous peoples on the Ngaanyatjarra/Pitjantjatjara lands (http://www.isee-ilearn.com.au) and the 'Ara Winki: Life on the Pitjantjatjara Lands CD-ROM (http://www.rightside.com.au/Ara_Winki.php)

- e-commerce activities initiated by Indigenous Arts Centres (http://www.desart.com.au; http://www.nyinkkanyunyu.com.au)

- a multitude of 'not quite up and running' community access centres, rural transaction centres and e-Cafs on remote communities whose primary objectives are related to service access—banking, Centrelink (Turk 2002)

- a number of public Internet cafes in large service centres (including in public libraries) of which only a handful are offering formal training (http://www.deadlymob.org/default.cfm; http://www.lyl.nt.gov.au)

- telecentres in Western Australia, including an intended eight on remote communities offering service interfaces rather than formal educational activity (http://www.dlgrd.wa.gov.au/regionDev/telecentre.asp; http://www.wafuturefund.riotinto.com/partnerinfo.asp?projectID=43)

- an array of training, awareness activities and resource construction activities driven by a handful of individual and organisational champions, usually Indigenous (http://www.waru.org.au; http://www.deadlymob.org.au/col3_ob.cfm?randid=931204)

These activities enhance local information flows to support social and kin networks and knowledge exchange and cultural activities. They are dedicated to preserving culture, language and traditional knowledge, supporting Indigenous e-commerce and access to banking and other services online. In many ways these uses are more concerned with local needs emerging from local sociopolitical and cultural contexts rather than with policies or equity goals defined and assigned from elsewhere, however 'culturally appropriate'. Indigenous peoples across the desert are engaging with new ICTs, but for their own purposes, whatever they might be. ICT, as a medium for enabling flexible

approaches to learning, necessitates improved access to ICT infrastructure in remote desert areas and this will ultimately depend on how educational policies and practice can engage with local need, relevance and purpose rather than merely being a tool for distributing predefined services which ultimately may have a tenuous link to tangible outcomes. Achieving a Certificate III via flexible learning without a corresponding pathway to improved local livelihoods or employment opportunities will have minimal impact. It is important to note that, however learning is mediated, it needs to be integrated within initiatives that bed down real work and livelihood opportunities.

The RTI 2002 recommended that an audit of ICT infrastructure on remote Indigenous communities be undertaken. Similar audits identifying the nature of the use of such infrastructure to support basic communications, local information flows, service access and educational activity are also required. In particular, there is a need to focus on ways in which desert Indigenous dwellers are embracing new technologies and building educational resources and approaches that enhance, rather than sideline, engagement with ICTs. The structural and cost implications for training organisations seeking to expand desert delivery by identifying and building on the strengths of how and why their learners are engaging with new technologies also needs to be explored. Bandwidth access and cost, access to professional development and technical support impact as much at the delivery end as at the learner end. To this end the research team undertook a small survey of e-learning activity across the desert. The preliminary findings are presented overleaf.

Preliminary survey of e-learning activity across the desert

In order to gather current evidence of e-learning activity by Indigenous people across desert Australia, a preliminary phone survey was undertaken. This involved cold-calling a range of institutions and individuals, and following through with a semi-structured interview based on the following topic areas:

- What is happening across the desert in terms of utilising new technologies to support improved learning pathways for Indigenous peoples?

- What is the difference, if any, between the five jurisdictions (States, Territory) in their use and support of using innovative technologies?

- What infrastructure issues are still having impact, eg technical hiccups or lack of support, connection, costs, hardware, software etc?

- What learning issues are having an impact, eg literacy and numeracy, inappropriate resources?

- How far has professional development for teachers in e-learning reached across the desert?

- Are there any examples of outstanding innovation?

A total of 27 interviews were undertaken across the five jurisdictions of the desert. Sixteen of these were with staff from registered training organisations (RTOs) or State/Territory employment and training authorities, with the remaining interviews including staff from telecentres and Indigenous organisations. Participant information sheets and consent forms were distributed.

Summary of findings

The findings from this preliminary survey are summarised under five key headings below.

- *Institutional policies*
There appears to be a difference between the intended outcomes, or policies of many institutions in this area and the actual practice on the ground. Many respondents felt that they were 'making progress' but that there were still significant obstacles to be overcome.

These obstacles related to four core areas, the most significant being teacher skills in relation to e-learning and especially the essential technology skills that form the basis of much of the delivery. A number of people consulted expressed reservations about their skills and the availability of technology.

- *Available resources*
Most respondents identified that the resources available for use were not always suitable, especially for the Indigenous students in remote communities across the desert areas.

Issues such as the high text content and the assumed literacy levels of students were raised as barriers that need to be broken down before the resources would be suitable. In addition, the overall context and 'look and feel' of many of the resources was raised as being inappropriate, as the following quote about Toolbox resources demonstrates.

- That it is very 'look and feel' and you do get levels of interaction and a multi-sensory kind of experience from the technology, and yet, in a way, that is partly what makes it even … which makes those mismatches and those misalignments with our situation here, even more obvious. And, that's an issue in itself, because it is, it does get in the way.

- You know, you can't use a lot of those things with our students because our students aren't going to relate to them and our teachers don't relate to them.

- But, even at the next level down, it's … a shame because some of the resources in those Toolboxes can be very useful and very helpful whether they're adapted or whether they're just taken out and used as a separate thing. But people don't have time to get to that level of knowing something because they get put off by the fact that it looks wrong and it sounds wrong and it isn't going to fit with our student situation.

Discussions with people in relation to e-learning resources, such as Toolboxes, indicated that, while many staff see them as good resources for mainstream education, they do not believe them to be appropriate for remote Indigenous students. This was largely due to issues of context, whereby it was felt the scenarios in the Toolboxes were outside students' experiences or not suitable in terms of literacy.

The development of other resources that could be used in e-learning was mentioned, and even the customisation of Toolboxes to make them more appropriate, but no solid evidence was found that this had been done, only that this was being talked about within some institutions. Some electronic resources and websites were being used, but primarily in face-to-face class settings. Most of these seemed to be pilots or individual efforts.

In addition, some resources were being used from existing online sources such as the British Broadcasting Corporation's (BBC) website online English materials. The free access to the resource was given as a major reason for this adoption. Again the use was in face-to-face class contexts and not delivered online when students were in their home communities. One respondent commented:

> We don't deliver into the communities using computers. They exist but we don't have anything useful to put onto the web that would enhance student learning.

- *Access and skills*

Many respondents identified that the majority of their Indigenous learners did not have access to the technology nor the necessary skills to enable them participate. There is some evidence that these skills are beginning to be developed in those places where the technology is available, although many of these are in the larger service centres—Deadly Mob Internet Café in Alice Springs. The comment was made that, in some places where telecentres exist, no Indigenous students were currently using them. In other places, the resources for such training in terms of the computers and Internet connections did not exist. In other instances, these problems have been solved with satellite technology. In the words of another respondent:

> While there are computers in some of the places where we teach most of them are powered by diesel generators. The price of diesel has gone right up so communities have to choose what they will power. Lots of the time the computers miss out. So there is no consistency of use.

- *Teaching strategies*

There would seem to be a lack of awareness of e-learning strategies that bring teachers and students together through the use of technology. Many teachers admitted to not really being sure of what was implied by e-learning, nor do they understand how it works. They had a positive attitude to the concept but were unclear about the day-to-day practicalities of a workable model. In many ways e-learning is conceived as inseparable from products such as Toolboxes. Where Toolboxes are unavailable or deemed inappropriate, e-learning possibilities tend to falter.

- *Emerging activities*

Outside the formal VET training areas there is increasing activity, with many communities reporting that Indigenous people were conducting Internet banking and other similar activities online. There were also a number of cultural projects involving multimedia and Internet technologies that showed a significant level of technology complexity and online elements. There is also evidence of e-learning materials being developed and online technologies being used by some groups (Warlpiri media and PYComm as discussed earlier in the report).

There are also signs of activity in the development of cultural multimedia in a range of contexts. For example, in relation to land management, there are the biodiversity and cultural heritage programs on Indigenous Protected Areas on the Anangu Pitjantjatjara Lands where Indigenous knowledge and technical knowledge such as that enabled through Geographical Information Systems (GIS) are being combined to develop biodiversity plans and activities (DEH 2003). In the field of Indigenous health, there is the recently developed MARVIN resource for disseminating health information to Indigenous peoples (DHCS 2004). In financial management, activities such as the '*Money $tory*' products have been developed for Indigenous community councils (http://www.littlefish.com.au). A great deal of positive sentiment within the Indigenous communities in relation to computers and culture and doing business is being generated.

A number of Indigenous organisations are utilising their ICT facilities to run non-accredited basic IT skills courses. Others are using their websites to enhance local information flows and IT readiness amongst their constituency by updating sites regularly with local news, photos and reports, often in the specific language and with highly visual presentations. Many are supporting Indigenous community residents to access services online, particularly banking, in recognition of the absence of such services in communities.

In essence it would appear that Indigenous desert peoples' use of ICT is increasing. However, it is important to note that local relevance and local content, both audio and visual, enables a threshold of use and interest that needs to be harnessed, particularly in educational endeavour. This will perhaps demand greater and more innovative processes for resource development than those undertaken to date. There is potential for the Indigenous media sector to play a key role in such development, providing both local jobs and local relevance. Finding the means to develop and maintain cross-sector partnerships and relationships is a key challenge.

Findings and conclusion

This study set out to map the picture of learning utilising ICTs in VET and ACE programs with Indigenous desert dwellers and identify the issues impacting on such activities.

The key findings are summarised as follows:

- There has been and is significant policy intent and practice targeting the mainstreaming of flexible learning across the VET system. These efforts have had minor impact to date in shaping learning activities with Indigenous desert peoples.

- The very nature of Indigenous settlements across desert Australia—their small size, dispersion and lack of access to compulsory education services—highlights both the potential of and constraints experienced in adopting e-learning activities.

- The types of constraints identified include infrastructure issues—ICT equipment, power supplies and affordable bandwidth and access—as well as the poor prior education experiences of Indigenous peoples and the uncertainty of educators and trainers in adopting new practices.

- Most of desert Australia is in the installation phase in terms of accessing ICTs. With only half of all desert communities having access to a payphone, securing lifeline communications access remains a high priority. Innovative methods utilising 'new' technologies for 'old' purposes are occurring to meet this demand.

- Innovative technical design of hardware and software which is responsive to the geographical and climatic challenges of desert Australia as well as the cultural and language diversity is critical. Where this is occurring (for example, Anangu Pitjantjatjara Lands), the technologies are facilitating both local and intercultural communication and informal learning and skills development.

- There has been a significant rollout of technology, including satellites and computer hardware, through programs funded by the sale of Telstra. Many of these have targeted the establishment of community access centres in 'hub' communities. Issues of ongoing affordability and sustainability are problematic.

- Computers and new media are being utilised in face-to-face delivery of a range of programs, but client-suited resources are very limited.

- Institutional policies and interoperability issues between providers and communities are a significant barrier.

- The literacy and numeracy skills of Indigenous desert learners are seen as a barrier to the effective use of VET resources, such as Toolboxes.

- The skills of teachers and trainers in adapting new technologies and resources to suit their learners' need focused development. The isolation and/or extensive travel typical of teaching work across the desert limits professional development opportunities.

- The development of local resources utilising audio and visual files in Indigenous languages and English is seen as the critical next step, one which builds upon the emerging use of ICTs by Indigenous desert peoples outside the education sectors.

- There is a strong and well-established Indigenous media sector operating across the desert. It features radio networks across vast areas of lands, a mix of local and other

content, and a substantial depth of skilled operators who are also versatile in a range of new technologies. Across the desert there would appear to be few educational or flexible learning initiatives tapping into the strengths of this sector.

- The 'Champions' of innovative use of new technologies across the desert are Indigenous organisations normally servicing a particular language group, or region, rather than training providers or external agencies.

- The focus of these existing initiatives is on enhancing local information flows and service access as well as enabling local people to develop and post stories and information in English and local languages, and developing the skills to maintain and troubleshoot systems. Formal education initiatives are yet to link in and support such activities to any great degree.

- Cultural inclusiveness and local perspectives can be facilitated through ICT-mediated activities since these allow local Indigenous peoples both voice and accurate representation. This seems to be the major aim of Indigenous people currently engaging with new technologies. Externally developed products and resources (eg, Toolboxes) need to enhance rather than compete with such engagement.

Infrastructure and access issues are critical barriers to the uptake of ICT, for any purpose, across desert Australia. However, addressing these issues, given the unique contexts of Indigenous settlements patterns, cultures and lifestyles in the desert, requires innovation in technology design and technology choices, as well as a shift from a technology-driven model to a people-centred approach to development. This means assessing the types of ICT use and functions already emerging amongst Indigenous desert peoples, and implementing the infrastructure, energy and maintenance systems that are sustainable and affordable. It means questioning the *carte blanche* transfer of infrastructure from mainstream Australia that tends to presume different usage patterns, access to help and maintenance services, and financial support and viability options, quite alien to the contexts that apply in discrete Indigenous communities. It means developing strategic, innovative and integrated approaches to the end-users of the technologies, deploying the types of technologies enabling such use and subsequently harnessing the learning and employment opportunities these may bring. It means coordinated and sustainable administrative and funding approaches to facilitate community-driven aspirations.

In particular, attention needs to be given to the potential of ICT to enable expanded livelihood opportunities for Indigenous desert peoples. This does not necessarily mean starting with the delivery of qualifications, but actually creating the types of opportunities such as those emerging through Indigenous media activities, Indigenous art e-commerce activities and Indigenous knowledge and biodiversity conservation practices. Local use, local content and the learning and employment opportunities already existing within such activities can perhaps provide a critical step for Indigenous desert peoples into the digital future and into, as Noel Pearson (2001) would argue, the 'real economy'. One issue emerging from this research is that Indigenous peoples are keen to use new technologies, especially when such use enhances cultural and kin networks and embraces Indigenous practices and knowledge structures (DCITA 2004; ATSIC 1999). To the extent that education programs match local aspirations and emerging livelihood opportunities, they will have an impact, whether or not such learning is mediated through technology. However, the opportunity exists for the innovative use of new technologies to begin to reduce the disparities between desert realities and emerging opportunities. The leadership of Indigenous agencies such as PYComm and Walpiri Media provides exciting models for such innovative approaches.

The initial scoping of issues and activities relating to e-learning with Indigenous desert peoples presented in this report underscores the importance of undertaking more comprehensive research that informs policy in this area. Rather than focusing on the penetration of ICT-mediated learning activities or the uptake of resources such as Toolboxes, an analysis which explores the 'how, what and why' of Indigenous engagement with new technologies and media across the desert is required. If, for example, cultural maintenance, protection and transmission are indeed an inducement for engagement with ICTs, educational strategies that enable acquisition of the skills to develop such local responses and activities will be critical. Appropriate intellectual and cultural property protocols for such activities will also be critical. The challenge for the VET system is to harness effort towards securing the types of outcomes Indigenous desert people are already realising through new technologies—cultural integrity and strength, social connection and cohesion, enterprise and knowledge-based economies. This means being able to be responsive to emerging demand and innovating cross-sector and coordinated solutions, rather than supplying sector-specific services or products initiated and conceived elsewhere.

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