Volume 1, Issue 4   **December 2005**

ICT for development in Asia and the Pacific

Chief Editors:

Stewart Marshall
The University of the West Indies, Barbados, West Indies

Wal Taylor
Cape Peninsula University of Technology, South Africa

Editorial Team

Open Access Policy

This journal provides open access to all of its content on the principle that making research freely available to the public supports a greater global exchange of knowledge. Such access is associated with increased readership and increased citation of an author's work. For more information on this approach, see the Public Knowledge Project, which has designed this system to improve the scholarly and public quality of research.

Archiving

This journal utilizes the LOCKSS system to create a distributed archiving system among participating libraries and permits those libraries to create permanent archives of the journal for purposes of preservation and restoration.

Publication Frequency

There will be five issues of IJEDICT per year, in a continuous publication cycle. Articles will be published immediately in the current issue of IJEDICT on completion of the review/editing process.

Publication Classification Details

Key title: International journal of education and development using information and communication technology
Abbreviated key title: Int. j. educ. dev. using inf. commun. technol.

ISSN: 1814-0556

About the journal

The International Journal of Education and Development using Information and Communication Technology (IJEDICT) is an e-journal that provides free and open access to all of its content.

Regional economies and communities are facing increasing economic, social and cultural hardship in many parts of the world as economies adjust to the demands of the new orders of commerce and governance. A part of this is the paradox that regional economies and communities can be either enhanced or disadvantaged by information and communication technologies (ICT) products and services. The potential enhancement comes from the increased social, economic and cultural capital that comes from harnessing ICT products and services in a community sense. The disadvantage comes from the power that ICT products and services have in centralizing commerce, service provision and governance away from the regional community.

Unless we get a greater level of access AND adoption of information and communication technology (ICT) for education and development at community level, we will miss the opportunity to turn the "digital divide into a digital opportunity for all, particularly for those who risk being left behind and being further marginalised" ("Declaration of Principles", WSIS-03/Geneva/Doc/4-E, Principle 10). The International Journal of Education and Development using Information and Communication Technology (IJEDICT) is an e-journal, with free and open access, that seeks to address this issue.

IJEDICT aims to strengthen links between research and practice in ICT in education and development in hitherto less developed parts of the world, e.g., developing countries (especially small states), and rural and remote regions of developed countries. The emphasis is on providing a space for researchers, practitioners and theoreticians to jointly explore ideas using an eclectic mix of research methods and disciplines. It brings together research, action research and case studies in order to assist in the transfer of best practice, the development of policy and the creation of theory. Thus, IJEDICT is of interest to a wide-ranging audience of researchers, policy-makers, practitioners, government officers and other professionals involved in education or development in communities throughout the world.

Coverage

IJEDICT has a major emphasis on the use of ICT in education and development in hitherto less developed parts of the world. The journal includes descriptive case studies about ICT projects in developing countries and in rural and remote regions of developed countries, as well research articles

evaluating such projects, developing policy or creating theory. Topics covered include, but are not limited to, the following areas:

Community informatics and development in remote, rural and regional areas;
Developing regional industries (e.g., agriculture, tourism) with ICT;
E-Commerce and Business in remote, rural and regional areas;
ICT for micro, small and medium enterprises;
ICT in local governance;
E-Democracy;
ICT and social marketing;
ICT enabled healthcare for remote, rural and regional consumers;
Social epidemiology and virtual communities;
Education: distance, e-learning, flexible learning and delivery, open learning, e-literacy.

Notification of new articles

Sign up to receive regular notification of new IJEDICT issues and articles at:
http://ijedict.dec.uwi.edu/notification.php

Call for Papers/Articles

IJEDICT comprises: a "research articles" section for academic, peer-reviewed articles; a "studies from the field" section for edited (but not peer reviewed) case studies; a "project sheets" section for brief descriptions of relevant projects; a "notes from the field" section for working papers, and other commentaries on relevant topics; and, a "book/media review" section for book, software and other media reviews.

The Editors welcome submissions at: http://ijedict.dec.uwi.edu/submissions.php

Section Policies

Refereed Articles

This section contains articles that have been reviewed by at least two academic peers in a process that ensures that authors and reviewers remain unknown to one another. To be included in this section, articles must be based on research and scholarship, and contribute "new" and significant knowledge to the field of ICT for education and/or development. Reviewers for research articles are selected from the Editorial Board, the Review Board and the Peer Review Panel.

Book/Media Reviews

This section contains editorially reviewed reviews of books that are relevant to the use of ICT in education and/or development.

From the Field

This section includes editorially reviewed case studies (2000-5000 words) of the use of ICT in education and/or development.

Invited Articles

As the name suggests, "Invited Articles" are ones specially requested by the Editors. Generally, they are editorially reviewed.

Project Sheets

This section includes brief descriptions (500-1000 words) of education and development projects that utilise ICT.

Notes from the Field

This section contains short comments or notes that are useful for practitioners working in the field of ICT in education and/or development.

Editorial

This section contains the editorial written by the editors for the specific issue.

Submission of Articles

Authors can upload their papers, as well as data sets, research instruments, and source documents through the journal's Submissions section. They can submit their papers, figures, and appendices in a variety of file formats, including Microsoft Word, WordPerfect, or RTF (Rich Text Format).

Registration and login are required to submit items online and to check the status of current submissions.

Author Guidelines

General Information

o   Submissions are invited for all sections of this journal. Refereed articles should be between 3,500 and 6000 words in length. Project descriptions for the "Project Sheets" section should be between 500-1000 words in length. Submissions for other sections of the journal can be any length.
o   Submissions can be in Microsoft Word, Rich Text Format (RTF), equivalent Open Source document file format, or HTML format.
o   Please use Arial 12-point font for the Title, which should be in bold "title" (upper and lower) case.
o   Use Arial 10-point font for the remainder of your article.
o   First level headings should be in bold uppercase, and second level headings in bold "title" (upper and lower) case.
o   No footnotes please - instead use endnotes.
o   Photographs, maps, diagrams and other audio-visual aids are encouraged. Please include these in the text where and as they should appear. Please provide images in gif or jpeg formats.

Abstracts

Please provide an abstract of approximately 100 words. The abstract should be included with the rest of your article in the submission file, but it should also be copied into the appropriate text box during the on-line submission process.

Biography

Please supply a short (100 word) biography for each author. This should include the name, rank, institution, institutional address, and email address. Do not place the biography in your submission file but copy it into the appropriate text box during the on-line submission process.

Style

Submitted manuscripts must be written in the Harvard editorial style:
o   References should relate only to material cited within the manuscript and be listed in alphabetical order, including the author's name, complete title of the cited work, title of the source, volume, issue, year of publication, and pages cited. See the following examples:

   Marshall, S. (1991), "A genre-based approach to the teaching of report-writing". English for Specific Purposes, vol. 10, no.1, pp. 3-13.

   Taylor, W. & Marshall, S. (2002), "Collaboration: the Key to Establishing Community Networks in Regional Australia", Informing Science, vol. 5, pp. 155-162.

Marshall, S., Taylor, W., & Yu, X. (eds.) (2003), Closing the Digital Divide: Transforming Regional Economies and Communities with Information Technology, Greenwood Publishing, Westport CT.

o Citations in the text should include the author's name and year of publication where you use the source in the text, as in the following examples:

In this way, information technology can be seen to effect and influence changes in organisational structure (Orlikowski & Robey 1991).

Edwards (1995, p.250) views the globalising of distance education as "invested with the uniform cultural messages of modernity".

Globalisation, especially in relation to open and distance education, will reduce the tolerance of difference and so "how can local issues and contexts be addressed?" (Evans 1995, p.314).

o Further information about the Harvard editorial style can be found at:

http://lisweb.curtin.edu.au/referencing/harvard.html
http://www.library.uwa.edu.au/guides/citingsources/harvard.html

Submission Preparation Checklist (all items required)

o The submission has not been previously published nor is it before another journal for consideration; or an explanation has been provided in Comments to the Editor.

o The submission file is in Microsoft Word, Rich Text Format (RTF), equivalent Open Source document file format, or HTML format.

o All URL addresses are activated and ready to click (e.g., http://pkp.ubc.ca).

o The text is single-spaced; uses Arial 10-point font; employs italics, rather than underlining (except with URL addresses in HTML documents); with figures and tables placed within the text, rather than at the end.

o A 100 word abstract has been prepared and included in the submission file.

o A 100 word biography of the author has been prepared but NOT included in the submission file (the biography will be submitted separately with the other metadata).

o The text meets this journal's formatting requirements outlined in the Author Guidelines found in About the Journal. If the journal section is peer reviewed, author identification has been removed, and "Author" and year have been used in the bibliography and footnotes, instead of authors' names, titles, etc. The author's name has been removed from the document's Properties, which in Microsoft Word is found in the File menu.

Copyright Notice

Privacy Statement

The names and email addresses entered in this journal site will be used exclusively for the stated purposes of this journal and will not be made available for any other purpose or to any other party.

Principal Contact and Mailing Address

Professor Stewart Marshall
Managing Editor, IJEDICT
The University of the West Indies Distance Education Centre
Cavehill Campus, Bridgetown, BARBADOS, West Indies
Phone: (+1 246) 417 4497;   Fax: (+1 246) 421 6753;   Email: stewartmar@gmail.com

Table of Contents

editorial

refereed articles

from the field

Editorial: ICT for development in Asia and the Pacific

Stewart Marshall
The University of the West Indies, Barbados, West Indies

Wal Taylor
Cape Peninsula University of Technology, Cape Town, South Africa

Welcome to the fourth issue of the International Journal of Education and Development using Information and Communication Technology (IJEDICT) - an e-journal that provides free and open access to all of its content.

IJEDICT emphasises collaboration across disciplines, across professions, across institutions, across sectors, and across continents in an attempt to freely share and promote best practice and best research. This fourth issue deals with information and communication technology (ICT) for development in Asia and the Pacific, and brings articles from and/or about India, Mongolia, South-East Asia, New Zealand and Australia.

In "Profiting from Empowerment? Investigating Dissemination Avenues for Educational Technology Content within an Emerging Market Solutions Project", Payal Arora explores the dissemination avenues of the Stills in Sync (SIS) folksongs product and its effects within the Inclusive Community (i-community) of HP in Kuppam, India. This community has functioned as a social and economic laboratory in which HP tested new technologies. Analyzing this test environment makes apparent the dichotomy between corporate responsibility and community development.

Sambuu Uyanga writes about "The usage of ICT for secondary education in Mongolia". The author presents the current situation of usage of ICT in secondary education in Mongolia, including national policies, strategies and programs, hardware and software, teaching staffs, informatics curriculum and related projects and initiatives. SWOT (Strength, Weakness, Opportunity, and Threat) analysis and conclusions are also presented.

Angelina Russo and Jerry Watkins, in their article "Digital Cultural Communication: Enabling new media and co-creation in South-East Asia" describe 'Digital Cultural Communication' as a new field of research and design which seeks to build a co-creative relationship between the cultural institution and the community by using new media to produce audience-focused cultural interactive experiences (Russo and Watkins 2005). The authors provide a number of examples from around Asia to demonstrate how individuals and communities can benefit from the economy and immediacy offered by new media to co-create and distribute distinctive cultural content to broader audiences.

Janet Toland and Pak Yoong, in their article "Learning Regions in New Zealand: The role of ICT", examine the potential for ICT to enhance the efforts of regions in New Zealand to achieve sustainable economic success, by improving the flows of knowledge, both within the region itself, and between the region and the outside world. Still in New Zealand, in "Business Undergraduates Learning Online: A One Semester Snapshot", Krassie Petrova and Rowena Sinclair report on research conducted at Auckland University of Technology in the second half of 2004 as part of a broad review of online learning in a business program. The study presented here was aimed at identifying key characteristics of student perceptions about the two online models implemented,

and the actual usage patterns of the online learning platform. It provided information about student perceptions of online learning and a picture of the online platform usage.

From Australia, the article "What role can educational multimedia play in narrowing the digital divide?" by Hilary Macleod explores the assertion that the development of educational multimedia has a key role to play in effectively reducing the impacts of the digital divide particularly in the context of developing nations. Facilitating the development of electronic literacy, culturally relevant online content and interfaces through the development of educational multimedia can assist the process of social inclusion within developing countries. Before examining the role of educational multimedia in this context, the article critically analyses the concept of the digital divide and why ICT has come to be seen as the panacea to the problems of global development. Also from Australia, Chris Murray, Jillian Condell and Peter Murray contend that Australian grain growers need to change their management approach to ensure their continued viability, but do not have the required knowledge and skills. They point out that professional development of farm partners has the potential to improve the viability of grain growers, and propose a model combining learning circles and action learning projects.

In "The Information Society and the Digital Divide: Some North-South comparisons", Bill Martin reviews the concepts of the Information Society and the Digital Divide in the context of national and international policies, many of which are techno-economic in nature and lacking a genuine social dimension. This social dimension must include attention to regulatory and access issues and critically, address core issues of poverty and living standards, including information poverty.

IJEDICT provides open access to all of its content on the principle that making research freely available to the public supports a greater global exchange of knowledge. Such access is associated with increased readership and increased citation of an author's work. For more information on this approach, see the Public Knowledge Project, which has designed this system to improve the scholarly and public quality of research, and which freely distributes the journal system as well as other software to support the open access publishing of scholarly resources.

IJEDICT seeks to support the community of researchers and practitioners involved in ICT for education and development, and we welcome feedback and suggestions as to how the journal can better serve this community.

Stewart Marshall and Wal Taylor

Chief Editors, IJEDICT

Digital Cultural Communication:
Enabling new media and co-creation in South-East Asia

Angelina Russo and Jerry Watkins
Queensland University of Technology, Australia

ABSTRACT

Digital Cultural Communication (DCC) is a new field of research and design which seeks to build
a co-creative relationship between the cultural institution and the community by using new media
to produce audience-focused cultural interactive experiences (Russo and Watkins 2005). By
situating the development of cultural communities within DCC, the institution adopts a more
representative curatorial practice and benefits through the creation of original community-derived
content which can form new digital collections. The community benefits through improved
'information literacy' – the skills required to use digital technologies to engage in both cultural
consumption and production (Russo and Watkins 2004) – and can go beyond being a
stakeholder of an institutional exhibition. Information literacy skills enable the community to both
produce and consume its own original cultural content, in the form of narratives, wikis, blogs,
vlogs or any other medium which is supported by the institution and connects to the audience.
The institution ceases to be the sole custodian of cultural experience; instead it provides co-
creative infrastructure for the community and distributes original cultural content to the audience
via multiple platforms – physical, online and broadcast.

This article uses a number of examples from around Asia to demonstrate how individuals and
communities can benefit from the economy and immediacy offered by new media to co-create
and distribute distinctive cultural content to broader audiences.

*Keywords: Digital Cultural Communication; community co-creation; information literacy; new
media.*

INTRODUCTION

Digital Cultural Communication came about due to the evolution of Virtual Heritage, a field which
began ten years ago. Virtual Heritage describes tangible elements of the built environment and
has been dominated by researchers undertaking cutting-edge visualization, augmented reality
and digitization projects. Virtual Heritage has been less focused on the social and cultural
opportunities which new media affords communities and the opportunities for new audiences to
be developed as a result of increased cultural representation (Forte 2005). For the most part, this
mission tends to focus on tools and methods for representing inaccessible historic sites and
whilst Virtual Heritage has broadened access to such sites, the field has often transferred the
linear curatorial communication model of the modern cultural institution into the online
environment. As a result, Virtual Heritage has not enjoyed widespread success with respect to
the creation of cultural e-communities.

This is not necessarily surprising given that in the late twentieth and early twenty first century, the
development of a critical mass of media and their impact on society presented such complex
institutional challenges, particularly in cultural institutions. The rise of social communication has
been pre-empted by the mutual remediation of telephone, television and computer (Bolter and
Grusin 2001, p.224). In that light, community co-creation could be considered the convergence of

memory, community, narrative and interaction. As audiences are given agency, their experiences with the interfaces of new media achieve new forms of interaction with the virtualized and dematerialized physical world. Community co-creation provides audiences with an agency where their individual experiences can bring together the social communication which relays the connections between memory, community, narrative and interaction. New media were defined as those forms which combined computing, communications and content through the process of convergence. While some of the questions of new media revolved around opportunities in representation - hence the rise of visualization - the contribution of new media would become their ability to produce new and otherwise unrealizable outcomes for social communication (Flew 2002, p.9-12).

DIGITAL CULTURAL COMMUNICATION

Shifts in entertainment and cultural tourism continue to impact upon the cultural sector. Global access to mass broadcast media; cyberspace and virtual reality technologies; video and interactive games, mobile technologies, the web, synchronous and asynchronous communication increasingly play significant roles in the consumption of cultural media. While these technologically based media continue to proliferate, 'site-specific' experiences which resemble museums - for instance, interpretive centers and theme parks - present challenges to the ways in which the museum and its audience conceptualize their experiences. These media use immersion in technology in an abstracted way by using mediated realities as a mechanism for drawing audiences into their knowledge base.

As both Bukatman and Morse suggest, less information comes to us via sensory, bodily experience while far more arrives in mediated, representational forms: "The relation between visual experience and cognition then...becomes increasingly crucial as a means of understanding the places available to the subject in this heavily technologized and electronically mediated culture" (Bukatman 1995, p.258). The separation of the visual and the haptic can sometimes result in an over-emphasis on the former: "visually based toys, displays and environments appeared, as if to compensate for the diminished role played by the senses" (Bukatman 1995, p.259). Although vision becomes detached from the body, it is reattached to an illusory body, that being the figure at the centre of the immersive experience - the one who enjoys the view.

The challenge for the contemporary cultural institution and one which is addressed by Digital Cultural Communication is to ensure that cultural content is not abandoned and that the value and durability of context is presented as much as the artifact itself. One of the reasons that immersion can be so deceptive in the cultural environment is that it limits the possibility for communities to partner with institutions. While they are engaged in effective and immersive interaction, this replaces effective communication of values or intention on the part of the audience. Witcomb (1999, p.104) suggests that - increasingly - the museum's role is one of translator and mediator and proposes that it see itself as involved in the production of cultural identity.

Digital Cultural Communication (DCC) examines relationships between cultural institutions, communities and audiences in order to create innovative cultural content by providing tools and methods for the design of compelling cultural interactive experiences across multiple platforms (physical, web, broadcast). The relationship between institution, e-community and audience can be illustrated by borrowing from Peirce's language of semiotics (in Mattleart and Mattleart 1998, p. 24). The community becomes the 'sign', the institution is the 'object of representation' and the audience becomes the 'interpretant'. Cultural 'experience' is a relative construct of the triadic relationship between these entities, represented in figure 1. By using the semiotic structure, we can re-appraise the role of the community in cultural communication. The community can go

beyond being a stakeholder of an institutional exhibition: new media and information literacy allows the community to both produce and consume its own original cultural content, in the form of narratives, wikis, blogs, vlogs or any other medium which is supported by the institution and connects to the audience. The institution ceases to be the sole custodian of cultural experience; instead it provides co-creative infrastructure for the community and distributes original cultural content to the audience via multiple platforms – physical, online and broadcast.
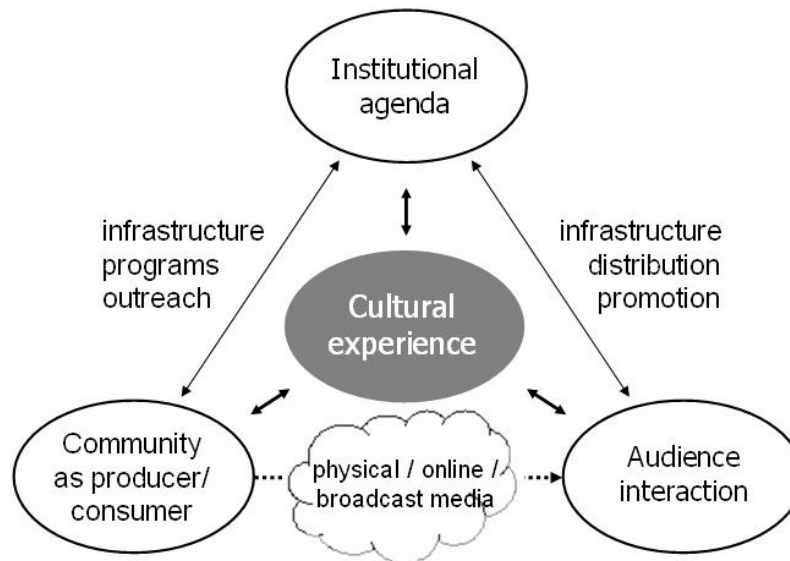
Figure 1: Semiotic representation of cultural experience as a construct of the triadic relationship between community, institution and audience.

This semiotic model of the institution-community-audience relationship is a virtuous one to the extent that all parties benefit. The institution achieves community engagement as well as original cultural content to offer to a more distributed audience across multiple platforms. The community benefits from information literacy training by the institution, as well as a platform and audience for co-creative production. The audience has access to new and innovative cultural experiences co-created by the institution and community.

Knowledge Transmission vs. Digital Cultural Communication

Throughout the modern age, cultural institutions created public spaces, buildings, collections and disciplines which presented mediated social narratives. These narratives were often conveyed as part of broader political, social and cultural discourses. Vested with such authority, cultural institutions came to dominate the transmission of cultural knowledge in the public sector.

This power came about in part due to relations between society and technology as they stood in the late eighteenth century. At that time, scientific culture (which was heralded as the discipline of the new age) relied on the discussion of visions in the populace through such mediums as public lectures, books and philosophical societies (Jacobs 1988, p.163-167). At the heart of these technological and social practices was the edict to transmit knowledge to the public. From the late nineteenth century onwards, museums used a variety of built and technological mediums to deliver this cultural knowledge. Museum exhibitions were used as a communicative form to

transmit universal laws. Such presentations enforced the institutional position of authority over their audiences (Hooper-Greenhill 2000, p.2).

The didacticism of the early modernist museum resulted in the transmission of knowledge as patterns communicated by emerging scientific systems of representation such as evolution. Evolutionary display sought to present 'universal scientific truths' by recording and displaying species which, when collected and presented in a series, would tutor the masses in both the specific object, and the family (whether natural or cultural) from which it came. The evolutionary display method tended to reduce cultural artifacts to specimens of natural science (Bennett 1996, p.75-76).

This method of knowledge transmission was supported by technologies such as panoramas and dioramas etc. Perhaps one of the most visually arresting uses of technology at this time was Mr. Wyld's Great Model of the Globe 1851. This immersive structure included viewing galleries connected by staircases, surrounded by a ground level circular corridor housing Wyld's maps, models and plans (Black 2000, p.30). Wyld's Model of the Globe used a number of technologies to transmit knowledge about the world: whilst being analog, it shares a common theme with many of today's seemingly accessible cultural experiences - that of immersion in technology. Immersion in technology has been used extensively in "museum-like" organizations, particularly interpretative centers and theme parks.

CULTURAL INSTITUTIONS AND COMMUNICATION

Since the beginning of the modern cultural institution, community objects and stories have been collected and in the process, social relations have become cultural capital where "the politics and poetics of collecting are the politics and poetics of us all; and its messages are messages for us all" (Pearce 1995, p. 22). In that environment, the commodification of cultural content brought with it the possibility for institutions to control the value-chain of information. Possibly the most significant difference between these early symbolic conquests and the convergent new media environment is that within the modern cultural institution, collecting cultural artifacts suggested a form of "cultural violence" (Fyfe 1998, p. 330) This came about primarily due to the ways in which community information was acquired. The 'real' artifacts enabled abstract ideas to be sustained, positioning people, nations and territories and constructing boundaries to social and cultural processes. These conquests were drawn together to map out the limits of the known (Hooper-Greenhill 2000, p.18-19). In the new media environment, communities, individuals and – to a growing extent – broadcasters and institutions are working together to present cultural information. When communities and individuals have the means of production at their fingertips – such as wikis and blogs – their knowledge and access to information becomes a powerful medium through which others can consume cultural knowledge.

Beginning with the advent of broadcasting and increasing with the internet, cultural institutions have faced critical challenges which include drawing audiences into their physical spaces and providing cultural interactive experiences which are both novel and entertaining. Cultural institutions not only hold major collections, they often have state of the art resources which can be utilized to deliver their messages to a broad audience. For instance, the Singapore National Library has just re-opened on a new site with a mandate to become the premier site for the research needs of Singapore and South-East Asia (Choh 2004). The National Museum of Australia has one of the few fully functional broadcast studios in any museum world-wide and is currently utilizing these resources to stage a "Talkback Classroom International United Nations forum" which provides students from Australia and the USA with a forum to discuss issues in a broadcast recorded at the UN Headquarters in New York.

China and the Association of the Southeast Asian Nations (ASEAN) Library have recently signed with a regional bloc to promote awareness, understanding and appreciation of each others' arts and culture through artistic collaboration and exchange, joint research and study, exchange of information and people-to-people exchange and interaction. The bloc will support the conservation, protection and promotion of tangible and intangible cultural heritage through programs in cultural heritage management, protection of intellectual property rights and networking and exchange among cultural heritage agencies and organizations (People's Daily Online, 4 August 2005). Each of these examples points to a growing phenomenon whereby cultural institutions have adopted the internet as a distribution medium for their collections and public programs. Few have come to terms with the profound shift in contemporary society from 'passive' media consumption to audience interaction with content: that is, few have established distribution models which not only provide access but display and allow interaction with the products of community co-created content. The value of this content can be considered within the historical framework of cultural institutions and the ways in which they present and represent collective memory.

Institution as Cultural Broadcaster

In the late nineteenth century, memory, consciousness and time were considered to contribute to the development of a collective memory where reality was re-interpreted through a 'collection of things'. This representation became problematic when individuals lost the ability to discern that representation was derived of recollection and perception Bergson suggested that as we become conscious of an act we detach ourselves from the present and replace ourselves in the past, metaphorically and more specifically within particular sites and spaces (in Deleuze 1988, p. 222-226). This transportation from actual to "virtual" time and place enabled communities to create and recreate experiences either personal of collective. In the 1920s and 1930s, Halbwachs claimed that collective memory was rooted in concrete social experiences and associated with temporal and spatial frameworks, therefore it could be constructed by recollecting places and situating ideas or images in patterns of thought belonging to specific social groups (1992, p.78-84).

In the Victorian period, cultural institutions such as museums and libraries began to emerge as instruments of the ruling classes with a mission to educate. The communication strategies which they adopted were used to tell the story of the institution (Cassia 1992, p.28-31). In the contemporary media environment, instead of communities being defined by geographic or joint interest, the internet enables "communities of practice" which engage in a joint enterprise via mutual engagement (Wenger 1998). Agre proposes that the interactions which emerge in this mediated environment engage in some degree of collective cognition where individuals learn from others' experiences, set common strategies, develop a shared vocabulary and evolve a distinctive and shared way of thinking (1998). The local museum, library or gallery is an example of this collective cognition at work. As the communities find ways of displaying their own stories, they often draw on nostalgic memory to create 'a past' which will generate a touristic impulse (Trotter 1999, p.19-28). This collective nostalgia renders the present familiar and validates and affirms present attitudes and actions in respect to past ones (Lowenthal 1985, p.4-13). Cultural institutions have become a meeting ground for both official versions of the past and the individual or collective accounts of reflective personal experiences. Just as Wallace (1995, p.107) suggests that visitors bring a well-stocked memory of film narratives into the cultural institution, they also bring their life histories and memories.

Cultural institutions in Asia, Australia and the UK are often state-sponsored and act as custodians of cultural information. The USA operates under a different economic model where only the largest organizations are state-sponsored whilst the bulk operates in the not-for profit sector. This

key economic difference affects the ways in which museums work with their communities and see their role in relation to their donors. For the purposes of this article we discuss DCC in relation to the Asian/Australian/UK model of state-sponsored institution.

DCC proposes that the cultural institution can now evolve from meeting ground to media distributor, using the life histories and personal experiences of visitors as a source of unique cultural content, thereby enabling community co-creation and providing information literacy. In contemporary media environments, cultural institutions can use new media to broaden audiences, create cultural interactive experiences and achieve broader distribution of content. The term 'new media' includes not simply interactive digital artifacts, but also new ways of consuming and producing such artifacts. Standardized internet technologies allow non-professional content creators to display and distribute new media artifacts by offering much lower 'barriers of entry' and greater immediacy than the traditional mass visual medium of television. This means that non-professional community-based creators can produce distinctive cultural content for broader audiences. Wood (2003) illustrates key points of new media in relation to broadcasting:

- New media forms should be designed around the way people live and interact with each other, rather than around the technology.
- New media provides opportunities to use the archives of media material which illustrate our past lives and cultures.
- Audiences need reliable information from trustworthy sources; therefore the context from which material is distributed is important.
- The context of audiences must be taken into account when preparing content.

Wood's summary points to the convergence of a number of resources and disciplines to explore both the narratives and experiences which result from audience engagement and interaction with content. It suggests that to create the environment for audience engagement, innovative methods will need to be developed to enable the co-creation of meaning and the generation of new content for wider audiences.

Convergent information and communication technology (ICT) has promised the delivery of multi-channel, multi-platform content where choice is in the hands of the consumer. Rabinovitch describes this as shifting consumption patterns and empowering audiences by enabling access to content on their own terms – i.e. where, when and how they choose (2003, p.74-76). Rabinovitch is careful to underpin this point with the clarification that new media has not delivered the demise of traditional media but has propelled many media companies into powerful conglomerates with stakes all along the media value chain. Convergent ICT is being used by broadcasters for the repurposing of content across multiple platforms and to facilitate greater cross-media collaboration (p.75). In terms of outcomes, the multi-channel, multi-platform challenge brings a commercial focus to the possibilities of re-purposing content for online distribution as well as describing a technology-oriented initiative to rationalize TV broadcast formats as part of digital TV developments. This initiative is consistent with the concerns of cultural institutions, particularly in the implementation of cross-platform cultural knowledge where the development of media and their impact on society have challenged both commercial and cultural organizations.

By reconfiguring relations between systems and audiences through institutions and cultural networks, new models of production, distribution and learning can be developed. Media distributors have identified a need to move beyond information archiving and display and into content generation and more porous community interface. Examining the possibilities and limitations for digital co-creation within these established, culturally rich environments will ultimately inform a model for effective low-cost digital content that will develop out of consumer-led creativity across public, community and commercial sites.

Turpeinen (2003) describes the co-evolution of broadcasted, customized and community-created media as a paradigm within which active individuals and communities use computer-mediated networking to tell and exchange their stories and to enhance the interaction among member and their peers in other groups. This form of community co-creation can both develop new paths for community knowledge and simultaneously enhance community life. Institutions which represent distributed cultural constituencies may have to work harder for audience share, and digital community co-creation programs can help the institution to the extent that such programs not only empower ground-up digital cultural creation, they also create new community audiences.

The balance of distribution between professionally produced and community co-created content is explored by Marinho (2003a, p.19) who suggests that the differing concerns of each bring its own problematic. Content distribution channels are services and tools (commodities) while social communication is the content (cultural asset) which travels along these channels and is of strategic value to both parties. When communities are engaged in the process of creating content, there is less of an opportunity for telecommunications companies to control both distribution and social communication (p. 20). Marinho's concerns stem from a belief that the convergence of media and telecommunications could create the control of the entire value chain including production of content, packaging and programming and distribution. He contends that in the process of continued and unregulated cultural convergence, cultural assets are increasingly dominated by communication companies who are often restricted in their capacity to distribute their products (2003b, p.44).

DCC seeks to circumvent this potential bottleneck in the cultural distribution process by offering cultural institutions as alternate 'channels'. For example: Australian Museums On-Line links collections across the country while the ASEAN network provides a useful example of how community knowledge can be collected and distributed across Asia. These examples provide content management systems where audiences can access cultural information from reputable sources. Institutions can promote their new partnerships by introducing communities to tools and methods for digital co-creation. The next step in the co-creation process is to ensure that community created content can be "broadcast" across the multiple platforms which the convergent new media environment allows. The next section of this paper provides examples from Australia to Thailand to highlight the opportunities that web-based cultural communication affords in relation to the creation and distribution of distinctive community created content to broader audiences.

Intellectual Property and Ownership

Issues of ownership become increasing complex when audiences partner with cultural institutions, not least because of existing restrictions on appropriate usage of content, but because institutions need to develop protocols which take into account the creative ownership of digital artifacts. Copyright laws are difficult to comprehend as categories for ownership can span multiple users. In the not-for-profit sector, this is particularly complex because museums often have different policies regarding the sale of work and leasing to commercial entities (Ellis and Mishra 2004, p.14)

Copyright serves the purpose of encouraging creativity and innovation by those who create by helping to ensure that they benefit financially from their ideas for a finite period before those ideas' utility is further exploited by their joining the unprotected 'commons'. As innovation is often a product of inspiration from existing creative works, copyright protections which are too rigid can limit creativity.

One way of approaching this is to consider restricted peer-to-peer networks as alternatives to unrestricted file-sharing. By approaching copyright in this way, the institution again provides a leadership role by encouraging their community to connect with the institutions and create content while providing mutually beneficial conditions of fair use for content. By encouraging innovation and allowing access by a wide audience, cultural institutions can again provide the infrastructure to enable the development of e-communities.

A more generalized approach to intellectual property issues has been termed the Creative Commons. Creative Commons enables copyright holders to grant some of their rights to the public while retaining others through a variety of licensing and contract schemes including dedication to the public domain or open content licensing terms (http://creativecommons.org). An excellent example of the way in which Creative Commons can be achieved within cultural institutions can be found in the development of the British Broadcasting Corporation's Creative Archive (Dean 2004). While many issues have arisen in the development of the Archive, there are some consistent problems which will be addressed throughout the development of this approach. This includes broadening the cultural debate to ensure that intellectual property decisions have a cultural dimension. Cultural identity and investment in culture are increasingly part of the creative workforce and the new economy. How we provide access to this content in democratic ways and ensure that audiences can both consume and produce creative works remain at the heart of intellectual property issues in this sector.

INFORMATION LITERACY IN AUSTRALIA

The Digital Cultural Communication method has successfully informed the authors' recent design consultancies for a number of multi-platform cultural projects in Australia, including an end-to-end community co-creation and cultural e-community program for the State Library of Queensland (Watkins and Russo 2005a), and the online expansion of a physical exhibition by the Museum of Brisbane and Brisbane Institute to connect with e-communities (Watkins and Russo 2005b).

The State Library of Queensland's Queensland Stories initiative is an end-to-end program designed to enable community members to partner with a cultural institution in the preservation and representation of cultural identity. Queensland Stories offers an opportunity for active, participating and creative individuals and communities to explore shared history through narrative, photography, audio and video. This growth of active content producing communities has required new and different tools to facilitate interaction among communities. The State Library of Queensland has provided a mobile multimedia "laboratory" which is made available for community narrative projects in regional areas of Australia. This information literacy training has powerful cultural outcomes: the community is empowered to create its own "digital stories", short multimedia narratives constructed from personal photographs and memories.

The Queensland Stories website provides a streaming media display platform for the multimedia narratives produced within the information literacies workshops. The design approach has considered the current library systems which require new audience literacies to enable consumption and production of content. By defining the characteristics of particular existing systems, information literacy architecture demonstrates how communities and institutions can describe the value of particular ICT products in the development of audience-focused outcomes. The information literacy architecture (table 1) illustrates how new media technologies can be used to enable cost-effective content creation and distribution.

Table 1: An information literacy architecture

Architecture characteristics	ICT product/service	Enabler
Access	Telco infrastructure	Cost-effective distribution
Publication	Podcasting	Community protocols, IP/copyright, censorship, privacy
Evolution	Blogs	Users contribute content, systems encourage evolution
Interaction	Wikis	Capture, display and distribution of content
Collaboration	CSCW	Community participation and audience feedback
Platforms	CMS	Common technology and protocols

Table 1 demonstrates some of the relationships between the types of programs or themes which the institution can proactively develop (architecture characteristics) and matches these to the types of ICT products and services which enable information literacy. The enablers illustrate the types of outcomes which can be achieved by linking institutional themes with ICT products towards common creative ends. It also seeks to define the types of information literacy which would be required to support these outcomes.

Many challenges remain within the Queensland Stories project, primarily a scarcity of workshop facilitators with the necessary information literacy to transfer skills in narrative and new media to the community. Furthermore, the limited telecommunications infrastructure within the vast yet sparsely populated state of Queensland limits many regional and remote communities to low-band dial-up internet access which prevents a satisfactory online audience experience of the digital story collection. These issues remain the focus of ongoing research and consultancy by the authors.

BLOGGING IN SOUTH KOREA

The commercial environment continues to spawn a myriad of sprawling e-communities. A particularly successful example is South Korea's "Cyworld", a personal diary-style website which features commentary, pictures and links to other sites (www.cyworld.com). Cyworld is an advanced blogging site which interconnects personal homepages, encouraging users to form a network with friends or colleagues. This network is now an e-society with 13 million residents and visitors - more than a quarter of South Korea's population. There is certainly nothing new about personal home page product – for example, the Yahoo! search engine has been offering portal personalization for years. But Cyworld could be of interest to the cultural institution wishing to extend the quality of its online experience to audiences because the concept combines interactivity, personal creativity and audience reach. In this regard, Cyworld provides a number of lessons from the commercial sector which may be of use to the cultural e-community. Firstly, the site targets a specific audience segment – the information literate twenty-something market. Cyworld has been enormously successful at drawing together a huge proportion of the South Korean youth market towards the creation, support and maintenance of a viable and highly creative e-community.

Secondly, Cyworld provides an appropriate technical infrastructure for the audience segment. Its developers have constructed an online space where audiences can create their own content, browse other user's blogs and link to relevant external pages. Cyworld is extending its services into Taiwan, Hong Kong and Singapore and in order to accomplish greater interaction and wider distribution, the developers are currently assessing how local relevance can be realized in each country. By providing an infrastructure specific to the needs of a particular community, Cyworld will graft diverse cultural identities to their sites to produce a localized product for each new country of distribution. This strategic approach demonstrates the proactive role that an organization can take in the development and representation of cultural identity. Importantly, it demonstrates how cultural institutions could reconsider their resources to support diverse cultural e-communities.

The third lesson from Cyworld is the use of interaction design which encourages the e-community to co-create personal content. Cyworld features its own currency, slang and particular social pressures. Cyworld community members inhabit an address or a "minihompy" (or mini-homepage). The minihompy is represented by an empty virtual room which the inhabitant then "decorates" to construct a distinctive online personality (Cameron 2005). Unlike e-communities which use blogs to further political, social or historic causes, Cyworld audiences use this site to publish their own creative efforts and to explore the possibilities of community co-creation. In so doing, Cyworld as a whole creates new media artifacts and new types of interaction which in turn strengthen the organizational impetus to support and maintain the community.

CULTURAL PORTALS IN THAILAND

While blogs and wikis provide up-to-date non-professional media for individuals to create content, Content Management Systems offer opportunities for decentralized and community-oriented modes of publishing whereby media organizations and cultural institutions evolve from gatekeepers to mediators between communities. Cultural institutions can facilitate this exchange by supporting the interchange of content and ideas while providing new tools for Digital Cultural Communication. Cultural institutions which position themselves as community providers are bound to benefit as they extend their audiences and opportunities for advertising and commerce. By providing infrastructure which includes training, institutions are in an enviable position; they own the content and manage the method of distribution. If they are able to creatively combine community creativity with customized services in innovative ways, they can extend their programs to meet the needs of individuals and small communities.

The relationship between institution, community and audience which underpins Digital Cultural Communication can be seen in a number of examples from smaller cultural institutions around the world. For example, the Ban Jalae Hill Life Tribe and Culture Center in Thailand provides a rare case study of a privately funded, community-run multi-platform cultural portal comprising:

- A solar-powered physical Center.
- An online museum.
- An end-to-end community co-creation program.
- A community TV initiative.

The Mirror Art Group which runs the Cultural Center is made up almost entirely from community members. It operates on the tenet that technology can help preserve and document a vanishing way of life, especially in communities which do not rely on written language. Most hill tribes have only developed a written script within recent generations and literacy remains extremely low. The

Mirror Art Group captures cultural knowledge throughout the Northern Thai tribes in a number of ways: digital storytelling, folk music recordings, community interviews and documentation of traditional festivals.

For example, working with village elders, the Mirror Art Group has begun creating a video record of genealogical lines in surrounding Akha villages. By recording the elders reciting their genealogy and producing video compact discs, the Mirror Art Group are both documenting cultural heritage and attempting to revitalize traditional customs by broadcasting cultural content to the world, thus encouraging Akha youth to see themselves and their identities as valued within modern society. The cultural portal incorporates traditional music, videos, transcripts of genealogies as well as still images, stories and general interest for the mutual benefit of community members and broader audiences. Furthermore, the Center features a community TV initiative which keeps abreast of relevant local issues and provides positive media images to the hill tribe youth community, as well as addressing a lack of knowledge in the wider community about the hill tribes of modern Thailand (www.mirrorartgroup.org/web/projects).

The cultural portal www.hilltribe.org is supported by the institutional funding but is created by the community and maintains a strong link to the dispersed communities throughout the region. The Center also provides digital literacy outreach programs to community members with a diverse range of media products which are displayed at either the physical site, the online museum of the community TV broadcast. This represents an innovative approach to cultural representation in both site-specific (Center) and distributed (website) cultural content. In many ways, the Center's approach is similar to Cyworld:

- Infrastructure is provided to develop and maintain the community.
- Community co-created content is at the heart of the interaction.
- A specific audience is targeted.

Unlike a number of institutionally supported cultural portals, the online museum does not describe itself as an arts portal and is therefore not restricted to displaying higher art forms. Neither does it emulate other indigenous cultural portals, which focus on institutional or governance matters (for example, see the Avataq Cultural Institute and the American Indian Cultural Center). Therefore the Center presents itself as a viable and interesting case study for the ways in which cultural institutions can partner with communities and audiences to create meaningful cultural interactive experiences while broadening the distribution of cultural knowledge and utilizing media technologies to the mutual benefit of all partners.

CONCLUSION

The most pervasive communication technology within industrialized and developing societies remains broadcast television. Whether one considers this most powerful medium as a positive, negative or neutral factor upon social development, its position as a driving force of cultural globalization is widely acknowledged. To the extent that its economics often require the support of either state or corporation, broadcast television stands accused of being the propaganda mouthpiece of a ruling class or industrial elite. Although community television production can provide a more representative source of cultural information, in many countries the medium has yet to realize a significant role.

The examples discussed in this article suggest that web-based new media for social and cultural communication have made a more immediate impact on individuals and communities than pre-convergent communication forms. In Thailand, the privately funded and community-operated Ban Jalae Hill Life Tribe and Culture Center is an innovative example of how new media technology

can help preserve and document disappearing indigenous cultural identity. Through an end-to-end program of creation, interaction, distribution and information literacy, the Center supports community efforts to strengthen existing connections and disseminate cultural knowledge to a broader audience. In South Korea, the Cyworld blogging community provides an enormously successful example of the potential of addressing a specific audience segment and providing appropriate technical infrastructure to support community co-created content. Additionally, Cyworld demonstrates both how information literate, active e-communities can proliferate and how distributors can provide global infrastructure while supporting local content. In Australia, the Queensland Stories project records and archives the personal stories of a developing multi-cultural nation-state. Developed as an end-to-end program of creation, distribution and information literacy, Queensland Stories provides a compelling example of the ways in which cultural institutions can support community representation.

These snapshots clearly do not make up a compelling analysis of Digital Cultural Communication across South-East Asia, but they do serve to illustrate some of the potential of new media as an enabler of community co-creation. DCC examines the potential for co-creative relationships between cultural institution, community and audience in order to create innovative cultural content. As part of this examination, DCC considers the institutional strategies, community programs and distribution strategies required to achieve audience-focused co-creative outcomes and – unlike Virtual Heritage – provides tools and methods for the design of compelling cultural interactive experiences across multiple platforms (physical, web, mobile, broadcast). DCC is underpinned by the notion that media channels – whether commercial or institutional – can evolve from their roles of 'gatekeeper' to mediator of community knowledge. This discussion has explored some of the foundations for this cultural exchange and has provided significant and successful examples from the South-East Asia region to explore the value of new media in the dissemination of cultural content. It has outlined shifts in audience experience and the value which can be drawn from broader access to and distribution of cultural content.

REFERENCES

Agre, P. E. 1998, 'Designing Genres for New Media: Social, Economic and Political Contexts', in *Cybersociety 2.0: Revisiting Computer-Mediated Communication and Community*, ed. S.G. Jones, Sage Publications, Thousand Oaks.

Bolter, J.D., and Grusin, R. 2000, *Remediation. Understanding New Media*, MIT Press, Cambridge, Massachusetts.

Borton, J. 2005, 'Tsunami bloggers in tribal news network', *Asia Times*. Available from: www.atimes.com/atimes/Southeast_Asia/GA05Ae02.html [14 September 2005].

Cameron, D. 2005 'Koreans cybertrip to a tailor-made world', *The Age*. Available from: http://www.theage.com.au/news/Technology/Cyberworld-imitateslife/2005/05/06/1115092684512.html?oneclick=true [13 September 2005].

Cassia, P.S. 1992, 'Ways of displaying', *Museums Journal*, vol. 92, pp. 28-31.

China, ASEAN to expand cultural cooperation (4 August 2005). [Online]. Available from: http://english1.people.com.cn/200508/04/eng20050804_200197.html [14 September 2005].

Choh, N.L. 2005, 'New National Library to open in July 2005', *Getforme Singapore*. Available from:

http://www.getforme.com/previous2005/210405_newnationallibrarytoopeninjuly2005.htm
[14 September 2005].

Dean, K. 2004, 'BBC to Open Content Floodgates', Wired News, 16 June. Available from:
http://www.wired.com/news/culture/0,1284,63857,00.html?tw=wn_tophead_4 [10
November 2005].

Deleuze, G. 1988, *Bergsonsim*, Zone Books, New York.

Ellis, A. and Mishra, S. 2004, 'Managing the Creative Industries' *Report to Getty Leadership
Institute and National Arts Strategies for the Managing the Creative: Engaging New
Audiences dialogue between for-profit and non-profit leaders in the arts and creative
sectors*, AEA Consulting. Available from: http://www.artstrategies.org/assets/
ManagingTheCreativeBackground.pdf [10 November 2005].

Forte, M. 2005, 'Ecology of the Virtual : New Scenarios of Virtual Heritage', *Papers presented to
the 11th International Conference on Virtual Systems and Multimedia* in Ghent, Belgium, 3-
7 October 2005. Available from:
http://belgium.vsmm.org/pages/program_tuesday_keynotes.html#2

Flew, T. 2002, 'What's New about New Media' in *New Media: An Introduction*, Oxford University
Press, Melbourne, pp. 9- 28.

Fyfe, G. 1998, 'On the relevance of Basil Bernstein's Theory of Codes to the Sociology of Art
Museums', *Journal of Material Culture*, vol. 3, pp. 301-324.

Halbwachs, M. 1992, *On Collective Memory*, University of Chicago Press, Chicago.

Hyun-oh, Y. 2005, 'Cyworld Storm Heads for Asian Countries', *The Korea Times*. Available from:
times.hankooki.com/lpage/special/200502/kt2005022320383545250.htm [3 September
2005].

Lowenthal, D. 1985, *The Past is a Foreign Country*, Cambridge University Press, London, pp. 4-
13.

Marinho, J.R. 2003a, 'Comments on Article 2 of the WSIS Broadcaster's Declaration', *WEMF
Final Report, World Electronic Media Forum*, pp. 19-20. Available from:
http://www.wemfmedia.org/documents/final_report.pdf [30 August 2005].

Marinho, J.R. 2003b, 'Keynote Address, Media Freedom in the Information Society', *WEMF Final
Report, World Electronic Media Forum*, pp. 44-45. Available from:
http://www.wemfmedia.org/documents/final_report.pdf [30 August 2005].

Mattleart, A. and Mattleart M. 1998, *Theories of Communication*, Sage, London.

Pearce, S. 1995 'Collecting as medium and message', in *Museum, Media, Message*, ed. E.
Hooper-Greenhill, Routledge, London, p. 22.

Russo, A. and Watkins, J. 2005, 'Digital Cultural Communication: Audience and Remediation' in
Theorizing Digital Cultural Heritage eds. F. Cameron and S. Kenderdine, Cambridge,
Mass., MIT Press (in press).

Russo, A. and Watkins, J. 2004 'Creative new media design: achieving representative curatorial practice using a Cultural Interactive Experience Design method' in *Interaction: Systems, Practice and Theory*, eds. E. Edmonds and R. Gibson. ACM SIGCHI, pp.573- 597.

Trotter, R. 1999, 'Nostalgia and the Construction of an Australian Dreaming', *Journal of Australian Studies*, vol. Dec, pp. 19-28.

Turpeinen, M. 2003, 'Co-Evolution of Broadcasted, Customized and Community-Created Media', in *Broadcasting & Convergence: New Articulations of the Public Service Remit*, eds. G. F. Lowe and T. Hujanen, Nordicom, Göteborg.

Wallace, M. 1995, 'Changing media, changing messages', in *Museum, Media, Message*, ed. E. Hooper-Greenhill, Routledge, London, pp. 107-123.

Watkins, J. and Russo, A. 2005a, 'Digital Cultural Communication: designing co-creative new media environments' in *Creativity & Cognition, Proceedings 2005*, ed. L. Candy, ACM SIGCHI, pp. 144-149.

Watkins, J. and Russo, A. 2005b, 'Extending Site-Specific Audience Experience via Multi-Platform Communication Design, in *Internet and Multimedia Systems and Applications, Proceedings*, ed. M.H. Hamza, Calgary, ACTA Press.

Wenger, E. 1998, *Communities of Practice: Learning, Meaning and Identity*, Cambridge University Press, Cambridge, UK.

Wood, D. 2003, 'New Media: Time Machine for the 21st Century', *WEMF Final Report, World Electronic Media Forum*, pp. 74-76. Available from: www.wemfmedia.org/documents/final_report.pdf [1 September 2005].

Web references

Avataq Cultural Institute - http://www.avataq.qc.ca/
Creative Commons - http://www.creativecommons.org
Cyworld - http://cyworld.com
American Indian Cultural Center - http://www.nacea.com
National Museum of Australia - http://www.nma.gov.au
Queensland Stories, State Library of Queensland - http://www.qldstories.slq.gov.au
Singapore National Library - http://www.nlb.gov.sg/CPMS.portal
Virtual Hilltribe Museum - http://www.hilltribes.org
Ban Jalae Hilltribe Life and Culture Center –
        http://www.hilltribe.org/museum/01-museum-banjalae.html
Mirror Art Group - http://www.mirrorartgroup.org/web/projects/

Profiting from empowerment?
Investigating dissemination avenues for educational technology content within an emerging market solutions project

Payal Arora
Columbia University, USA

ABSTRACT

The Stills in Sync (SIS) project is a joint initiative of the non-profit organization PlanetRead and the global information and communication technology (ICT) company Hewlett Packard (HP). The SIS project entails creating a multi-media product designed to enhance literacy in rural India through the revival of regional folksongs on relevant social issues. This product utilizes the Same Language Subtitling (SLS) feature that won the World Bank Development Marketplace Award in 2002 and the Tech Laureate in education honor from the Technology Museum of Innovation (San Jose) in 2003. This paper explores the dissemination avenues of the SLS folksongs product and its effects within the Inclusive Community (i-community) of HP in Kuppam, India. This community has functioned as a social and economic laboratory in which HP tested new technologies. Analyzing this test environment makes apparent the dichotomy between corporate responsibility and community development. Keeping the balance between profitable goals of the ICT business and development goals towards sustainable social and economic reforms has been illustrated by the survey results in this paper.

Keywords: *inclusive community, literacy, information and communication technology, Stills in Sync, Same Language Subtitling*

THE INCLUSIVE COMMUNITY MODEL

> *"The company believes i-communities will lead to the creation of significant new markets that will drive growth in revenue and profit"* (World Business Council for Sustainable Development, 2005, p 1).

The Bottom of the Pyramid (BOP) idea conceived by the management scientist Prahalad (2004) has caught the global attention of managers in the private and public sector alike. This BOP paradigm combines the eradication of poverty with profitable business, and as Prahalad (2004) argues, it presents a change in the global awareness for creative entrepreneurs and value conscious consumers[1] alike. Bill Gates, the chairman and chief software architect of Microsoft called it the "blue print for fighting poverty" (Economist, 2004). The former United States secretary of state Madeleine Albright found that with the introduction of the BOP concept, the search for fresh thinking on emerging market solutions had ended (Economist, 2004). The Inclusive Community project of Hewlett Packard (HP) seems to be inspired by this new model. In 2001, Chandrababu Naidu, the former Chief Minister of Andhra Pradesh, India, invited HP to support the social and economic development plans in Kuppam using information and communication technology (ICT). Kuppam was meant to serve as a laboratory for ICT dissemination within rural areas to be scaled nationwide. This was intended to address the critical challenge of mitigating the digital divide[2] that has become central to current national and international development policy and practice

Hewlett-Packard in collaboration with the former government of Andhra Pradesh, embarked on founding the inclusive community[3] programme in Kuppam in 2002. This HP initiative was part of the company's' effort at creating ICT solutions within emerging markets in lieu of creating a new consumer base. This involved the strategic deployment of technologies to engender a sustainable and replicable model for socio-economic growth in rural Kuppam. It embraced the revenue-based model where the poor are viewed as the new consumer base and where profit and social service are aligned towards a common goal of community development. Communication Information Centers (CICs), tele-medicine portals, and touch screen information kiosks are some of the inventive means that were meant to facilitate this process. For example, the CICs were designed as information portals to provide access to information on women's health, HIV/AIDs, employment opportunities, crop prices and the like. This in turn was expected to generate grassroots momentum and mobility, particularly amongst the marginalized groups. In fact, all these initiatives shared the goal of stimulating change through access to local, relevant and contextual information for the community. To run this pilot initiative, HP collaborated with numerous partners at the local, national and international level, non-profit and the private sector alike. One such partner was PlanetRead, the acting non profit for localized[4] content development.

WHAT IS STILLS IN SYNC

This initiative entails the usage of the Same Language Subtitling (SLS) feature that won the World bank Development Marketplace award in 2002 and the 'Tech Laureate' honor from the Technology Museum of Innovation (San Jose) in 2003. It comprises of an audio-visual karaoke experience combining folk song audio files, still images and SLS in a multi-media format. Language switching options have been provided to make the lyrics readable in Telugu, English, and possibly Hindi (depending on user need). The villagers can view highlighted lyrics on the screen, sing along with the songs and download transcribed lyrics. Through the sponsorship of HP, PlanetRead created an Internet/CD-based jukebox of SLS folksongs songs using local folksongs with social awareness themes such as child labor, education, farmers plight, women's empowerment, dowry, HIV-AIDS and caste segregation. Through surveys on folksong preferences and fieldwork within the community, the most popular folksongs were chosen to serve these needs. By using photographic stills of the local village environment, and combining it with folksong audio files and multiple language subtitles, this product is designed for social and cultural empowerment.

THE KUPPAM COMMUNITY

Located at the confluence of Karnataka, Tamil Nadu and Andhra Pradesh, Kuppam is strategically if not symbolically stationed amidst the three states. The constituency of former Chief Minister Chandrababu Naidu, Kuppam had the reputation of a prison encampment area as of ten years ago. Today, Kuppam is brandished by some as the 'silicon valley of the east' (Srinivasan 2001) where new technologies are being tried and tested within its vicinity. It is a rural Indian village, 105 kilometers from Bangalore on the Bangalore-Chennai railway. Telugu is the official and most widely spoken language in the state. Other spoken languages in this area include Urdu, Hindi, Tamil, English and Kannada. With a population of around 300,000 people across 5 districts, the area has experienced a transformation in every aspect of its development: from health, education, agriculture to employment. According to the official statistics (KADA 2003), improvements have been made regarding student enrolment rates, retention, school facilities, passing rates and the like. For example, the total literacy rates of primary and secondary school children in government schools have been reported to have jumped from 26% in 1989 to 68% in 2003. Within those years, total dropout rates amongst this population are stated to have

decreased by almost 84%. Furthermore, in 2003, the Kuppam district committed to installing computers at 20 public high schools under the *Vidhya Vahini* Scheme[5] as an attempt to reduce the digital divide with the goal of covering all high schools by end 2005.

DISSEMINATION AVENUES FOR THE SLS FOLKSONGS PRODUCT

> *"Distribution systems that reach the BOP are critical for developing this market. Innovations in distribution are as critical as product and process innovations" (Prahalad 2004, p.43).*

The following section presents the relevant available options within the HP inclusion model in Kuppam along with the related key challenges in approaching these distribution channels. I have illustrated the potential distribution channels available in the Kuppam community in Figure 1.
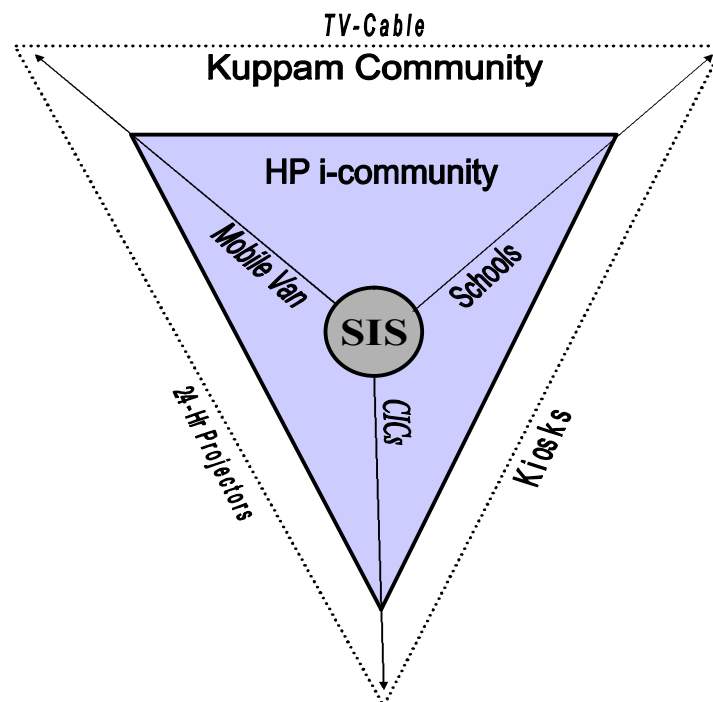
Figure 1: Potential distribution channels available in the Kuppam community

A. Schools

> *"Contrary to popular view, BOP consumers are getting connected and networked" (Prahalad 2004, p.14).*

HP had been contemplating the setting up of CICs in certain local schools as ICT portals for the community. It is a natural choice given that schools are often the fulcrum where parents, teachers, community elders and children can gather. Also, the former government's initiative of

supplying computers to all government high schools by 2005 gave impetus to this idea. Notably, 70% of all government high schools in Kuppam are less than 5 years old (see Table 1).

Table 1: *Education System in Kuppam: Government High School District Statistics 2003 + Fieldwork*

Item	%
High Schools founded within last 5 years	70
On students	
Female students in high schools	43
Co-educational schools (M+F)	85
Students from Backward Castes, Scheduled and Tribal Castes	90
On Teachers	
Female teachers in schools	26
Language in Schools	
Schools with Telugu as prime medium of instruction	100
English as prime medium of instruction	0
Teachers graduated from Telugu medium school	91
Technology in Schools	
Schools with Computers	40
Televisions in Schools	38
Cable access	0
Student preferences in educational technology content	
Students claim playing computer games to be their favorite usage of internet	47
Students claim graphics & GK to be their favorite usage of computers	30
Students claim internet to be their favorite usage of the computers	17
Challenges reported: technology in schools	
Maintenance for technology in schools	62
Provision of education technology content	23
Computer teachers	42
Connectivity, Electricity problems	89
Facilities	
Schools with access to drinking water	50
Schools with libraries	15
Schools with girls toilets	32
Schools with Cultural activities/ Functions	57
School perception on education	
Principals that claim instilling moral values to be the most important aspect of schooling	75
Principals that claim schools main role is to prepare children with skills for jobs	17
Principals that claim hiring more teachers to be their most urgent need	43
Principals that claim their need for more facilities as most urgent	30
Access to drinking water being the most predominant facility need	60
Principals that claim reforming state mandated curriculum as their most urgent	9
Total	**n=23**

Prior to this time, most high schools were private, spanning from modest one room buildings to large spaces with state of the art equipment. Of interest, although the private schools charged an average monthly fee in addition to the cost of uniforms, books, entrance and lab fees, 61% of its total student body came from poor backward castes, scheduled and tribal castes (KADA, 2003, p.

21). Perhaps one of the most distinguishing features between private and public schools is their language of instruction. While government high schools use Telugu as the medium of instruction with English taught as a subject, most private schools teach only in English.

Through fieldwork observations across government high schools in Kuppam (n =23), it was apparent that a large number of government schools did not have access to drinking water, libraries, desks and chairs, and enough classrooms for all the children (Table 1). To a large extent government schools did not have sufficient teachers. In interviews with the principals of these schools, 43% (n=23) stated the need for teachers as their most urgent need (Table 1). The government has adopted the ICT pathway to tackle some of these chronic maladies. Almost half the government high schools had been given computers with the other half promised delivery by end 2005. Televisions had been provided to some schools in addition to the computers. This was to enable children to watch educational programmes shown on TV and thereby circumvent temporarily the dearth of teachers. However, we discovered that many schools did not have power lines for the television which had been delivered to these schools almost two years ago. Meantime, these televisions had been locked away in school storage for the last two years. Power is perhaps the most critical factor in ICT access. A *shift policy* system had been implemented in Kuppam where every alternate week there was a power outage from 10 in the morning to 5 in the evening. Another issue seemed to be maintenance of computer equipment (Table 1). For example, at one of the schools, we noticed six computers sitting idly due to a fuse problem. Due to a reported lack of support, these computers had been unused for months. "We are willing to pay from our own pockets, just tell us where to go," said the computer teacher at this school.

Furthermore, with the average ratio of 10 pupils to 1 computer in the classroom, more focus was given to collaborative, group learning activities. As part of content provision, some educational software was provided to these schools as tools for learning. Some of the teachers were using these programmes to instruct children by translating its English based material into Telugu, thereby converting it into a teaching aid. However, this was dependant on the teachers grasp of English. When it came to children directly interacting with the software, some of the children did not seem to understand the material. When we watched the students in these schools demonstrate their knowledge of the computers, we noticed that they were comfortable handling the computers. When asked to show us their favorite programme on the computer, some of the children showed biology centered programme, programmes on the Agra fort, and the solar system. Yet, when they were questioned on these programmes to gauge their comprehension, we realized that they had not grasped the meaning of the content. They were still dependant on the teachers to translate this information to them.

Interestingly, in interviews with the principals on their vision for education, 75% reported that instilling moral values was at the heart of good schooling (Table 1). Overall, there seems to be a scarcity of appropriate educational software. What is needed is ICT content in local languages, that is more culturally sensitive and engaging to the local populace. This serves as a natural forum for the SLS folksongs product. However, the current status of power, lack of maintenance and limited computers, pose as formidable barriers to content access.

B. Mobile Van

> "The poor also spend their earnings in ways that reflect a different set of priorities. For example, they might not spend disposable income on sanitation, clean running water, and better homes, but will spend it on items traditionally considered luxuries"(Prahalad 2004, p.12).

"Both sides-the larger firms and the BOP consumers-have traditionally not trusted each other. The mistrust runs deep. However, private-sector firms approaching the BOP market must focus on building trust between themselves and the consumers"(Prahalad 2004, p.20).

At a school in Dasegownur, we asked the children about HP's i-community project. There was silence and blank stares. Soon someone timidly asked if we were referring to the *mobile van*. Over time, we realized that HP was better known across villages, among both children and adults as the *mobile van*. The *mobile van* was in actuality a large bus converted into a computer lab with laptops, printers, scanners, digital cameras, and speakers. There was a shelf of education and video game CDs. At the back of the van, there was a small compartment for soil testing. This equipment was supported by a solar generator attached to the van. In the evenings, the van doubled up as a movie theatre and showed government documentaries during the intermission. This was the most popular feature by far. Ironically, this was one of the few features that HP did not charge for. HP charged for services ranging from soil testing, requests for ration cards, crop prices to health information. They also charged for video games, and digital photographs. Interestingly, amongst these services, the most popular was the video games, followed by digital photography. In fact, the children primarily associated the *mobile van* with video games and the free evening movie. However, what was worrisome was that the staff under pressure to make a profit, were compelled to promote video games over educational games which were provided free of cost to the children by local non-profits. This exemplifies the challenge in balancing the dual mission of social empowerment and profit-making. In fact, this dual identity continued to create a conflict of interest amongst the HP staff when servicing their customers.

Another feature observed was the kind of clientele the van attracted. Boys were the primary consumers at the van. The girls on the other hand, stood as a group and continued to look on from a safe distance. None of the women in the villages came near the van, nor did they engage the team in conversation. It had been almost a year since HP started these trips to the villages. Yet, their ties to these communities were weak if any, else non-existent. Part of this could be explained by the fact that the HP van team was all male. To get more women on the HP team, women would have to sign up to work odd hours at remote villages with other men. This was not an ideal job for a woman with a family to support and a local reputation to maintain. Yet, with a flexibility of hours and partnering with Self Help Group (SHG) women[6], this gender inequity could have been mitigated.

Furthermore, in an effort to do community outreach, the team would split up to do house surveys, leaving two people to mind the van to serve the customers. A team of four young men went house to house, making enquiries among the local villagers, mainly women in the households, on their knowledge of HP services. A young man led the troop of trainees, following with notebooks in their hand and cameras round their neck. The idea was to build trust and bring awareness through an ongoing dialogue with the locals. However, in practice, it appeared to be more like an intimidating HP campaign group. Besides the gender aspect, there was a flaw in the choice of people employed for this grassroots work. The team comprised of recently graduated young men full of enthusiasm to work in an IT multinational company but little real experience in grassroots activism. To penetrate these villages, it was important to partner with local NGOs who had the appropriate combination of skills for outreach activities. In spite of these hurdles, the *mobile van* is an innovative means of disseminating the SLS folksongs product. Its audio can be played at the onset of its arrival at the villages on the loudspeakers instead of the cinema songs. Also, during the cinema movie, or in the place of it at times, the SLS folksongs DVD/CD can be shown with karaoke competitions built around it with the entire village there to participate. Parents could see their children perform before the villages, making them more engaged in their literacy and acculturation process. This could also serve as a communal glue and a means for genuine trust.

C. Community Information Centers (CIC)

"It is clear, therefore, that pursuing the promise of BOP markets will challenge the dominant logic of both MNCs and NGOs. MNCs will benefit from learning how to engage with NGOs and local community-based organizations to co-create new products, services and business. NGOs will benefit from partnerships with MNCs, through which they can leverage MNC know-how and systems to scale innovations broadly" (Prahalad 2004, p.32).

Community Information Centers (CICs) are internet information portals for the community which builds on the idea that access to critical information like health, employment opportunities, farm prices and the like provides for social and economic mobility. We met with the manager of an international non profit stationed in Kuppam and contracted by HP to oversee the CICs. We asked her about the challenges faced in setting up the CICs. She stated that even though they had been working on this for about five years, the first two years were primarily spent understanding the scope in Kuppam. Initially they started with 15 entrepreneurs. However, within a year, this number was reduced to 7. She believed that the high failure rate occurred for a variety of reasons, the prime one being the large loan given at the onset which made paying back much harder for these villagers. Also, she claimed that their search process for entrepreneurial people to oversee these CICs was flawed from the start; "We were lucky to have found a few needles in the haystack but we did realize down the line that we were perhaps looking in the wrong haystacks to start with." However, with the help of the local activists, they were able to understand and improve on their processes. When we spoke of the HP partnership, she said that if it weren't for HP, their non profit would probably have taken the simpler route of making the CICs into cybercafés without the community building component given their capacity. Now they had branched into training, follow-up support, packaging of loans, assessing needs, marketing and ownership rights. However, private-public partnerships (PPPs) had their problems too, she remarked; "Any kind of partnership is hard – its as if we are forced to marry... but in India, we are used to arranged marriages and after a while, we get used to it and may even start to appreciate it." Overall, the CICs can function as a useful conduit for disseminating the SLS folksongs product, especially if the CICs are stationed in schools. However, the reverting of the CICs to serve as just cybercafés is a real possibility once the funds dry up.

D. Computer Kiosks

"Research on interface is critical given the nature of the consumer population. The heterogeneity of the consumer base in terms of language, culture, skill level, and prior familiarity with the function or feature is a challenge to the innovative team" (Prahalad, 2004, p.43).

There was a computer kiosk outside the HP office where children, primarily boys would cluster daily to play car chase video games. There was no mediator between the children and the computer interface. It had a touch screen and a mouse attached to it. Unfortunately, the idea did not reach fruition in serving as a hub for information access to the diverse public. Even though HP designed a comprehensive, multi-language site on social concerns, particularly targeted to women, this information was rarely accessed through these kiosks. Part of this could be explained due to its location at the HP office and the fact that it was primarily adult content. However, these kiosks have potential if placed strategically. Given that users tend to be children, more child centered content is needed for maximizing usage. For example, it can function as a dissemination tool for the SLS folksongs content or it can serve as a jukebox of popular community folksongs and thereby reach a more diverse public. These kiosks could allow for

participation even amongst primary school children given that the current computerization efforts are targeted solely towards high schools. By stationing kiosks as entertainment portals in restaurants, coffee stands, train stations, and other populated areas, it could produce higher participation and buy-in that would reinforce parallel ICT and education efforts amongst other non profits, nationally and internationally. If embracing the revenue based model, it could charge a nominal fee, buying entertainment by the hour or half hourly. Instead of reinventing the wheel, these kiosks could share cyber space and costs with several different agencies, international and national that already have kiosks or content in place for medical information, health, agriculture and the like. This could function as a one-stop shop for the new ICT consumer. In essence, it can function as a 'carrot' for other social, cultural and economic applications.

E. Televisions: Public & Private

> *"Innovation must reach the consumer. Both the highly dispersed rural market and a highly dense urban market at the BOP represent an opportunity to be innovative in methods of distribution. Designing methods for accessing the poor at low cost is critical"* (Prahalad, 2004, p. 27).

Nearly 500 million people in India have access to television. Hence this medium has been looked at seriously to scale social and cultural programmes across boundaries (UNESCO, 2003). A surprising discovery was the spread of cable amongst even the most remote villages in Kuppam. The reason cable had spread so quickly within these few years was partly due to the cost difference. The antennae for the televisions that allowed access to the *Saptagiri* national channel cost around Rs. 1000 ($20) as a one time installation which was a small fortune for the villagers. However, if they paid Rs.30 per month (less than a $1), they had access to cable TV. This defied the commonly held perception that public television programming is the most effective in reaching the poor. E-TV, a cable channel seemed to be more prevalent than the *Saptagiri* channel in quite a few villages we visited. The idea of disseminating the SLS folksongs CD/DVD through private channels where it could pay for itself by demand of the audience is a possibility. However, one must remember that even though cable has a fast growing niche market, public television viewing is still the predominant means of media outreach.

F. 24-hour projector

> *"Product development must start from a deep understanding of functionality, not just form"* (Prahalad, 2004, p. 26).

We dined daily at a popular vegetarian restaurant at the heart of Kuppam proper. In the first week, we noticed a projector screen hanging above the public bike stand, just outside the restaurant. Part of the HP project, this projector was meant to give 24-hour access to information for the Kuppam community: news, the current prices of tomatoes to the weather report, this was meant to be the NASDAQ for village life on display, the democratic knowledge bank for the passer-by in the community. We were there at the onset of this effort. Initially, the screen displayed the geographic area and history of Andhra Pradesh. In the evening, the projector showed reruns of the same programme. The next day, similar programmes of tourist nature was shown. The third day, the projector was off by 5pm. And the following day, the screen was rolled up. From that point onwards, we did not see the screen used at any point during the day or night. It continued to be neatly scrolled up and untouched at the entrance of the restaurant. Genuine concerns of electricity supply, safety and ownership, technical maintenance, access to relevant content and regional language provision stood as obstacles in executing this successfully. SLS

folksongs can be displayed on these screens for engagement and social empowerment. Much like the karaoke booths, innovative strategies in partnership and content creation can best facilitate this process.

CONCLUSION

At the Geneva conference in 2005, HP stated that it was already benefiting from its engagement in Kuppam, "…by establishing new partnerships and positions for the future, by strengthening its position in emerging economies for traditional products and services and by showcasing its technologies in compelling, high-volume applications" (WBCSD 2005, p.2). In 2003, several countries including China, Russia and Brazil evinced interest in implementing the inclusive community project (Financial Times, 2003). A year later, HP announced expansion of its inclusive community programme in Europe, Middle East and Africa with the opening of three new HP Digital Community Centers in Tula (Russia), Slavutych (Ukraine) and Wahdat (Jordan) (HP Press, 2004). Yet at the end of 2004, these projects lost its support under new HP leadership. This left several of these projects across global settings in a tentative situation. Many sub projects under this model, including a sound distribution plan for the SLS folksongs product has been pending. Several not-for-profit projects in Kuppam are likely to lose their funding as HP recedes from Kuppam.

The scope of this paper is not to resolve distributional challenges of educational technology products nor to execute a comprehensive analysis of the emerging market solution model pioneered by Prahalad and adopted by Hewlett Packard. Instead, I hope to shed light on some of the complexities involved in marrying social empowerment with profit-making as exemplified in the distributional hurdles for ICT content. I demonstrate this by juxtaposing some of the inventive principles proposed by Prahalad with ground realities within the HP inclusive community project. It needs to be noted that HP's effort to address the persistent issues of world poverty through the adoption and implementation of new models for development has been commendable. It was evident that much thought had been invested in the planning of the inclusive community to shape it into a holistic entity. Also, their strategic partnering with local and international not-for-profit projects furthered the integration of HP's processes into the community.. Also, one should not underestimate the impact of governmental commitment in furthering such a task. The former chief minister of Andhra Pradesh, Chandrababu, with his explicit support to reforms using ICT propelled these initiatives to rich and varied directions. Furthermore, within the limited time frame of three to five years, HP and their partnering organizations had gained knowledge of the local community and had been able to sieve through quite a few solutions that worked from those which failed. Yet, as new models are embraced and old ones discarded within the corporate realm, the risk of Kuppam reverting back into poverty is tangible and real. Overall, the issue of corporate responsibility in such an undertaking needs to be investigated further.

ACKNOWLEDGEMENTS

Endnotes:

[1]   In this paper, I use the word "consumer" in the same light as Prahalad's usage of this word to continue to parallel his theory with my fieldwork experience. Hence, in this case, "consumers" refer to the disadvantaged, low income, marginalized individuals who continue to exercise power of choice based on their values and needs.

[2]   Digital divide here is defined as the gap between those who have access to technology from those who do not. See digital divide network as an example of current ICT in development concerns: http://www.digitaldividenetwork.org/

[3]   See Hewlett Packard Web site for details on the HP i-community in Kuppam initiative: http://www.hp.com/e-inclusion/en/project/project_kuppam.html

[4]   The implementation of multi-language frameworks and cultural features can be collectively viewed as localization.

[5]   National Task force on Information and Technology Development. (1999). Information technology action plan Part III: Long term national IT policy. Retrieved November 3, 2005, from Government of India Web site:
http://it-taskforce.nic.in/actplan3/index.html

[6]   SHGs are perhaps the most powerful groups in these village communities. Arguably one of the most successful development initiatives in the recent past, these microfinance groups borrow and lend finances amongst themselves for furthering their livelihood. In Andhra Pradesh, 70% of the women belong to SHGs (KADA, 2003). In fact, it has only been about five years since the SHGs were created in this region. In our observations and interviews, it seemed that they had become highly institutionalized in this short span of time. Instead of functioning as just microfinance models, they seemed to have become the prime portals in disseminating ideas, values and information across domains: health, nutrition, finance, employment and the like. For more information on the impact of SHGs on social mobility, see the World Bank Website:
http://web.worldbank.org/WBSITE/EXTERNAL/TOPICS/EXTGENDER/0,,contentMDK:20619817~menuPK:336874~pagePK:64020865~piPK:149114~theSitePK:336868,00.html

Abbreviations

AIDS	Acquired Immune Deficiency Syndrome
CD-ROM	Compact Disc Read-Only Memory
CEO	Chief Executive Officer
CIC	Community Information Centers
CPU	Central Processing Unit
DD	Doordharshan
DVD	Digital Video Disk
EFA	Education For All
ICT	Information and Communication Technology
IIM-A	Indian Institute of Management - Ahmedabad
KADA	Kuppam Area Development Authority
HIV	Human Immunodeficiency Virus

HP	Hewlett Packard
NCERT	National Council of Educational Research and Training
NGO	Non-Governmental Organization
NASDEQ	National Association of Securities Dealers Automated Quotations
OECD	Organization for Economic Cooperation and Development
PC	Personal Computer
PPEDS	Poor People Education and Development Society
PPP	Private Public Partnerships
PROBE	Public Report on Basic Education in India
SHG	Self Help Groups
SIS	Stills in Sync
SLS	Same Language Subtitling
UNESCO	United Nations Educational, Scientific and Cultural Organization
WBCSD	World Business Council for Sustainable Development

REFERENCES

Biswas, S, 2004, 'How India's elections were won and lost,' May Issue. Retrieved November 7, 2005, fromBBCWorldNews,SouthAsia: http://news.bbc.co.uk/2/hi/south_asia/3711395.stm

Kothari, B, 2000, 'Same Language Subtitling on Indian Television: Harnessing the Power of Popular Culture for Literacy,' In K, Wilkins (ed.) Redeveloping Communication for Social Change: Theory, practice and Power, pp 135-146. New York: Rowman & Littlefield.

Kropp, E & Suran, B.S, 2002, 'Linking Banks and Self Help Groups in India.' New Delhi: NABARD.

Manuel, P, 1998, 'Music, Identity, and Images of India in the Indo-Caribbean Diaspora,' vol. 29, no. 1, pp.17-35. Asian Music.

OECD, 2001, 'Knowledge and Skills for Life: First Results from PISA 2000' pp 69-96.

Prahalad, C,K, 2004, 'The Fortunes at the Bottom of the Pyramid: Eradicating Poverty through profits.' New Delhi, The Wharton School Publishing, Pearson Education, Inc.

Prasad, A, 2004, 'For Rural Entrepreneurship: A non philanthropic business model for collaborative e-governance project takes IT to rural Andhra Pradesh,' October 6th Issue. Dataquest Magazine.

Srinivas, R, 2003, 'Profiting from Non-Profit Activities.' Mumbai: Financial Express, Indian Express Group.

Srinivasan, S, 2001, Associated Press 10-29-2001, TeNet press group. [On-Line]. Retrieved November 7, 2005, from TeNet press group Web site: http://www.tenet.res.in/Press/29102001.html.

The Economist, 2004, 'Face Value: Profits and Poverty,' August 19 Issue. Retrieved November 7,2005,fromtheEconomist.comWebsite: http://www.economist.com/business/PrinterFriendly.cfm?Story_ID=3104498

UNESCO, 2003, 'IT in Education Innovation for Development - Interfacing Global and Indigenous Knowledge.' Bangkok.

Varshney, A, 1995, 'Democracy, Development and the Countryside: Urban-Rural Struggles in India.' New York: Cambridge University Press.

World Bank, 1996, 'Primary education achievement and challenges' (Report no.15756- IN). Washington DC: Author.

World Bank, 2001, 'India: Expanding and improving upper primary education in India,' (Report no. 20347 –IN). Washington DC: Author.

World Business Council for Sustainable Development, 2005, 'HP e-inclusion, Kuppam hp i-community, Case study 2005.' Retrieved on November 7, 2005 from Hewlett Packard Website: http://www.wbcsd.org/plugins/DocSearch/details.asp?type=DocDet&ObjectId=MTQ0ODc

Original article at: http://ijedict.dec.uwi.edu//viewarticle.php?id=74&layout=html

The Information Society and the Digital Divide:
Some North-South comparisons

Bill Martin
Royal Melbourne Institute of Technology (RMIT) University, Australia

ABSTRACT

The concepts of the Information Society and the Digital Divide are reviewed in the context of national and international policies, many of which are techno-economic in nature and lacking a genuine social dimension. This criticism applies to programs in both the emerging and developed worlds. This social dimension must include attention to regulatory and access issues and critically, address core issues of poverty and living standards, including information poverty. The role and significance of information and knowledge need to be better understood in a world where intangible value is increasingly dominant and where metrics for knowledge are at best rudimentary.

Keywords: Information Society; Digital Divide; World summit (WSIS);

THE INFORMATION SOCIETY

Although interest in the concept of society as *information society* dates back to the 1960s (Bell 1969) it virtually exploded during the 1990s. Initially much of the impetus for this widespread manifestation of national Information Society initiatives was explicitly economic or industrial (Brazil, Ministry of Science and Technology 2001). However, in Europe, the first wave of Information Society policy, that focused heavily on the liberalisation of telecommunications and the development of information and communication technologies (ICTs) was followed by a second phase, more concerned with the wider social aspects including issues of social cohesion and the digital divide (Henten et al 1996, Henten and Kristensen 2000, Anttiroiko 2001). Despite recognition of these major social issues and repeated endorsements by governments and international agencies of their continued significance, much of the impetus in these programs continues to stem from techno-economic rather than social drivers (Martin 2005).

From its inception in the 1960s, the concept of society as *Information Society* has continued to engage the attention of researchers, commentators and governments. In a general sense, this presents a view of a society where social as well as economic change is driven through interactions with information embodied and represented in products, services, in media and in the structures and governance of society (Martin 1995). A recent United Nations document referred to the emergence of an Information Society that was transforming public and private spheres and was creating new social, political, economic and cultural opportunities throughout the world (UNDSF 2005) However, consensus on the nature and meaning of the concept has been hard to find. There remain differences between those who would view it as representing epochal-type change (ITU 2002) and perceive the emergence of different types of networked *informational societies* (Castells 2000), and those who maintain that there is no novel, post-industrial society, and that changes in occupational and industrial structures simply reflect continuity with the past (Webster 1995).

Moreover, for all those who proclaim the Information Society as providing the answer to social inequality, poverty and unemployment, there are others who would regard it as likely to widen the

gap between information *haves* and *have-nots* and to maintain existing socio-economic disparities (Sarker 2001). This divergence in perspective has led to calls for a unitary theory of the Information Society, one that balances the manifold elements of *informatisation* (Duff 2001). One's own view is that a single all-embracing theory is neither practicable nor desirable and that pluralism, for example in the emergence of different models of Information Society development is to be welcomed, These different models apply both at an urban level (Van der Meer and Van Winden 2003), and within regions and between them, including for example, models for East Asia, the United States and the European Union (Venturelli 2002).

Looking beyond Information Society programmes per se to include the broad range of initiatives in fields such as e-Government, e-business and e-Learning reflects the essential continuity in aims and content that exists between these programmes. At one level this continuity exists in respect of technology dissemination and uptake initiatives in e-Government and e-Business initiated by agencies of the United Nations, by the OECD and by many sovereign governments. At another level, the growing emphasis on Lifelong Education, on e-Learning and social inclusion in an economic and social context in which the major locus of value is in intangibles (Stiglitz 1999; APEC 2000; OECD 2001) reflects the continued importance of people as the ultimate targets of all such initiatives. Although this includes a view of people as human capital essential to a knowledge-based economy, it also recognises the need to address issues of disadvantage and inequality, issues that can be characterised in terms of the *Digital Divide*. The Digital Divide has been described in by the United Nations as a factor of exclusion from global exchange processes, restricting the development of intellectual capital, slowing down economic growth and dangerously increasing the lack of understanding between cultures and civilisations (UNDSF 2005). It exists both within and between countries and regions and as a result remedial Information Society programs have been launched at both European and at a global level. This paper looks briefly at some examples drawn from within the European Union and at the wider level of the United Nations and relevant agencies.

Information Society programs within the EU

Although there are country specific aspects to the range of current Information Society strategies, the search for concerted European action is reflected in a common core which includes quality of life and rights protection concerns, as well as those dealing with ICT access and digital disadvantage, with education and skills gaps and with infrastructure development (European Commission 2000). A useful basis for assessing progress towards such aspirations is to be found in two EU initiatives, eEurope 2002 and eEurope 2005. In the case of eEurope 2002, the objectives were: develop cheaper, faster and secure Internet access; invest in people and skills; and stimulate use of the Internet. (European Commission, 2002) Although several of these targets may have been relevant to issues such as social inclusion and removal of the Digital Divide, they nonetheless exuded a strongly techno-economic flavour.

The eEurope 2005 Action Plan sought to redress this perceived imbalance by referring to the importance both of the new competitive Knowledge Economy and an inclusive Information Society. Once again however, the vehicle chosen for such transformation was technological, with two key dimensions to the Action Plan being *Digital Inclusion* (giving every citizen access to the benefits of the new information and communication technologies) and *eInclusion* (meaning that key services must be available not only via personal computer but also via interactive digital television, third generation mobiles and cable networks. The broad intention was the creation of a digitally-literate and socially inclusive Europe, a true knowledge-based society, employing enabling technologies for use by highly skilled workers producing goods and services for digitally literate consumers. The expectation was that by ensuring the widespread availability of broadband networks and of access to electronic government, learning, health and business, there would be a focus on the users of these services, a focus characterised by e-inclusion and e-

accessibility (European Commission 2002 b). These are in themselves not unreasonable expectations and when added to the wider body of social legislation and associated strategies for the alleviation of poverty and disadvantage across the European Union they might be judged in a somewhat more positive light.

Moreover, genuine improvements have been demonstrated in improving levels of Internet access and in the promotion of eGovernment, eBusiness and ehealth services across the EU. This includes improvements in levels of eGovernment services to business at around 70% and to citizens of around 50%. This is clearly encouraging but experience requires that we always look behind the bare statistics. There are reasons for concern about the real levels of take up of such services and of the breakdown of numbers in terms of different social groups within society. Looked at in bare statistical terms, the inference might be that the Information Society already exists in Europe and in some respects and in certain regions it does. However, it remains a truism that for all its power and ubiquity, information and communications technology is simply an enabler of social and economic change. Furthermore, those people who for whatever reason find themselves at the margins of using and benefiting from these technologies are clearly not full members of society whatever its designation. Statistics such as those quoted here may in fact be more relevant to the development of an Information Technology-intensive Society than of an Information Society. They continue to exhibit the strong techno-economic characteristics of the first wave of Information Society programmes and in order to attain a genuine second wave dimension the role of social factors needs to be more prominent and explicit.

The EU has recently launched i2010I, a five-year strategy for the digital economy. Once again the emphasis is on efforts to boost this economy, including measures to create an open and competitive single market for information society and media services, and to increase EU investment in ICT research by 80%. However, a third priority is the promotion of an inclusive European Information Society by closing the gap between Information Society *haves and have nots* (European Commission, 2005). Even reasonable success in this regard would mark a significant step towards attainment of a genuine European Information Society.

World summit on the information society

With recognition of the positive potential of the revolution in information and communication technologies (ICTs) has come the realization that the vast majority of the world remains excluded from these possibilities. As access to information and knowledge is regarded as a prerequisite to achieving the Millennium Development Goals (MDGs) set by the United Nations, bridging the digital divide is essential to closing the development gap. A major response to this challenge was the launching of the World Summit on the Information Society (WSIS) which was held first in Geneva in 2003, and more recently in Tunis in October 2005.

The tenor of both the principles adopted and the actions proposed during the first summit strongly resembled those in the European programs, with emphasis on access to infrastructure and services, the application of ICTs to all walks of life and the attainment of internationally agreed development goals through effective regional and international cooperation (ITU 2003). Likewise the principles were reflected in priority targets which included: adaption of all primary and secondary school curricula to meet the challenges of an Information Society, ensuring that all of the world's population had access to television and radio services, and encouraging the development of content and the use of all world languages on the Internet (ITU 2003).

Again following a similar pattern to European initiatives, the second Summit placed a particular emphasis on narrowing the digital divide, and on the creation of an open, non-exclusive information society which would benefit all the people of the world. A specific objective was to give poorer nations the means to take advantage of the new information and communication

technologies and in particular the Internet, for their economic and social development (ITU 2005). Clearly, finding effective means of realising such aspirations clearly presents much more of a challenge to nations faced with social and human problems that are orders of magnitude greater than those in Europe. The following section looks briefly at aspects of the interplay between technology and development in emerging societies, but to the extent that the European experience is any guide, more than the application of ICTs will be needed to narrow the digital divide. Allowing for basic disparities between the North and the South, therefore, the digital divide continues to make serious demands on the imagination of planners and policy makers in both parts of the world.

ICT, DEVELOPMENT AND THE DIGITAL DIVIDE

Until around the middle of the last century, development, to a large extent, meant closing the gap between industrialised and non-industrialised countries, with the latter striving to catch- up in industries that would today be regarded as belonging to the Old Economy. By the end of the 20th Century the focus had shifted from industries such as steel and shipbuilding to those engaged in the production and application of information and communication technologies (ICTs) and to fields like biotechnology. Viewed through a different lens this can now be seen as the development of interest in the Information Society. The mainstream view on the interplay between ICTs and development as enunciated a decade ago remains essentially positive. In the late 1990s, both the World Bank (1998) and the United Nations Development Program (1998) lauded the role of ICT in facilitating the acquisition and absorption of knowledge, not only to improve economic growth and performance but also to help advance sustainable human development. Even more positive has been a recent statement by the International Telecommunications Union to the effect that:

> *The digital revolution, fired by the engines of Information and Communication Technologies, has fundamentally changed the way people think, behave, communicate, work and earn their livelihood. It has forged new ways to create knowledge, educate people and disseminate information. It has restructured the way the world conducts economic and business practices, runs governments and engages politically. It has provided for the speedy delivery of humanitarian aid and healthcare, and a new vision for environmental protection. It has even created new avenues for entertainment and leisure (ITU 2005).*

Despite the perhaps over-optimistic tenor of this statement, there are signs of real improvement. For example, non-OECD countries now account for over 50% of fixed telephone lines and constitute 46% of the world's mobile subscribers. However, Internet subscribers in non-OECD countries were only one-third of all subscribers in 2003, and in broadband the disparity was worse, with only 17% of subscribers coming from non-OECD countries (OECD 2004).The problem is particularly acute in the lowest income countries with inadequate or non-existent telecommunications infrastructure, low Internet connectivity and little local content available to domestic users. This is particularly significant in that local content and services, especially in local languages, will be a key to increasing demand.

Social and market factors

However, explanation for the Digital Divide lies in more than just disparities in access to telecommunications and infrastructure. It includes a wide range of factors such as income, literacy and education, a lack of both general and ICT-specific skills, regulatory uncertainty and the absence of efficient market structures, institutions and competition. In the poorest countries, users often do not have the literacy or ICT skills sufficient to take advantage of even the *low*

bandwidth text-based technologies that are available. (OECD 2004).Illiterate users require audio and video technologies to take advantage of ICT, which partially explains the uptake of mobile in these countries. Moreover, telecommunications markets are complex and require a wide range of skills from users who access the network, engineers who maintain it and policy makers who regulate it.

Regulatory reform is seen as one element that can help to increase access to telecommunications and hence, reduce the Digital Divide. Evolving tele-communication markets need a strong, effective regulatory regime to ensure that markets function properly and services are delivered to consumers and businesses efficiently and fairly. One of the key elements of regulatory success is existence of an independent and separate regulator, outside the influence of both government policy and private industry interests. The presence of a strong regulator has greatly assisted the growth of mobile telephony in places such as Botswana and Cameroon (OECD 2004).

Markets with effective Internet competition often have higher penetration rates than their incomes suggest, for example Latvia and Estonia, where penetration rates are as high as in many of the richest economies. Latvia's Internet penetration rate of 40.6 Internet users per 100 inhabitants in 2003, was higher than Chinese Taipei, France, Switzerland, Italy and Belgium. Both Latvia and Estonia have very efficient ISP markets with large numbers of licences awarded (in 2004 Latvia had 195 such licences and Estonia 112) and subsequently a healthily competitive tele-communications regime. More generally, competition in mobile markets is responsible for an innovation that could serious impact on the communications element of the digital divide, that is, pre-paid telephony. Since users in developing economies often have little or no access to credit, introduction of pre-paid services has allowed such users to have mobile service. Pre-paid accounts now comprise 36% of all mobile accounts in the world (OECD 2004).

This said, a recent article in the Economist makes sober reading. It argued that merely plugging poor countries into the Internet was unlikely to help because the Digital Divide is a symptom of more important divides of income, development and literacy (Economist 2005). In order to derive meaningful benefit from ICTs, users need money to buy or access the technologies, the usage skills to employ them and the literacy skills to read the content. However, realistically the poor will not own ICTs or be able to use them in hands-on fashion to any significant degree in the foreseeable future (Heeks, 1999). Put differently, a computer is not much use if one has neither food nor electricity and cannot read (Economist 2005) As another source observed, the life of vulnerable populations cannot improve dramatically if suddenly they have a computer. But if their doctor is able to provide better health care thanks to a computer, then that is different (Boston Herald 2005).

In any case, finding the money for all such initiatives continues to be a critical challenge. The launch of a *Digital Solidarity Fund* first proposed at the 2003 World Summit on the Information Society had still not been implemented at the time of the second, with all the countries contributing to the fund being African, but for the exception of France. Opposition to involvement in the fund has been particularly strong from the European Union and Japan both leaders in Information Society development.

Funding mechanisms aside, there is clearly need for reflection on issues of *appropriateness*. This means putting money into programs that involve more than simple technology transfer and that make a more direct contribution to alleviating poverty. Technology transfer programs most usefully would include an element of ICT production, both hardware and software, rather than the simple consumption of applications developed elsewhere. Also key to appropriateness is attention to the local dimension in development projects be this provision for adequate local training, for native language websites and for the meaningful integration of ICT into local curricula

(Heeks 2005a). The inclusion of this local dimension would go far towards addressing the problem of *conditionality*, with conditions imposed on aid projects by outside agencies that are often inimical to the realities of life in the developing country. The ability to combine a knowledge of local conditions --- including knowledge of local political and social structures – with the learning derived from global experiences, could offer the best prospects for deriving policies which are both effective and engender broad-based support (Stiglitz 1999). Education in its various forms and in a variety of delivery modes is a factor of fundamental importance to success in all such attempts to reduce the digital divide and here too the local dimension is critical. The educational component in development programs also includes educating donors and recipients in the value and significance of knowledge in a global economy in which intangible resources play an increasingly major role.

THE NATURE OF KNOWLEDGE AND ITS ROLE IN DEVELOPMENT

Hitherto, analyses of cross-country differences in growth and development have not had much to say about knowledge. Arguably this can be attributed to the public goods aspect of knowledge, but it could also derive from too narrow an understanding of knowledge and its place in economic processes, including its role in growth towards closing the digital divide (Fagerburg 2005).

Knowledge remains an ambiguous and highly contextual construct, with obvious implications for knowledge transfers within and between the developed and developing worlds. This is likely to apply both in the case of explicit or codified knowledge available in print format or via the Internet, and of that tacit or implicit knowledge that surfaces at an interpersonal level. A particular case in point could be the tacit knowledge of expert advisors to developing countries. Not only can there be clear difficulties in the transmission and receipt of such knowledge (and/or information), but also some or all of it may not be relevant in any practical sense.

This is not to say that knowledge and information of truly general or global value is irrelevant to the needs of emerging countries. What does seem to be clear, however, is the importance of the local dimension. In emerging countries, as elsewhere, knowledge (and information) is required for myriad purposes including the provision of public services and for decision making in business. In the latter case, this can entail the need for information relating to *supply* (availability and sources of finance, labour, technology and raw materials), *demand* (including market opportunities and characteristics) and environmental information such as laws. Much of this information may come from informal sources or from sources that are dominated by commercial (overseas) interests or are often trivial in nature, including the World Wide Web. (Heeks, 1999) This may not always operate to the benefit of emerging countries but, there can be a role for ICTs in channelling local information from a variety of sources to government, donors and trading partners. It is important, however, to ensure as far as possible that such activities are not at the expense of organic information systems and indigenous knowledge – the systems and knowledge that arise from within poor communities (Heeks 1999). Experience has shown that even attempts to adopt best practices have required adaptation to take account of the specifics of place, people and time. This requires the active participation of people familiar with local institutions and environments in order both that knowledge is made locally available and that any adaptations are effected in a way that reaffirms local autonomy (Stiglitz 1999).

In the event, information and knowledge form only one element (albeit a very significant one) in a mix that includes problems of access to finance and to softer infrastructures of trust and community networks. In identifying the role of intangibles such as information and knowledge in tackling the problems of the Digital Divide, and indeed in addressing the criteria by which developing countries would be assessed in an Information Society context, this wider mix of variables is an essential prerequisite. There is also the critical issue of success or failure, of the

impact of respective variables or their absence, on progress towards bridging the Digital Divide. For this we need much better metrics for progress towards the Information Society.

THE MEASUREMENT DIMENSION: METRICS FOR THE INFORMATION SOCIETY

Exploration of the Information Society in a serious statistical sense has not progressed at the same pace as that for the knowledge-based economy. Progress of a sort emerged from the 2003 World Summit on the Information Society which advocated that all countries establish internationally comparable statistics on the Information Society. The Summit also established a *Partnership for the measurement of ICTs for Development*, resulting in the creation of a set of indicators that collectively would form a *Digital Opportunity Index* (DOI)**.** The classification of indicators included:

- **Affordability and coverage**: To participate in the Information Society, consumers must have access to affordable ICT services. The *percentage of the population covered by mobile cellular telephony* represents basic accessibility, while the two tariff indicators, *Internet access tariffs as a percentage of per capita incomes* and *Mobile cellular tariffs as a percentage of as a percentage of per capita income* reflect affordability.

- **Access path and device**: Includes the means for electronic communication, *main telephone lines per 100 inhabitants* and *mobile cellular subscribers per 100 inhabitants*. It also includes the equipment that provides the interface between the user and the network, represented in DOI by *computers per 100 inhabitants*.

- **Infrastructure**: For the DOI includes proxies that reflect advanced higher level information networks such as the Internet. Indicators include *Internet subscribers per 100 inhabitants* and *International Internet bandwidth per country*.

- **Quality**: Reflects a level of access that enables higher degrees of functionality. This provides support for services such as video streaming that can enhance desirable Information Society applications such as telemedicine, e-government and e-learning. The DOI indicator selected in this category was *Broadband subscribers per 100 inhabitants* (ITU 2005)

The subsequent application of the DOI to the circumstances of 40 economies that were geographically and economically diverse, revealed the existence of a huge Digital Divide, with Sweden the highest ranked , scoring 69% of the maximum, and India, the lowest, scoring 14%. (ITU 2005). The problem with the DOI, however, remains its heavily techno-centric nature.

Previous research conducted by the author including an extensive series of interviews in Europe revealed a similar techno-economic dimension to European Information Society programs (Martin and Byrne, 2003. There was a general consensus among those interviewed of the importance of supplementing existing metrics with indicators more likely to reflect issues of poverty and disadvantage and in a broader sense the Digital Divide. Across Europe this is now beginning to happen with programs targeted at women, the elderly and youth. Particularly encouraging in this recognition of the need for metrics that address issues of social cohesion and inclusion, is a focus on the value and likely role of knowledge in combating the Digital Divide. This is particularly the case in the Nordic countries, in Ireland and the United Kingdom. There is also acknowledgement not only of the importance of knowledge but of the need to find ways of managing it within and between societies, something which would seem to be critical to the future prospects for an Information Society.

Other positive signs in terms of metrics have been the creation by the OECD of macroeconomic indicators that include relative levels of national investments in knowledge, and microeconomic

indicators for knowledge diffusion and human capital (Considine et al 2002). At the national level, advances have also been made in countries like Australia, with the emergence of a framework for measuring the knowledge-based economy and society (ABS 2002). This framework while relatively narrow in scope, also contains a number of social elements including the impact, both positive and negative, of knowledge processes and the effects of knowledge use. In Australia there is also an annual *Information Economy Index*, a statistical compendium for the Information Economy comparing 12 countries over 23 indicators (NOIE 2002). All these Australian indices, however, retain a predominantly techno-economic character. Most recently, Eurostat, the Statistical Office of the European Communities organised a conference in Luxembourg during December 2005. Its specific aims included assessing the state-of-the-art in measurement of the knowledge economy, and identifying gaps in European statistical systems and finding possible solutions. The conference operated on the basis of three which included R & D and Innovation, the impact of ICT on the knowledge based society and perhaps less predictably Human Capital. This latter stream addressed not only issues of output and productivity but also the contribution of human capital to such social dimensions as active citizenship, improved health, the problems of *at risk* populations and reduction in crime (Eurostat 2005).

While such events are to be seen as positive both in helping to illuminate progress (or the lack of it) towards Information Societies and in providing means for better identification of the Digital Divide, they remain only a means to an end. The nature of this end and the complexity of the outcomes, mean that this involves various forms of Information Society and different manifestations of the Digital Divide both between and within countries and regions. Having the metrics will still not substitute for missing factors in an *information chain* which includes not only access to and the use of data and information, but also the economic resources, social resources and action resources to implement them (Heeks 2005, b). Even in developed nations (as the Smart Newtown project in Wellington, New Zealand demonstrated), there are additional challenges to do with persuading those perceived as *have nots* to actually benefit from opportunities to join the *haves* and in so doing help to close the Digital Divide (Crump and Murray 2003). At Newtown, a significant minority of the local population simply chose not to engage with the opportunities to participate in an online environment that held considerable promise in terms of digital literacy and personal development opportunities. The likely explanation for this lack of interest lay in a lack of the necessary educational and social skills with which to take advantage of opportunity. This appears to be a global problem and as such it mandates a major role for education in digital divide initiatives. Critically it implies the need for attention to curriculum content at both local and global levels, something which seems to have taken second place to delivery modes dominated by the potential of ICTs. In both the developed and the developing world, the challenges of bridging the Digital Divide and in the process of creating sustainable Information Societies remain as daunting as ever.

REFERENCES

Anttiroiko, Ari-Veikko (2001), "Toward the European Information Society", *Communications of the ACM*, vol. 44, January, pp. 31-36

Asia Pacific Economic Forum (2002), *The New Economy in APEC: Innovation, Digital Divide and Policy*, APEC Secretariat, Singapore, 181 pp

Bell, Daniel (1969), *The coming of postindustrial society*, Basic Books, New York

Brazil, Ministry of Science and Technology (2001), *Information Society in Brazil: Green Book*, Ministry of Science and Technology, Brasilia, 74 pp.

Castells, Manuel (2000), *The rise of the network society*, (2nd ed.), Blackwells, Oxford

Computer Business review Online (2004), *U.N. Summit postpones Digital Solidarity Fund*, Available from: <http://www.cbronline.com/print_friendly84f6f75b8baaf46680256Df8001e4364> [November 2005]

Crump, Barbara and Andrea Murray (2003), The Digital Divide: Why *the don't-want-tos* won't compute; lessons from a New Zealand ICT project, *First Monday*, Available from: <http://www.firstmonday.org/issues/issue8_12/crump/crump>

Denmark, Ministry of Research and Information Technology (1995), *From vision to action: Info-Society 2000*, Ministry of research and Information Technology, Copenhagen 30 pp

Economist (2005), *The Real Digital Divide: Leader*, March 18th, Available from: < http://www.economist.com/opinion/display/Story.cfm?story_id=3742817> [November, 2005]

Ein-Dor, P, Myers, M and Raman, K (2004), "IT industry development and the knowledge economy: a four country study", *Journal of Global Information Management*, vol. 4, no. 12, pp. 23-27

European Commission (1993), *Growth, competitiveness and Employment: the challenges and courses for entering the 21st Century*, European Commission, Brussels.

European Commission (1994), *Europe and the Global Information Society (the Bangemann Report)*, European Commission, Brussels.

European Commission (1997), *Building the European Information Society for all: Final report of the High Level Group*, European Commission, Brussels.

European Commission (2000), *Public strategies for the Information Society in the member states of the European Union: An ESIS report*, September, 298 pp.

European Commission (2001), *eEurope: Impact and priorities: A communication to the Spring European Council in Stockholm*, 23-2 March. European Commission, Brussels

European Commission (2002, a) *eEurope: An Information Society for All. Action Plan*, European Commission, Brussels, 29 pp

European Commission (2002, b) *Towards a knowledge-based Europe: The European Union and the Information Society*, European Commission, Brussels, 19 pp

European Commission (2002, c), *eEurope 2002 Final Report*, European Commission, Brussels, 18 pp.

European Commission (2002, a) *eEurope: An Information Society for All*. Action Plan, European Commission, Brussels, 29 pp

European Commission (2002, b) *Towards a knowledge-based Europe: The European Union and the Information Society*, European Commission, Brussels, 19 pp

European Commission (2002, c), *eEurope 2002 Final Report*, European Commission, Brussels, 18 pp.

European Commission (2005), *i2010, European Information Society 2010*, European Commission, Brussels.

Eurostat (2005), *Conference on the knowledge economy: Challenges for measurement*, 8-9 December, Luxembourg.

Fagerburg, J (2005), "Knowledge in space: What hope for the poor parts of the globe?" (Paper prepared for the Washington Conference *Advancing knowledge and the knowledge economy*), National Academies, Washington

Firestone, Joseph and McElroy, Mark (2003), *Key issues in the new knowledge management*, Butterworth-Heinemann, Boston.

Gerschenkron, Alexander (1962), *Economic backwardness in historical perspective*, The Belnap Press, Cambridge, Mass.

Heeks, Richard (2005a), *ICTs and MDGs: On the wrong track?* Institute for Development Policy and Management, Manchester University, Manchester.

Heeks, Richard (2005b), *Foundation of ICTs in development: The Information Chain*, Institute for Development Policy and Management, Manchester University, Manchester. (eDevelopment Briefing, 3)

Heeks, Richard (2001), *Reinventing Government in the Information Age: International Practice in IT-enabled Public Sector Reform*, Routledge, London

Heeks, Richard (1999), *Information and communication technologies, poverty and development, Institute for Development Policy and Management*, Manchester University, Manchester.

Henten, A. and Kristensen, T (2000), "Information Society visions of the Nordic countries", *Telematics and Informatics*, vol. 17, pp. 77-103.

Henten, A., Skouby, K and Falch, M. (1996), "European planning for an Information Society", *Telematics and Informatics*, vol. 13 (2/3), pp. 177-90.

International Telecommunications Union (2002) World Summit on the Information Society Geneva 2003-Tunis 2005, Basic information about WSIS, ITU, Geneva

International Telecommunications Union (2005), WSIS Thematic Meeting on Measuring the Information Society, ITU, Geneva

International Telecommunications Union (2005), Measuring Digital Opportunity (WSIS Thematic Meeting on Multi-Stakeholder Partnerships for Bridging the Digital Divide, Seoul, June), ITU, Geneva

Ireland, Information Society Commission (2002), *Building the knowledge society*, Information Society Commission, Dublin, 72 pp

Japan, Ministry of Posts and Telecommunications (1993), *Reforms towards the intellectually creative society of the 21st Century*, MPT Communications, Tokyo.

Martin, William (1995), *The Information Society*, Gower, London

Martin, B. and Byrne, J., (2003) "Implementing e-Government: Widening the Lens", *Electronic Journal of E-Government*, vol. 1, no. 1, October

Martin, Bill (2005), "Information Society revisited: from vision to reality", *Journal of Information Science*, vol. 31, no. 1, pp. 4-12.

NOIE (2002), *The Current State of Play: Australia's Scorecard*, National Office of the Information Economy, Commonwealth of Australia, Canberra.

Organisation for Economic Cooperation and Development (1995), *Impact of the emerging Information Society on the policy development process and democratic quality*, OECD, Brussels 71 pp

Organisation for Economic Cooperation and Development (1996), *Employment and Growth in the Knowledge-based economy*, OECD, Paris.

Organisation for Economic Cooperation and Development (2001), *The New Economy: Beyond the hype*, OECD, Paris

Organisation for Economic Cooperation and Development (2002), E-government and reform of public administration, *Focus, Public Management Newsletter*, 25, September, 8 pp Available from: <http://www.oecd.org/puma/focus> [July 2005]

Organisation for Economic Cooperation and Development (2003), *Policy Brief: The e-government imperative: main findings*, OECD Observer, March, 8 pp

OECD (2004), *Regulatory reform as a tool for bridging the Digital Divide*, OECD, Paris.

Polanyi, M. (1966), *The Tacit Dimension*, Routledge and Kegan Paul, London.

Sarkar, Partha P (2001), Questioning the ICT Revolution: Structural analysis of Information Society Available from: <http://www.bytesforall.org> [December 2005]

Stiglitz, J (1999), "Scan globally, reinvent locally: knowledge infrastructure and the localisation of knowledge", *First Global Development Network Conference*, Bonn, Germany, December 1999 Available from: <http://www.iucn.org/themes/ceesp/Publications/CMWG/Stiegliz-local-knowledge.PDF> [December 2005]

United Nations Development Program (1998), *Information and Communication Technologies for Development*, UNDP, New York.

United Nations, Digital Solidarity Fund (2005), *From the Digital Divide to the need for a worldwide solidarity movement*, United Nations, New York, September.

United Nations, Economic and Social Council (2000) *Report of the Economic and Social Council for 2000*, Preliminary version, 00-61381 (E), 27 pp

United States, National Information Taskforce (1993), *The National Information Infrastructure – Agenda for Action*, U.S. Government Printing Office, Washington, DC.

van der Meer, A and van Winden (2003), "E-governance in cities", *Regional Studies*, vol. 37, no. 4, pp. 407-19.

Venturelli, S. (2002), "Inventing e-regulation in the U.S., E.U. and East Asia", *Telematics and Informatics*, vol. 19, no. 2, pp. 69-90.

Webster, Frank (1995), *Theories of the information society*, Rutledge, London

World Bank (1998), *World Development Report*, World Bank, Washington, DC.

World Information Society Index (2000), *IDC/World Times Survey* Available from: <http://www.worldpaper.com/2000/Feb00/isi.jpg> [August 2005]

World Information Society Index (2002), *IDC/World Times Survey* Available from: < http://www.worldpaper.com/2002/Feb02/isi.jpg> [August 2005]

Worth, D. C. (2001), "New wine in old bottles", *OECD Observer*, February 1, Available from: < http://www.oecdobserver.org/News/Printpage.php/aid/478/New_wine_and_old_bottles.html > [August 2005].

What role can educational multimedia play in narrowing the digital divide?

Hilary Macleod
Queensland University of Technology, Australia

ABSTRACT

This paper explores the assertion that the development of educational multimedia has a key role to play in effectively reducing the impacts of the digital divide particularly in the context of developing nations. This assertion is based on the premise that the global diffusion of Information Communication Technologies (ICTs) should not be guided by a technologically deterministic approach but situated in the context of an appropriate development and critical theory of technology approach, which takes into account a broad range of social, cultural, political and economic enabling factors. Such an approach is a feature of a social and community informatics framework. Within this context, facilitating the development of electronic literacy, culturally relevant online content and interfaces through the development of educational multimedia can assist the process of social inclusion within developing countries. Before examining the role of educational multimedia in this context, the paper critically analyses the concept of the digital divide and why ICTs have come to be seen as the panacea to the problems of global development.

Keywords: Learning Region; educational multimedia; electronic literacy.

INTRODUCTION

Amongst the recent pressing issues relating to the phenomenon of globalisation is an overwhelming call to arms to address poverty and inequality in developing countries by facilitating the global diffusion of Information Communication Technologies (ICTs). ICTs are seen as the electricity of the informational age and access to them as all important to the process of development. For example, Castells refers to those sections of the community least connected to ICTs as the 'black holes of informational capitalism' (Castells 2000, p. 165). The buzzword that has found its way into common parlance and public policy arenas to label this issue is the 'digital divide', which has been defined in its simplest form as:

> *the division of the world between those who have access to new information and communications technology (ICT) and those who do not (Quibria et al. 2002, p. 1).*

There can be no doubt that the digital divide has attracted the attention of decision makers worldwide and generated a plethora of public addresses, reports, policies, and plans, complete with an interesting array of clichés, that attest to the importance that is placed on addressing this issue (Council of Regional Organisations of the Pacific (CROP) 2002; Baker 2001; Miller 2001; Murelli 2002; United Nations 2002; World Bank & AusAID 2001). In many quarters, 'crossing', 'breaching' or 'reaching' across this 'chasm' is perceived as the panacea to development problems. At the highest international level, ICT public policy based on a digital divide framework has been adopted by various agencies such as the World Bank, UNESCO and the United Nations, and at the G8 Meeting on Okinawa in 2000 (Mamtora 2001, p. 3; Norris 2001, p. 40; UNESCO 1997).

Specific reference to the role of ICTs in addressing development goals is included in the United Nations Millennium Development Goals[1], and the Secretary-General of the United Nations, Kofi Annan, has said:

> *…a wide consensus has emerged on the potential of information and communications technologies (ICT) to promote economic growth, combat poverty, and facilitate the integration of developing countries into the global economy. Seizing the opportunities of the digital revolution is one of the most pressing challenges we face (United Nations 2002).*

In Australia, *The Virtual Colombo Plan* was launched by AusAID and the World Bank in 2001 with its goal:

> *To use the opportunities presented by Information and Communication Technologies (ICTs) to improve education and access to knowledge in developing countries (World Bank & AusAID 2001, p. 21).*

Clouding the issue of defining the digital divide is that it is not just a gap that exists between developed and developing nations, but also within nations and thus also creating inequality for marginalised communities within developed nations. This aspect of the digital divide reflects a more complex understanding of a centre - periphery model of development, whereby centres of power as well as peripheries of marginalisation exist within all countries. Thus Rogers W'O Okot-Uma, Chief Programme Officer, Commonwealth Secretariat refers to the digital divide as:

> *the relative differential in access to information and communications technologies (ICTs) **between** and **within** regional groupings (Murelli 2002, p. x, emphasis in original).*

Whilst the digital divide is clearly an issue affecting all countries of the world, for the purposes of clarity in this paper I will be focusing on the digital divide as it impacts on developing nations.

There is no doubt that in statistical terms inequality in access to ICTs does exist between developed and developing nations. Most frequently the statistical disparities between countries regarding ICT are based on measures of access to hardware and connectivity and the figures present a picture of developed world dominance in ICT access. For example the Digital Divide Network Website cites the following 2001 Neilsen/ Netratings statistics as evidence of the digital divide:

> *There are an estimated 429 million people online globally…of those 429 million, fully 41% are in North America. Also, 429 million represents only 6% of the world's entire population…The United States has more computers than the rest of the world combined…When assessed by region, Internet use is dominated by North Americans: 41% of the global online population is in the United States & Canada, 27% of the online population lives in Europe, the Middle East and Africa (25% of European Homes are online), 20% of the online population logs on from Asia Pacific (33% of all Asian Homes are online)…Only 4% of the world's online population are in South America (Benton Foundation 2004).*

THE CONTESTED NATURE OF THE DIGITAL DIVIDE

More recent attempts to measure the extent of the digital divide suggest that this picture is more complex and dynamic. In 2003 the International Telecommunication Union introduced what it called the 'first truly global ICT ranking' based on indicators from 178 countries. The Digital Access Index (DAI) measures the 'overall ability of individuals in a country to access and use Information and Communication Technology' and distinguishes itself from other indices by broadening the definition of 'access' to include a number of new variables, such as education (literacy and school enrolments) and affordability (Internet access cost). This index provides a far more complex scenario which has Korea in the top five rankings[2], jumping 20 places in the last 4 years, and the other Asian Tiger economies (Taiwan, Singapore and Hong Kong) in the Top Five biggest gains category (International Telecommunication Union 2003).

As the DAI suggests a picture is emerging regarding the digital divide and its indicators which is far more complex than has been suggested in the past. The appearance of a surprising number of developing nations amongst the top rankings and the biggest gains in the DAI lends more weight to a reconceptualisation of the digital divide both in defining the phenomenon and the factors which contribute to it.

Contrary to Kofi Annan's assertion of a consensus of the potential of ICTs to assist the development process there is considerable debate about how to realise this potential. A number of commentators have questioned whether the use of the term digital divide is actually an appropriate or useful one to use as a basis for policy and decision making, since the difficulties in defining the digital divide make it difficult to devise solutions (Bridges.org 2003; Mitchell 2002). Others specifically argue that the digital divide is defined too narrowly in terms of physical access to hardware and connectivity to the exclusion of other development and ICT enabling factors and that to formulate solutions on this basis, simply by increasing the numbers of computers, telephone lines or Internet access that a country has, is flawed (Cisler 2000; Gurstein 2000, p. 5; Mamtora 2001; Warschauer 2003b).

Behind these debates lie differences in perceptions of what ICTs represent and what access to them means, underpinned to some extent by comparative theories of technology. According to Feenberg an instrumental theory (also known as a neutralist approach) of technology is probably the most commonly held belief and is one which views technology as a 'tool' without any inherent value (Feenberg 1991, p. 5). Since ICTs are deemed to be neutral and their value lies in how they are used, proponents of this theory would support a one-size-fits-all policy of universal employment of ICTs (Ebersole 1995). Substantive theory (also known as a determinist or autonomous approach), on the other hand argues that technology is not neutral and in itself it has a positive or negative impact (Feenberg 1991, p. 6). Warschauer extends the analysis particularly with reference to technological determinism which he says encourages the idea that:

> *the mere presence of technology leads to familiar and standard applications of that technology, which in turn bring about social change (Warschauer 2003a, p. 44).*

To draw a link between theories or approaches to technology and digital divide public policy measures - on the basis of an instrumental or deterministic approach the digital divide could be seen as a simple question of access to the physical constructs of ICT and solutions based on increasing the diffusion of these physical constructs.

In relation to ICT public policies, Warschauer criticises both theories on the basis that they underestimate the interrelationship of ICTs with social, political, economic, and cultural factors. As such he is a proponent of the critical theory of technology proposed by Feenberg in which:

> *technology is viewed as a site of struggle, and investigations of technology implementation seek to uncover underlying power relations that shape how technology is used (Warschauer 2004, p. 2).*

This view is also supported by Wiseman who states:

> *Ultimately, the Internet is best understood as creating a new set of relationships and places, rather than as a high-technology tool. It is one more global arena in which struggles over the distribution of resources, power and information will be fought out (Wiseman 1998, p. 85).*

There is also some empirical evidence to suggest that rather than narrowing the digital divide, amelioration based on simple technological deterministic solutions to the digital divide can exacerbate inequities within countries since those who benefit the most are the elite who can afford the technology and skills to make effective use of it and those who are already marginalised become more so (Cisler 2000; Mamtora 2001, p. 8; Warschauer 2003b, p. 7). A good of example of this is in Bangalore, India where a growing software development industry has brought prosperity to those employed in the industry whilst increasing to the public health problems, corruption and real estate prices impacting on the poor (D'Souza 1996, p. 25). This phenomenon is also supported by Warschauer who says:

> *India has one of the largest and most developed information technology industries in the world. This industry has created a tiny group of multimillionaires and a small middle class of network and software engineers, computer programmers, and computer-assisted design specialists. At the same time, though, the benefits of the information technology revolution have had very little trickle down effect on the country's overall population, most of which lives in desperate conditions in rural areas (Warschauer 2003b, p. 23).*

It is not surprising that technological determinism with respect to ICTs has its drawbacks since these experiences mirror somewhat that of previous development interventions. For example, the Green Revolution, which was heralded as solving global development inequities in agriculture, was initially embarked upon with a 'one-size-fits-all', deterministic and top-down approach whereby money and agricultural equipment was delivered to developing countries in the hope of reducing poverty only to find that equipment was abandoned due to the lack of skills in how to use it and the expected trickle down effect did not eventuate as little attention was paid to other social, political and cultural factors that impacted on their adoption. Subsequent interventions, which focused on broader development goals and a community-driven, bottom-up approach, were far more successful. Consequently it is not so much a debate about whether the digital divide exists but rather the effectiveness of measures to deal with it. The learning curve of what works and what doesn't regarding development interventions ultimately leads us to consider a model of ICT diffusion which focuses on appropriate and locally contextualised development underpinned by a critical theory of technology.

Whilst theoretical stances of technological determinism or neutrality (instrumentalism) fail to explain the reality of ICT diffusion, empirical evidence shows that social purpose, social context and social organisation is critical to an understanding. The social embeddedness of technology is what distinguishes the field of Social Informatics. The central tenet of social informatics is what a number of authors refer to as 'social shaping' of technology (Kling 2000; Loader & Keeble 2004, p. 39; Taylor 2004; Schuler 1996). Social Informatics helps to explain why ICTs and the diffusion of ICTs operates differently in different contexts, because it takes into account that there are different social relationships and factors operating in these different contexts. In a Social Informatics framework both the technological artefacts and social relationships are considered to be interdependent and are woven into an integrated socio-technological model. In Social

Informatics, looking at what people do with technology rather than what they have is pertinent for making effective use of ICTs for social change and social inclusion. As an extension of Social Informatics there have recently been developments to focus on Community Informatics which Gurstein defines as:

> *the application of information and communications technologies (ICTs) to enable community processes and the achievement of community objectives including overcoming "digital divides" both within and among communities (Gurstein 2002, p. 1).*

However, whilst the rhetoric of policies and programs outlined by international bodies does reflect a broader social and community perspective, the indicators employed to measure progress are consistently based on numbers of computers and connectivity United Nations 2004).

ICTS AND SOCIAL INCLUSION

What a number of stakeholders have now recognised is that 'access' to ICTs needs to be defined in broader terms (Bridges.org 2003; Carvin 2000; Clement & Shade 2000; Mamtora 2001; Warschauer 2003b). The problem with an access fix to the digital divide is that it is simplistic and does not take into account other enabling factors. As a policy stance it can also be reduced to a marketing ploy and becomes an approach about receiving and consuming rather than producing and distributing. Granted access is the foundation stone of ICT diffusion but it is not the whole solution. Gurstein argues that ICT implementation is not simply a question of access to ICTs but of how they are accessed, by whom, under what circumstances and for what purposes?

> *The key element in all of this is not "access" either to infrastructure or end user terminals (bridging the hardware "divide"). Rather what is significant is having access and then with that access having the knowledge, skills, and supportive organizational and social structures to make effective use of that access and that e-technology to enable social and community objectives (Gurstein 2003).*

An access fix also implies a one-way bridge approach in which the 'haves' on one side supply the 'have nots' on the other. Eglash on the other hand promotes a two-way bridge approach whereby cultural resources are shared and ICT users become producers of cultural heritage knowledge (Eglash 2002). Thinking in these terms allows us to combine social critique with an appreciation of cultural resources and is more socially inclusive.

Social inclusion therefore is dependent not on equal resource share but on equal participation in the use of the resources. To illustrate this point, socioeconomically disadvantaged groups who have been provided with unlimited ICT resources may remain marginalised from the information society as they do not have the supporting mechanisms to effectively use these resources. On the other hand, socioeconomically disadvantaged groups with few ICT resources have made effective and meaningful use of communal ICT resources. The flip side of this is that socioeconomically advantaged groups with unequal access to resources can be marginalised by other factors. As Miller says:

> *Access to the technology and the availability of infrastructure to facilitate its use are undoubtedly the most important and first steps to narrowing the divide, but access alone is not enough to address the problem. There are numerous other factors that come into play in the quality of people's access, such as education and training, language and literacy, bandwidth, hardware and software, and even Web design (Miller 2001, p. 2).*

THE ROLE OF EDUCATIONAL MULTIMEDIA

Inherent in the concept of social inclusion is the notion that education generally is both a factor behind the digital divide and a means to overcome it and it follows that, if we accept a Social and Community Informatics perspective, educational multimedia has an important role to play in promoting social inclusion and narrowing the real digital divide.

In canvassing the digital divide based on a social and community informatics framework in the context of education multimedia development, three interrelated issues emerge which prevent effective use of ICTs in developing countries. The first issue relates to the skills and practices required to make use of ICTs e.g. the level of electronic literacy. The second issue relates to the tools or products of educational multimedia e.g. lack of relevant online materials. Finally there is the question of the cultural relevance of dominant models of interface design.

Electronic Literacy

In the same way that basic literacy has long been promoted as the key to closing the development gap between rich and poor[3], proponents of social inclusion through ICTs propose a focus on electronic literacy as a key to overcoming the digital divide. This reflects the argument that access to physical hardware is of little use if you don't have the means to use it effectively and meaningfully (Carvin 2000; Gurstein 2003).

Electronic literacy[4] includes basic text related literacy and is a prerequisite to effective use of ICTs. In a parallel process to understanding the concept of literacy, electronic literacy has itself evolved from a notion of being able to operate a computer and performing computer drills through to more constructivist approaches to multimedia development (Jonassen 2000). Warschauer for example refers to the concept in its plural and in very broad terms:

> *electronic literacies are not isolated from the types of literacy practiced with print but rather involve added layers that account for the new possibilities presented in the electronic medium of computers and the Internet. Electronic literacy is actually an umbrella term that encompasses several other generic literacies of the information era, including computer literacy, information literacy, multimedia literacy, and computer-mediated communication literacy. These new literacies stem in part form the new technological features of the computer but also from the broader social setting in which computers are used (Warschauer 2003b, p. 111).*

Since electronic literacy is a key to unlocking the access to ICTs, it is important that projects in developing countries incorporate proposals to assist the development of electronic literacies in the broadest sense; encompassing not only the operational aspects of using a computer such as opening and saving files, navigating, word processing and Internet searching but also the development of higher order skills situated within a cultural context. Of all the aspects of electronic literacies, multimedia literacy and computer-mediated literacy have particular relevance for developing countries since they are strongly linked with the process of democratising education. Not only does educational multimedia reflect preferred learning styles based on audio-visual preferences but multimedia literacy enables users to become producers of information and this, as we will see, has implications for the diversity of online content (Gurstein 2003, p. 7; Worcman 2002 , p. 2; Warschauer 2003b, pp. 115 - 116).

Computer-mediated communication (CMC) literacy also has the potential to shift power bases for developing countries. The Internet acts as a medium of communication for geographically dispersed people, and provides opportunities for online networking. This can be an empowering

process for marginalized groups with the potential to level the playing field of disadvantage which may be caused by geographical dispersion (Council of Regional Organisations of the Pacific (CROP) 2002; Learnlink) .

A successful example of this process is provided by the case study of *Running Drik*, a photo library in Dhaka, Bangladesh, which set up an electronic mail network called *DrikTAP* for its own networking purposes. As the use of the services grew the network expanded to eventually include other local and international NGOs, activists and universities. The network's services diversified from email to bulletin boards, online searching and conferencing (using of Bangla language) and training programs. Ultimately the organisation began to take on the role of electronic post office for the community. The critical mass of users in the network meant that although the organisation used the network to undertake anti-government activism, the government was reluctant to close it down. As Alam comments:

> *...DrikTAP has become a powerful way of talking to the outside world. and more importantly to each other... In a small way we are witnessing a shift in the balance of power (Alam 1996, p. 15).*

CMC literacy also plays an important role in the facilitation of online learning and distance education which has the 'potential to extend learning opportunities to millions who would otherwise be denied a good education (World Bank & AusAID 2001, p. 7). However, even if we overcome the issue of the basic literacy levels that online learning supposes, the potential may not be realised if we do not address the cultural factors. For example whilst online networking may be a practice that finds parallels with social networking preferences of indigenous communities, online learning that lacks avenues for social support through face-to-face instruction may not be successful (Warschauer 2003a, p. 46.). Furthermore, I suspect from my own experience in a Pacific context, that the Western protocols of CMC do not allow for the kinesics that forms an integral part of a number of languages. Addressing the issue of kinesics in CMC is an area of research which holds promise for the efficacy of CMC and online learning in developing countries.

Online Content

Whilst developing electronic literacy is fundamental to the effective use of ICTs, it should also be supported by the development of relevant online content. Currently there is a discrepancy between the potential of educational multimedia and the reality of its content which precludes its widespread use. For example the majority of online content currently emanates from the US, is text based, and written in English. Not only does this exclude those in developing countries with low basic literacy levels but it is also of questionable cultural relevance. This is a problem that developing country leaders are keen to overcome. As South African President Thabo Mbeki remarked in 1995[5]:

> *"... we are also extremely interested to ensure that we are not mere importers and consumers of a predetermined content. Rather, we also want to be producers and exporters and therefore active and significant participants in the creation, production and formulation of content ..." (Miller 2001, p. 4).*

My own experience working with teachers and students in developing countries[6] indicates that the audio-visual potential of educational multimedia facilitates learning styles that seem to be more in accord with non-Western cultures which have a strong emphasis on oral communication, audio-visual preferences and collaborative learning. This notion is further supported by Warschauer's experiences with teachers and students in Hawaii Warschauer 1998), Turk and

Trees design of an information system to contain cultural heritage information for an indigenous community in WA (Turk & Trees 2000) and Jonassen et al in the context of Navajo children in the United States:

> *Navajo children lack apparent reasons to learn in traditional learning modes. Producing multimedia materials can help. The key to constructive learning is ownership. Navajo children have no ownership in traditional transmissive approaches to learning, because the context has little meaning in their cultural context.....Perhaps the most interesting conclusion from this study was that collaborative multimedia production was so effective in this situation because the Navajo culture is a cooperative, non-competitive culture (Jonassen et al. 2003, p. 177).*

Another issue related to the development of online content is the disproportion of English language used online. This is largely due to the historical and social context of the Internet which was developed in the US, using ASCII code which only supports fonts based on the Roman alphabet. Languages which require the use of diacritical marks are disadvantaged (Warschauer 1999, p. 92). Although the number of indigenous language web pages is growing the current dominance of English online remains a disincentive to marginalised groups to go online. Allied with the issue of language relevance is the question of cultural relevance of online content. Empowering communities to engage in their own web authoring not only supports constructivist educational principles, it also contributes to the diversity of knowledge and languages on the Internet and has the potential to preserve cultural histories based on oral traditions (Learnlink; Turk & Trees 2000). However, as Worcman points out there are inherent dangers:

> *it is important to consider the way in which the creation of these collections assists the process of strengthening the identities of the communities…It is undeniable that when the oral traditions of a community without a written language are recorded, that community's history will be preserved. But preserved for whom? How can repeating the colonialization and appropriation of a group's culture, such as that which occurred previously with physical resources, be avoided when its knowledge is being recorded for the virtual world? (Worcman 2002 8, p. 3)*

Interface Design

Finally, another aspect of educational multimedia development which impacts on the efficacy of educational multimedia in developing countries is interface design. Miller, for example, outlines a number of web authoring principles to overcome the constraints (Bandwidth and electronic literacy) associated with marginalised groups based on experiences with the Centre for the Study of Violence and Reconciliation (CSVR), University of Witwatersrand, South Africa. As general principles she proposes avoiding large graphics files and photographs, plug-ins such as Adobe Acrobat and Flash, frame based web pages, and non-protocol hyperlinks (rollover features). In addition she advocates for printer friendly colour choices and sustainable content, which she defines as content requiring minimal maintenance (Miller 2001). Whilst these principles may be contested and some may become less important as access to bandwidth increases, they are a good starting point from which to consider the adaptation of interface design.

Related to interface design is importance of cultural metaphors in interface design. Both the Turk & Trees (2000) and Learnlink case studies of community informatics initiatives in indigenous communities incorporate the design of culturally relevant desk top icons and graphical user interface metaphors as elements of their educational design.

CONCLUSION

Kofi Annan's assertion of the potential of ICTs to facilitate the development process for developing countries is a valid one. However the notion of the digital divide, the factors contributing to it and the solutions pertaining to it are widely contested. A technologically deterministic perspective of the digital divide proposes solutions based on access as defined by the physical constructs. This appears to be the reality of much public policy to date and unfortunately appears to be exacerbating the digital divide within countries. What is required to address the digital divide is a social and community informatics perspective, based on a critical theory of technology, which places greater emphasis on broader development goals. Using a social and community informatics perspective, the role of education and educational multimedia, and in particular the issues of electronic literacy, online content and interface design, is fundamental. In a practical sense these issues can be addressed by facilitating indigenous and non-Western cultures to be actively engaged in the development of their own online content and interfaces thus also promoting democratisation of education and diversifying the nature of online knowledge and languages.

Notes:

[1]   Target 18: In cooperation with the private sector make available the benefits of new technologies, specifically information and communication (United Nations 2004).

[2]   The top five rankings in order with Index rankings are: Sweden (0.85), Denmark (0.83), Iceland (0.82), Republic of Korea(0.82), and Norway (0.79) (International Telecommunication Union 2003).

[3]   Although there have also been considerable debates about the notion of literacy and its correlation with socioeconomic levels, a detailed consideration of this lies outside the scope of this paper.

[4]   Warschauer summarises the proposers of alternative names for computer related literacy as electronic literacy (Craver, 1997); digital literacy (Gilster, 1997); technological literacies (Lankshear and Knoble, 1995); multiliteracies (New London Group, 1996); metamedia literacy (Lemke, in press) (Warschauer 1999, p. 117).

[5]   "South Africa and the Information Superhighway," Statement to the G7 Ministerial Conference: *Information and Society,* Brussels (24 February 1995) cited in Miller 2001).

[6]   I have worked on curriculum development projects in Malaysia, Tuvalu, Nepal and Papua New Guinea.

REFERENCES

Alam, S. 1996, 'On-line lifeline', *New Internationalist*, vol. 286, December, pp. 14 - 15.

Baker, P. M. A. 2001, 'Policy bridges for the digital divide: assessing the landscape and gauging the dimensions', *First Monday*, [online], vol. 6, no. 5. Available from: http://firstmonday.org/issues/issue6_5/baker/index.html [15/04/04].

Benton Foundation. (2004), *Digital Divide Network* [online], Benton Foundation. Available from: http://www.digitaldividenetwork.org/content/sections/index.cfm [27/05/04].

Bridges.org. 2003, *Spanning the international digital divide* [online]*,* Bridges.org. Available from: http://www.bridges.org/index.html [4/06/04].

Carvin, A. 2000, 'More than just access: fitting literacy and content into the digital divide equation', *EDUCAUSE Review*, vol. 35, no. 6, pp. 38 - 47.

Castells, M. 2000, *The Information Age: Economy, Society and Culture. Vol 3*: *End of Millennium*, 2nd edition, Blackwell Publishing, Malden, MA, USA.

Cisler, S. 2000, 'Letter from Cambridge: digital nations and eDevelopment meetings', *First Monday,* [online], vol. 5, no. 11. Available from: http://firstmonday.org/issues/issue5_11/cisler/index.html [15/04/04].

Clement, A. & Shade, L. R. 2000, 'The access rainbow: conceptualizing universal access to the information/ communications infrastructure', in *Community Informatics: Enabling Communities with Information and Communications Technologies,* M. Gurstein (Ed), Idea Group Publishing, Hershey, USA, pp. 32 - 51.

Council of Regional Organisations of the Pacific (CROP). 2002, *Pacific Islands Information and Communication Technologies Policy and Strategic Plan* [draft], ICT working Group.

D'Souza, D. 1996, 'Silicon valley east', *New Internationalist*, vol. 286, December, p 25.

Ebersole, S. 1995, *Media determinism in cyberspace*, [online], Regent University. Available from: http://www.regent.edu/acad/schcom/rojc/mdic/md.html [05/06/04].

Eglash, R. 2002, 'A two way bridge across the digital divide', *The Chronicle of Higher Education,* [online], June 21,The Chronicle Review. Available from: http://chronicle.com/free/v48/i41/41b01201.htm

Feenberg, A. 1991, *Critical Theory of Technology*, Oxford University Press, New York.

Gurstein, M. 2000, 'Community informatics: enabling community uses of information and communications technology', in *Community Informatics: Enabling Community Uses of Information and Communications Technology,* M. Gurstein (Ed), Idea Group Publishing, Hershey USA, pp. 1 – 30.

Gurstein, M. 2002, 'Community informatics: current status and future prospects - some thoughts, *Community Technology Review,* [online], Winter – Spring. Available from: http://www.comtechreview.org/article.php?article_id=56

Gurstein, M. 2003, 'Effective use: a community informatics strategy beyond the digital divide', *First Monday*, [online], vol. 8, no. 12. Available from: http://firstmonday.org/issues/issue8_12/gurstein/index.html

International Telecommunication Union. 2003, *ITU Digital Access Index: world's first global ICT Ranking*, [online], ITU. Available from: http://www.itu.int/newsarchive/press_releases/2003/30.html [02/06/04].

Jonassen, D. H. 2000, *Computers as Mindtools for Schools: Engaging Critical Thinking*, 2nd edition, N. J., Merrill, Upper Saddle River.

Jonassen, D. H., Howland, J., Moore, J. L. & Marra, R. M. 2003, *Learning to Solve Problems with Technology: A Constructivist Perspective*, 2nd ed., Merrill Prentice Hall, Upper Saddle River, N. J.

Kling, R. 2000, 'Learning about information technologies and social change: the contribution of social informatics', *The Information Society*, vol. 16, pp. 217 - 232.

Learnlink . n.d, *Taking Ownership: Strengthening Indigenous Cultures and Languages Through the Use of ICTs*, Learnlink, Washington DC.

Loader, B. D. & Keeble, L. 2004, *Challenging the Digital Divide? A Literature Review of Community Informatics Initiatives*, Joseph Rowntree Foundation, Teesside University.

Mamtora, J. 2001, 'Bridging the digital divide in the islands of Oceania', 67th IFLA Council and General Conference: Libraries and Librarians: Making a Difference, August 16 - 25, Boston, USA .

Miller, A. 2001, 'Reaching across the divide: the challenges of using the Internet to bridge disparities in access to information', *First Monday*, [online], vol. 6, no. 10. Available from: http://firstmonday.org/issues/issue6_10/miller/index.html [01/04/04].

Mitchell, M. M. 2002, 'Exploring the future of the digital divide through ethnographic futures research', *First Monday*, [online], vol. 7, no. 11. Available from: http://firstmonday.org/issues/issue7_11/mitchell/index.html [15/04/04].

Murelli, E. 2002, *Breaking the Digital Divide: Implications for Developing Countries,* Commonwealth Secretariat and SFI Publishing.

Norris, P. 2001, *Digital Divide*, Cambridge University Press, Cambridge.

Quibria, M. G., Ahmed, S., N., Tschang, T. & Reyes-Macasaquit, M.-L. 2002, *Digital Divide: Determinants and Policies with Special Reference to Asia*, Economics and Research Department Working Paper Series No. 27, Asia Development Bank, Manilla, Philippines.

Schuler, D. 1996, *New Community Networks: Wired for Change*, [Online], Addison-Wesley Publishing Company. Available from: http://www.scn.org/civic/ncn/

Taylor, W. 2004, 'Community informatics in perspective', in *Using Community Informatics to Transform Regions*, S. Marshall, W. Taylor & X. H. Yu (Eds), Idea Group Publishing, Hershey, PA., pp. 1 – 17.

Turk, A. & Trees, K. 2000, 'Facilitating community processes through culturally appropriate informatics: an Australian indigenous community information system case study, in *Community Informatics: Enabling Communities with Information and Communications Technologies*, M. Gurstein (Ed), Idea Group Publishing, Hershey, USA. pp. 339 – 358.

UNESCO 1997, *UNESCO and an information society for all*, [online], WebWorld: E-Publications. Available from: http://unesco.org/webworld/telematics/gis.htm [25/05/04].

United Nations 2002, *Digital divide still yawns, Kofi Annan tells assembly session on Information and Communication Technologies for Development*, [online], United Nations. Available from: http://www.escwa.org.lb/information/press/un/2002/june/18.html [01/05/04].

United Nations 2004, *Millennium indicators database*, [online], United Nations Statistics Division. Available from: http://unstats.un.org/unsd/mi/mi_goals.asp [01/06/04].

Warschauer, M. 1998, 'Technology and indigenous language revitalization: analyzing the experience of Hawai'i', *Canadian Modern Language Review*, vol. 55, no. 1, pp. 140 - 161.

Warschauer, M. 1999, *Electronic Literacies: Language, Culture and Power in Online Education*, Lawrence Erlbaum Associates Mahwah, New Jersey.

Warschauer, M. 2003a, 'Demystifying the digital divide', *Scientific American*, vol. 289, no. 2, pp. 42 - 47.

Warschauer, M. 2003b, *Technology and Social Inclusion: Rethinking the Digital Divide*, The MIT Press Cambridge, Massachusetts.

Warschauer, M. 2004, 'The rhetoric and reality of aid: Promoting educational technology in Egypt', *Globalisation, Societies and Education*, vol. 2, no. 3. pp. 377 – 390.

Wiseman, J. 1998, *Global Nation: Australia and the Politics of Globalisation,* Cambridge University Press, Cambridge, U.K.

Worcman, K. 2002, 'Digital division is cultural exclusion. But is digital inclusion cultural inclusion?' *D-Lib Magazine*, [online], vol. 8, no. 3, Corporation for National Research Initiatives. Available from: http://www.dlib.org/dlib/march02/worcman/03worcman.html [27/05/2004].

World Bank & AusAID 2001, *Virtual Colombo Plan: Bridging the Digital Divide: Joint Australian - World Bank Background Study*, Commonwealth of Australia Canberra.

Learning Regions in New Zealand: The role of ICT

Janet Toland and Pak Yoong
Victoria University of Wellington, New Zealand

ABSTRACT

A "Learning Region" is characterised by the existence of high quality linkages between different regional stakeholders such as: local businesses; community groups; and education providers. This sharing of information leads to innovation and economic success. Within a regional area interaction and exchange of information is easier and cheaper than in a national or international context. The success of an individual organisation is directly related to the quality of information available locally. Information technology can be an important tool in improving the flow of knowledge between the stakeholders within a region. This paper examines the potential for information and communication technologies to enhance the efforts of regions in New Zealand to achieve sustainable economic success, by improving the flows of knowledge, both within the region itself, and between the region and the outside world.

Keywords: *Learning Region; New Zealand; commerce; culture; learning; information flow.*

INTRODUCTION

Promoting the development of a knowledge society is a tactic increasingly adopted by governments who want to encourage economic development at the local, regional and national levels. Research has shown that regions in particular, are growing in importance as centres of innovation, and this has led several countries, notably those in Europe, to develop strategies to encourage knowledge sharing at a regional level with the aim of establishing "Learning Regions". There is no single definition of a learning region; however a common strand in the literature is that such regions have an explicit commitment to placing innovation and learning at the core of development (1999). A learning region would generally consist of a network of inter-firm relationships, supported by social capital and trust, and kept dynamic by a continuous process of interactive learning. The idea of a learning region has developed out of previous research on "Regional Systems of Innovation" (Cooke & Morgan, 1998) which noted the growing importance of the region as a nexus of learning. Related concepts are those of the "innovative milieu", "new industrial district" and "local productive system" (Doloreux & Parto, 2004).

Little is known about the role of information and communications technology (ICT) in enhancing learning regions. The presence of "institutional thickness" has been shown to be an important indicator of regional success (Amin & Thrift, 1994). This can be identified by lively interactions between firms, business associations, development agencies, innovation centres, unions and community groups. The use of ICT could encourage "digital institutional thickness" by providing technology that improves the quality of information flows between stakeholders in a regional setting. Of particular interest is to consider how these information flows can contribute to organisational learning and innovation. How does the changing balance of intra and extra-regional networking affect the organisations operating within a particular area?

This paper will discuss the growing importance of knowledge sharing at the regional level, and expand on the concept of the learning region. The different forms a learning region can take are explored, and the potential contribution that ICT could make to regional learning is discussed.

The paper finishes by considering what lessons New Zealand can take from the learning region concept.

THE SIGNIFICANCE OF THE REGIONAL PERSPECTIVE

The term region generally defines a broad geographical area distinguished by similar features. A region generally refers to sub units within a country, broadly equivalent to the state level in Australia and the United States, or a county in England. It should be noted that a region can either sub-divide a country or cut across national boundaries, for example the Øresund region is in two countries Sweden and Denmark, and the Great Lakes is in both Canada and the USA. The term region can also refer to a geographical area that covers many countries, such as the South Pacific region.

The variation in the definition of a region is not imprecision; it reflects the different geographic scales at which economic change can occur (Malecki, 1997). Geography, culture, economic activities and political boundaries can all be factors in defining regions. Regions are built environments rather than natural ones and are formed as societies build distinct economies and political systems. Regions tend to change over time in size, shape, and significance. A region may be bound together against a common external enemy, or there may be unifying internal factors, such as a common language, tribe, or religion.

Regions are different from nations in that they are more "open". A larger proportion of the region's economy depends on flows of imports from and exports to other regions. These flows are often difficult to measure due to the lack of formal borders and customs barriers (Malecki, 1997). A useful working definition of a region is given by Ann Markusen (1987):

> *"A region is a historically evolved, contiguous territorial society that possesses a physical environment, a socio-economic, political and cultural milieu and a spatial structure distinct from other regions and from other major territorial units, city and nation."* (p. 16)

Cooke and Morgan (1998) identify three main reasons why the regional level is so important:
1) There has been an increasing externalisation of the production of goods and services by corporations throughout the 1980s and 1990s as outsourcing has taken off, this has resulted in "clustering" as small firms look for better external economies from geographic proximity;
2) As a consequence of externalisation there is an increasing specialisation of regional economies, due to the exchange of tacit knowledge at the regional level or below;
3) There is a growing regionalisation of industrial policy, enterprise support and promotion for inward investment, partly caused by a relative decline in national economic sovereignty.

Ohmae (1995) explains the rising importance of what he terms "region states" by examining the flows of what he terms the four "I"s: investment; industry; information technology; and individual consumers. Investment is no longer geographically constrained, and is mostly private rather than from a particular government, wherever an opportunity looks attractive the money will go to that opportunity no matter where in the world it is. Industry is increasingly global in orientation, and as corporations move around the world they bring with them capital, and technology transfer and managerial know-how. Information technology is an important enabler, which makes it possible for a company to operate in different parts of the world without having to build up an entire business system in each area. Individual consumers, are increasingly global in orientation, and tend to want the cheapest products no matter where they come from.

At the regional level it is geographically possible for individuals to make face-to-face contact on a regular basis, this gives them the opportunity to maximise the use of human capital and

resources within the area. Each region has a unique cultural heritage and has the potential to utilise that shared understanding and common way of working together to obtain economic advantage. For some cross-country regions that shared understanding is achieved when different cultural backgrounds are combined in a complementary fashion, an example is San Diego/Tijuana which crosses the US/Mexico border. Though the use of ICT has made it possible to communicate globally, contact made through technology only reinforces the need for physical meetings. The use of ICT for communication can help to build up and enhance networks at a regional level.

THE LEARNING REGION CONCEPT

Many authors (Florida, 1995; Morgan, 1997; Ohmae, 1995; Saxenian, 1994a; Storper, 1995) have identified regions as the most important sites in which to capitalise on the flows of knowledge that abound in contemporary globalisation. Regional coalitions create economic and social relations to facilitate interactive learning, innovation networks, institutional thickness and soft social capital. Ohmae (1995) identifies the development of region states around regional centres such as the Bay area around Silicon Valley, and Southern China around Hong Kong. Saxenian (1994a) in a comparative study of Route 128 in Massachusetts and Silicon Valley in California argues that the success of the latter owes as much to its rich technical and commercial relationships as to the competitive rivalries and initiative of individual entrepreneurs. Morgan (1997) uses a network paradigm to show that flows of knowledge and social capital can be most appropriately nurtured at a regional level where regular interactions can be sustained over time.

Storper (1995) introduces the concept of untraded dependencies; these include institutional norms and values such as trust, reciprocity and cooperation, as well as regional conventions inherent in labour markets and public institutions. These interdependencies are vital to economic and organisational learning and co-ordination. They are based on collective tacit knowledge that cannot be removed from its human, cultural and social context. In other words, it is knowledge that is territorially specific. Storper (1995) views untraded dependencies as the most significant form of scarcity in contemporary capitalism, largely because they are non-codifiable. Soft infrastructures such as conventions, trust-based interactions and civic cultures are inherently esoteric and intricate and harder to identify than more visible public infrastructures such as roads, schools, training colleges, or the formulation of inward investment strategies.

Florida (1995) visualises the learning region as a large-scale version of a knowledge intensive firm. Regions must adopt the principles of learning in the provision of a series of inter-related infrastructures in production, human capital, physical and digital communications alongside an effective system of industrial governance. Amin and Thrift (1994) use the idea of institutional thickness to highlight the way that the capacity to territorially embed global processes in place is becoming increasingly dependent upon a whole series of social, cultural, and institutional forms. Institutional thickness is identified by a lively interaction between firms, business associations, development agencies, innovation centres, unions and voluntary bodies. How can ICT assist with the development of institutional thickness? Digital institutional thickness can be encouraged within a region by providing the software and telecommunications technology that facilitate the exchange of information, in the form of regional portals, extranets, groupware or similar.

Regional Tacit Knowledge

Knowledge flows are important to regional innovation systems, because tacit knowledge is more easily transferred within a regional context where constant interaction and exchange is easier and cheaper and tacit assumptions are more easily decoded, than in a national or international context. The innovative capacity of the regional firm is directly related to the learning ability of a region (Oughton et al., 2002). The learning that takes place between the businesses in a region depends on there being a pool of business intelligence that will trigger demand for new knowledge, and the access and availability of that knowledge. Usually regional government plays a key role in facilitating the development of a successful learning region, and well founded co-operation between the private and public sectors is critical in building the networking culture required for inter organisational learning (Morgan, 1997). Figure 1 illustrates some of the possibilities for flows of information within a learning region.
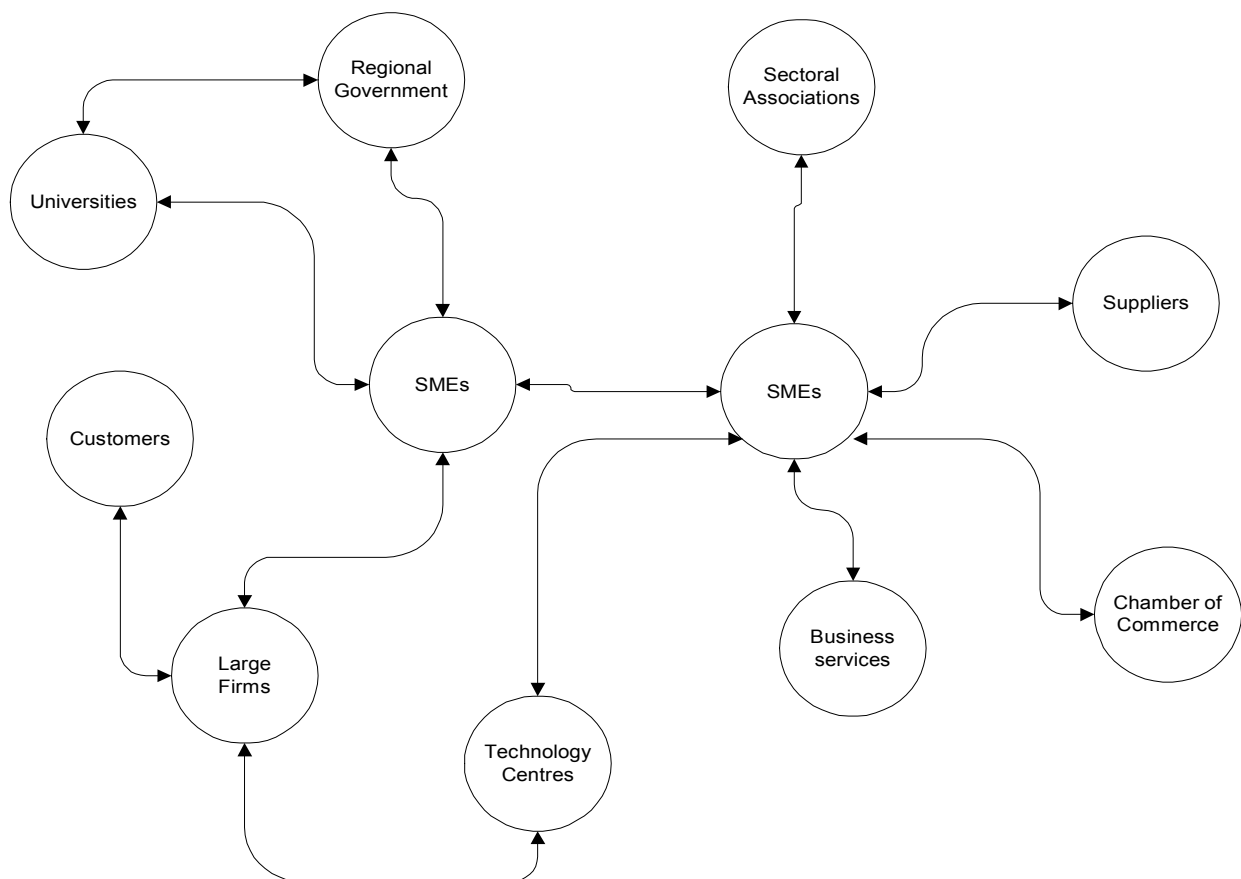
Figure 1: *Information Flow within a Learning Region (adapted from Oughton et al, 2002)*

Globalisation has resulted in an increase in international business collaboration, by locating various activities in different regions and countries organisations can gain economic benefits from a deepened division of labour. This in turn may provide new opportunities for less favoured regions and countries (Maskell & Tornqvist, 1999). These huge national differences in labour costs are likely to remain, as labour is still a largely immobile factor of production, while the cost of other industrial inputs will become similar. This could possibly provide advantages for New Zealand, as labour costs are cheaper here than in Europe or the USA, but there are also other

countries where labour costs are even lower. However the quality of work that can be purchased for a given labour cost is obviously an issue. Over a hundred years ago, Menger (1871) stated that *"What everyone has can never constitute an advantage"*, meaning that the possession of everyday resources will not help an organisation to prosper. Organisations most valuable inputs will be those that are scarce e.g. unique resources, a unique patent, or fishing rights, or by having the ability to do something better than their competitors. By being localised in a region, organisations are able to utilise factors in their surroundings that are not accessible to their competitors. One approach is to try to create a competitive advantage through learning, and this is most successful when it is done at a regional rather than an organisational level. In a 1996 study of 1,641 Canadian innovations from 1945 to 1970, it was found that less than 10% of them came from in-house ideas only (DeBresson, 1996). The sharing of the tacit knowledge concentrated in a particular geographical area results in a cross-fertilisation of ideas that creates an innovative regional culture. There is a general agreement that in order to develop learning regions more effort needs to be put into promoting inter-organisational flows of information and knowledge (Morgan, 1997). A learning region does not rely on labour as a principle factor of production, but on knowledge. New Zealand and Australia emerged as leading primary producers due to the fact that they had relatively few hands on the farm, but lots of brains in the science labs working on technology-driven applications to keep reducing the labour component of industry.

ELEMENTS OF THE LEARNING REGION

Maskell (1999) proposes that to develop a learning region 5 key elements need to be in place:
1) Critical and knowledgeable customers;
2) Competent suppliers;
3) Trustful inter-firm relations and networks;
4) High degree of intra-industry rivalry;
5) Good regional receiving system, which helps firms identify and utilise technological innovation.

Regional learning takes place between the organisation and its customers; between the organisation and its suppliers; and between the different organisations in a region. The regional receiving system will help firms identify relevant knowledge, and may be based in the public or private sector or a combination of both. Though the five factors identified above are relevant, they concentrate on the features that are relevant to business, without considering the underlying social, economic and environmental characteristics of a region. It is also relevant to consider human, social, and cultural capital, both from the point of view of the competence of the available workforce, and also because of "quality of life" issues that are important when trying to attract talented immigrants to a region (Florida, 2002).

From a global point of view, a learning region should have demonstrated consistent economic success. It should have the ability to attract and retain highly qualified human capital. It should have demonstrated the ability to be flexible, and have achieved success in more than one economic sector. There should be evidence of networks between businesses, between business and education providers, and between businesses and local institutions. A learning region should show consistent improvement in social capital.

An illustration of the types of interactions required in order for a region to benefit economically from an innovation can be gained by considering how New Zealand adapted to take advantage of freezer ship technology. Farming practices had to alter to rationalise land holdings, and improve productivity. Dairy factories and abattoirs were needed to process meat and dairy products. The government had to provide an overall quality control mechanism, and to provide the capital for research into increasing agricultural productivity (NZGovernment, 2004). The technology of

refrigeration in itself did not lead to economic benefits, local businesses needed to be flexible and alter their processes, with the aid of co-ordination and capital provided by government.

SHAPE OF A LEARNING REGION

Does a successful learning region have a particular form? Are there certain regional structures that lead to better collaboration? The classic model of the learning region is the new industrial district (NID) based on the Emilio-Romanga district in Italy. A NID consists of small innovative firms embedded within a regionally co-operative system of industrial governance. An industrial district is a spatially delimited area of trade-orientated economic activity which has a distinctive specialisation, which could be resource related, or based on manufacturing or service industries (Markusen, 1996). Cooke (1996) argues that small firms in industrial districts gain substantially from operating in a collaborative networked business milieu. They have been shown to be able to offer higher levels of employment, better wage levels, and higher rates of growth than firms in the same industry not operating in a district type setting.

This networking model has been successfully implemented in Denmark (Cooke, 1996) which in terms of geographical area and population size (5.1 million) is similar to New Zealand. In 1989 the Danish Technological Institute (DTI) established a "Network Programme" which channelled government support to firms willing to co-operate in certain business activities. In one case history, seven furniture makers from Jutland found their local markets shrinking, so they used the Network Program to create a trading company. They divided up key tasks, so that design for all the firms was done by two designers, and each firm specialised in a particular production phase. The company now exports high quality furniture to the European Union and beyond. Many regions are trying to set up network models of economic development. They are looking to develop an innovative infrastructure of vertical and lateral network linkages between large and small firms, research institutions, and public technology, and information transfer agencies.

However Markusen (1996) is critical of the dominance of the NID model, and argues that there are at least three other organisational forms that have demonstrated resiliency in advanced capitalist countries in the post war period. She argues that these alternative models demonstrate the continued power of the state and multi national corporations to shape and anchor industrial growth. Markusen researched the regional economies of North America looking for a number of features generally associated with NIDs (e.g. up and down stream industrial linkages) and a number of other features (e.g. long term development dynamic of major industries). The research did identify NIDS, but also found three other successful industrial spatial types: hub and spoke industrial districts; satellite platforms; and state anchored districts.

Alternative Models

 Hub and spoke industrial districts consist of a number of key firms and/or facilities that act as anchors or hubs to the regional economy, with suppliers and related activities spread out around them like spokes of a wheel. A simple version would be where a single large firm (e.g. Boeing in Seattle, Ford in Detroit, or Toyota in Toyota City) buys from both local and external customers who may be large or from masses of individual consumers. Markedly lacking is the co-operation among competitor firms to share risk, stabilise the market and share innovation. Strategic alliances on the part of the larger firms are more apt to be forged with partners outside the region. Workers loyalties are to core firms first, then to the district, and only after that to small firms. If jobs open up in hub firms, workers will often abandon smaller employers to get onto the hub firms payroll.

Satellite platforms are a congregation of branch facilities of externally based multiplant firms. Often created by government intervention as a way of stimulating regional development in outlying areas and simultaneously lowering the cost of business for competitively squeezed firms bristling under relatively high urban wages, rents and taxation. Business structure is dominated by large externally situated firms that make key investment decisions. Their most conspicuous feature is the absence of any connections or networks within the regions. Personnel exchanges are common between branch operations and the headquarters firm, but not locally with other branch facilities. There will be high rates of labour migration in and out of the district at the managerial, professional and technical levels.

State anchored districts are where a public or non-profit entity, e.g. a military base, prison complex, government office is the key anchor tenant in the district. It can look like the hub and spoke model. Labour markets will be tailored to the particular state activity hosted. Workers loyalties will be devoted to large state institutions and/or state dependent facilities first, then to the district, then to the firms.

Many localities, especially larger metropolitan areas are "sticky mixes" exhibiting elements of all four models. Silicon valley, for instance, hosts an industrial district in electronics, but also revolves around several important hubs (Lockheed Space & Missiles, Hewlett Packard, Stanford University) as well as hosting large "platform" type branch plants of US, Japanese, Korean & European companies (IBM, Oki, Hyundai, Samsung).

Though Markusen has a good point when she argues that certain sectors of the economy, for example the production of aircraft, are not likely to happen in small businesses, it is not really proven that all the organisational forms she identifies are conducive to innovation. As previously discussed, DeBresson (1996) has observed that 90% of innovations are a result of interactions outside the firm. Large organisations, such as Ford Motor Company, have a habit of internalising innovation which leads to diminishing returns in the long-term. The hub and spoke model seems to be successful in some cases but not in others, and the satellite industrial platform seems unlikely to lead to any lasting innovation. The classic NID model does seem to be the most relevant in terms of New Zealand's economy, however it is important not to assume that because the business in a region has another form, then that automatically means that innovation is unlikely to occur.

The Irish Example

Lessons can be learnt from Ireland, which developed as a "second wave" economy, that leapfrogged from a pastoral to an information economy, without going through a manufacturing stage (Trauth, 2000). In many ways Ireland faces some of the same issues as New Zealand: emigration of the brightest; an economy based on agriculture; and a history of colonial domination by the UK. Both countries have a well-developed infrastructure, a stable political system, relatively low wages, and an English speaking population which make them attractive to foreign multinationals. However Ireland has the extra advantage of providing access to the large European market. The Irish government used tax breaks and other financial incentives to attract foreign businesses to Ireland. They expected this to lead to the development of spin-off businesses, and the growth of a Silicon Valley type economy, but this did not initially happen The satellite firms were used by their foreign owners for routine assembly work, and not for research and development or decision making type work. This did not develop the skills of the local workforce, and there were few linkages with the local economy. In the early 1980's the strategy of attracting satellite branches of foreign owned companies was refined, to ensure that such companies did actually improve the local economy. There was a move away from low-waged assembly type work towards computer services and software development, together with the promotion of greater linkages between indigenous and multinational firms. At the same time there

was an increasing emphasis on education and producing skilled workers, and also a move to strengthen the telecommunications infrastructure. These changes resulted in much higher numbers of spin-off businesses being generated by former workers at satellite branches (Trauth, 2000). This shows that satellite branches of a multi national corporation are unlikely to produce learning region type growth if left to their own devices. However, the Irish example does show that if the conditions under which satellite branches are operating are carefully controlled, they can provide lasting economic benefit to the region.

QUANTIFYING THE LEARNING REGION

How can you identify a learning region? Cooke and Morgan (1998) suggest that only three regions of the world qualify as true learning regions: Silicon Valley, Emilia-Romanga, and Baden-Württemberg. Other authors would not even accept that these three regions make the grade. At a 2002 OECD conference it was concluded that at present there are no pure learning regions (Keating et al., 2002). An alternative view is that all regions, even the least favoured have some rudimentary learning system in place (Doloreux & Parto, 2004). Wherever the benchmark is set the concept of the learning region is important for the overall economic prosperity of regions. It is clear that certain conditions are conducive to the development of a learning region, and that there is a high degree of synergy between those conditions that lead to economic competitiveness and growth and those that promote the social inclusion of all members of society. Four themes have been identified as benchmarks against which progress towards a learning region can be measured:
1) Sustainable economic growth including the expansion of high quality jobs;
2) Social inclusion and the building of social capital;
3) The role of different education and training strategies in fostering learning regions;
4) An integrated approach to achieving good governance.

More specifically Antonio Acosta (Rio, 2001) has identified a number of variables that taken as a whole can help to determine whether an area exhibits or lacks the profile of a learning region. Innovation can be quantified to some extent by looking at the level of spending on research and development by the government, business, and institutional sectors. The level of computerisation is another measure of technological development, as is the number of technology patents issued. The control that a region has over research and development policies is also relevant, has a region got the capacity to develop its own innovation policies? The percentage of the population with tertiary education is another important variable, and it is also relevant to look at whether the majority of these qualifications are technical and professional in nature, rather than academic. Another indicator is the number of research groups operating in a region. It is also important to try to gauge qualitative aspects such as the readiness of the local inhabitants to change, and whether they are willing to engage in ongoing training. There are many models for measuring social capital, which typically look at factors such as crime rates, and participation in voluntary groups. Cultural capital can be gauged by looking at indicators such as library consultations, museum visits, or number of speakers of Te Reo. Other relevant variables are migration movements, is the region a "magnet" region which is attractive to outsiders in terms of the quality of life it offers? The regions' infrastructure in terms of its capacity to relate to other areas is of key importance. Instead of making a distinction between central and peripheral regions, it is more relevant to use the concept of regions with low, medium or high levels of relations. The weighting of these individual elements is very closely tied to the particular model of regional development being used, so it is important to reconsider the relative importance of these variables in each individual case.

RELEVANCE TO NEW ZEALAND

New Zealand is a mountainous country; only a quarter of the land surface is suitable for European style agriculture. The scattered arrangement of this land lies behind much of the country's human geography. The mountains present a major barrier to movement between the West and the East coasts, particularly in the South Island. The rivers are short and steep in profile, and provide poor or no access to the interior from the sea. At the start of European colonisation, the shape of the land influenced the siting of the earliest settlements; safe ports with promising hinterlands were few. In New Zealand, as in Australia, a strong regional and coastal primacy developed because of the distance and difficulty of internal communications. Each region has a unique cultural identity, which has developed from the original Mãori pattern of settlement, and been changed by the migration of different ethnic groups to various parts of the country. The country grew outwards from a few nodal points established by the geography of first arrival and by the nature of the land itself.

 Agriculture in the two countries developed as a technology driven enterprise, employing a relatively low percentage of the settler population. This meant that the population clustered in the coastal cities, reinforcing the effect of the physical geography. New Zealand cities have been nodes for intellectual capital from the beginning, and the economy relied on this. The cities were centres for the management of the postal and rail systems that enabled capital-intensive, thinly populated, export orientated agrarian and extractive economies. Though New Zealand's main exports are agricultural it is the cities themselves that drive the economy, and generate economic growth rather the agricultural land around them (Jacobs, 1972). The city is the centre of learning, knowledge and innovation that drives the logistics, exporting, and market intelligence for it's regional hinterland, thereby adding value to the raw materials available.

New Zealand's geographical location as a small country at the bottom of the South Pacific poses particular problems for the national economy's integration into the global economy. Primary industries dominate, and exports of meat and dairy products make a large contribution to New Zealand's economy. However industries such as forestry, horticulture, fishing, manufacturing and tourism have become increasingly significant, and over the past decades, many new industries have emerged and grown strongly, including software, biotechnology, electronics, marine, education exports, media/film and wine. Due to the low population the issue of critical mass is important; for New Zealand's economy to develop businesses need to reach international markets. New Zealand has always been a country where foreign trade forms a high percentage of production. In 1992, 77% of New Zealand production was for foreign trade, compared with 45% for Australia, 62% for the UK, and 29% in the USA (Maskell, 1999). However, New Zealand's isolation and physical distance from major trading partners' means that New Zealand's predominantly small firms wanting to move into export markets face big costs.

Potential of ICT

The New Zealand government has identified a number of success factors for local economic development. The two most relevant to ICT are;

1) Key essential infrastructure (particularly communications infrastructure);

2) Critical mass achieved through networks and co-operation (Schollman et al., 2002)

Due to economies of scale and scope, central government can reduce transaction costs and add value by acting as a catalyst and facilitator for the formation of economic development networks for capability building and for ensuring the provision of quality information. Morgan (1997)

identifies an essential role for regional development agencies in acting as the initiators of regional renewal.

New Zealand's infrastructure for the knowledge economy is relatively strong. It includes Internet access and ICT penetration, and electronic commerce. New Zealand has a very high rate of engagement with new technology. However, New Zealand lacks the intense interaction between enterprises, learning, innovation and high value added production that characterise the leading knowledge intensive regions such as those in the USA and parts of Europe. In addition, despite the fact that New Zealand has a larger proportion of its population that has tertiary education than Australia, the country's economic performance is much weaker.

ICT AND SMALL AND MEDIUM SIZED ENTERPRISES (SMES)

What role can ICT play in facilitating knowledge flows? Both the public and private sectors and their interactions are sustained by networks, there are "soft networks" for social interaction, and also "hard networks" that plug into the Internet (Malecki, 2002). The competitiveness of firms depends not only on the degree to which they are embedded within local networks of suppliers, but also on the presence of links to external markets. Successful regions, like successful companies, maintain connections with other places in the global economy (Malecki, 2002).

SMEs are particularly significant for the New Zealand economy, with 96% of businesses having less than 20 employees (StatisticsNZ, 2005). Since the early 1990s SMEs have been identified as the only source of employment growth in most OECD countries (Cooke, 1996). Large privately owned firms are "downsizing", and the public sector has been contracting from the mid 1980s. Many regions have adopted network models of SME orientated industrial policy in the hope and expectation of improving business competitiveness.

It is argued by some that ICTs (together with range of other factors) are creating a networked economy where firms will trade electronically over increasing distances. Not all firms, peoples or territories will necessarily become part of networked economy. Castells (1996) suggests that central nodes will become even more important, while surrounding areas become irrelevant. This suggests that action is required if small firms, particularly those in rural areas are not to be excluded from the networked economy.
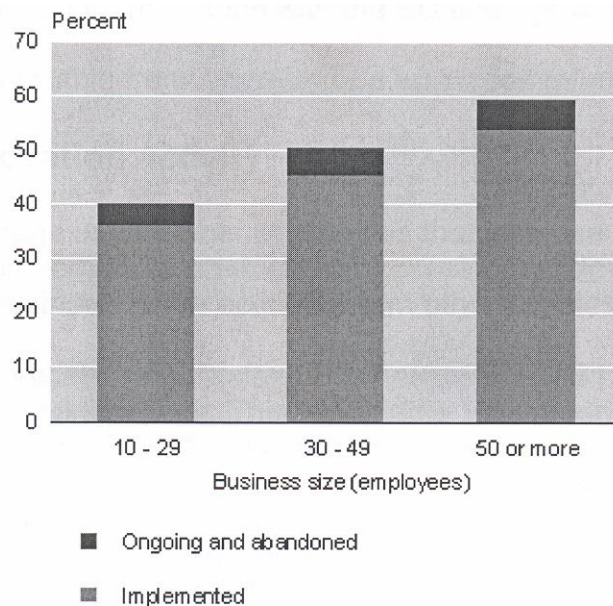
Figure 2: Innovation Rate by Business Size (from NZ Statistics, 2003)

In 2003, Statistics New Zealand carried out a survey of innovative activity in businesses (StatisticsNZ, 2003). The results showed that SMEs tended to be less innovative than larger businesses. As shown in Figure 2 only 40% of businesses with less than 30 employees reported innovative activities, as compared to 59% of businesses with 50 or more employees. ICTs are seen by some as a tool to help SMEs become more innovative and to overcome the limitations of small size and remote location by amplifying information flows and by allowing small enterprises to borrow scale from networks. A UK study of the potential impacts of ICT in rural areas (Richardson, 2002) suggests that SMEs in general, and rural SMEs in particular, are relatively slow to adopt ICTs for the following reasons:
1) SMEs are unwilling to get involved in projects if the bottom line is not clear;
2) SMEs want "just-in-time" fixes rather than generic or strategic solutions;
3) ICT hardware and software providers develop services for the corporate market and do not tailor services to smaller firms;
4) SMEs do not devote time to training.

Three approaches for inserting SMEs into networked economy include:
1) Portals and web –sites;
2) Providing broadband to SMEs;
3) Creating serviced e-incubator units.

A portal is a website designed to act as a gateway to other related sites. One of their benefits is the amount of traffic that travels through them. Portals that attract large numbers of browsers and retain them for longer have the potential to make money from advertising (Tatnall et al., 2004). There are a number of different types of portal: there are general ones such as Yahoo; vertical industry portals that are based around a specific industry; community portals based around special group interests; and horizontal industry portals which are based around a group of businesses in an industry or a local area. A regional portal is generally a horizontal portal that links small businesses, community groups, and other organisations within a particular geographic area. At present many small businesses are not in a position to set up a portal with facilities such

as secure payment services themselves, so becoming a member of a regional portal is a good introduction to electronic commerce (Tatnall et al., 2004). The fact that the portal is regional means that there are cost and efficiency benefits, especially if the physical transport of goods is involved. By participating in a regional portal small businesses can also feel that they are contributing to their local community.

Another example is in Nord-Pas de Calais, which uses ICTs as an integrative mechanism to strengthen business in the region. Tourism is one of most important sectors, and the region is seeking to bring together disparate information bases into a single database. The use of a central portal ensures reciprocal links with small firms already buying and selling over the Internet e.g. renting gites, small brewers (Richardson, 2002).

E-Business-Foundation is a network of e-commerce incubators in the North East of England; it is a public private partnership, drawing together a number of warm hosts who manage individual incubators. The E-Business-Foundation aims to attract knowledge-based firms deemed likely to benefit from access to ICTs and broadband infrastructure. They may be small one-person businesses that have outgrown existing (often home-based premises). The network has both physical and organisational components:
1) Sites linked together with broadband;
2) Members have the opportunity to exchange information, intelligence and best practice;
3) Centres provide an opportunity for firms to make new contacts.

As of 2001 nine E-Business-Foundation centres had been created hosting over 40 firms with 120 workers. The positive features included: access to broadband; access to high-quality premises; technical and business support; and the opportunity to network. However it should be noted that it cost 6 million sterling to set up, and the impact has been mainly in urban areas with only two centres outside the main conurbations.

Regional and rural success and decline are major issues in Australia. Community-led revitalisation and initiatives to expand the uptake of ICT have been identified as essential enabling ingredients for regions to maintain competitiveness and stimulate growth. Many diverse ICT projects have been started, often with universities as recipients or key participants. Most of these are bottom up – trying to find local solutions to local problems. The major problem is sustaining these initiatives after the initial funding has been expended. One successful project is the development of the MainStreet portal by the Centre for Electronic Commerce and Communications at the University of Ballarat (Thompson, 2002).
Learning organisations can provide leadership in community informatics by forging partnerships and by *"helping establish the skilled hands and clever heads"* (Thompson, 2002 p. 1). The case indicates that the university-region engagement can be an important factor in developing a strategic approach to community informatics initiatives.

CONCLUSION

The New Zealand government has implemented several initiatives to help to develop a knowledge society, encourage innovation, build up regional economic development, and improve usage and access to ICT. The overarching aim is to return New Zealand's per capita income to the top half of the OECD rankings and maintain that standing. The use of ICT is seen as central to all of these developments. Among the current initiatives are:
1) The Regional Partnerships Programme run by New Zealand Trade and Enterprise, which provides guidance and funding to assist regions identify and develop sustainable economic growth strategies.

2) The Clusters Development Fund set up by New Zealand Trade and Enterprise to facilitate the development of business clusters with significant growth potential;
3) The Growth and Innovation Framework, which aims to enhance the existing innovation framework, develop people's innovation skills, increase global connectedness, and focus initiatives in areas which can have maximum impact. (NZGovernment, 2002);
4) Project Probe, a joint initiative between the Ministry of Education and the Ministry of Economic Development has rolled out broadband communications to schools and provincial communities. A follow on from this is the setting up of contestable "Broadband Challenge Funding" to encourage the take up of broadband by businesses, local and regional government and community groups.
5) The Digital Strategy brings together many of the current and former initiatives of the New Zealand Government in one unifying vision (NZGovernment, 2005). The purpose of the strategy is to work out the most beneficial way of utilising ICT to maximise the benefits to national and local government, communities and business. The three main goals are to: enable effective use of ICT by communities; encourage innovation by business; and to improve government service.

These five initiatives all recognise the importance of the relationships between commerce, culture, and learning. ICT is viewed as a tool that can assist the development of these relationships. The learning region strategy focuses on the role of networks in facilitating broad institutional learning within a regional economy. Both ICT networks and social networks are critical for the successful development of learning regions in New Zealand.

REFERENCES

Amin, A., & Thrift, N. (1994). Living in the Global. In A. Amin & N. Thrift (Eds.), *Globalisation, Institutions and Regional Development in Europe* (pp. 1-22). Oxford: Oxford University Press.

Castells, M. (1996). *The Rise of the Networked Society* (Vol. 1): Basil Blackwell.

Cooke, P. (1996). Reinventing the Region: Firms, clusters and networks in economic development. In P. W. Daniels & W. F. Lever (Eds.), *The Global Economy in Transition*. Harlow, England: Addison Wesley Longman Limited.

Cooke, P., & Morgan, K. (1998). *The Associational Economy*. Oxford: Oxford University Press.

DeBresson, C. (1996). *Economic Interdependence and Innovative Activity*. Cheltenham: Edward Elgar.

Doloreux, D., & Parto, S. (2004). *Regional Innovation Systems: A Critical Review*. Retrieved 5 July, 2005, from www.ulb.ac.be/soco/asrdlf/documents/RIS_Doloreux_Parto.pdf

Florida, R. (1995). Toward the Learning Region. *Futures, 25*(5), 527-536.

Florida, R. (2002). *The Rise of the Creative Class: and How its Transforming Work, Leisure, Community & Everyday Life*.

Jacobs, J. (1972). *The Economy of Cities*. Harmondsworth, England: Pelican.

Keating, J., Badenhorst, A., & Szlachetko, T. (2002). *Victoria as a Learning Region: Background Report*. Melbourne Victoria: OECD.

Larsen, K. (1999). Learning cities: The new recipe in regional development. *Organisation for Economic Coooperation and Development: The OECD Observer, Summer 1999*, 73-76.

Malecki, E. J. (1997). *Technology and Economic Development: The Dynamics of Local, Regional and National; Competitiveness* (2nd ed.): Longman.

Malecki, E. J. (2002). Hard and Soft Networks for Urban Competitiveness. *Urban Studies, 39*(5-6), 929-945.

Markusen, A. (1987). *Regions: The Economics and Politics of Territory*. New Jersey: Rowman & Littlefield.

Markusen, A. (1996). Sticky Places in Slippery Space: A Typology of Industrial Districts. *Economic Geography, 72*(3), 293-313.

Maskell, P. (1999). Globalisation and Industrial Competitiveness: The Process and Consequences of Ubiquitification. In E. J. Malecki & P. Oinas (Eds.), *Making Connections: Technological Learning and Regional Economic Change* (pp. 35-59): Ashgate Publishing Ltd.

Maskell, P., & Tornqvist, T. (1999). *Building a Cross-Border Learning Region: Emergence of the North European Oresund Region*: Copenhagen Business School Press.

Menger, C. (1871). *Grundsatze ver Volkswitshaftslehre*. Wein, Germany: Holder-Pichler-Tempsky.

Morgan, K. (1997). The Learning Region: Institutions, Innovation and Regional Renewal. *Regional Studies, 31*(5), 491-503.

NZGovernment. (2002). *Growing an Innovative New Zealand*. Wellington: Office of the Prime Minister.

NZGovernment. (2004). *Digital Strategy: a Draft New Zealand Strategy for Consultation*. Wellington: Ministry of Economic Development.

NZGovernment. (2005). *The Digital Strategy: Creating our Digital Future*. Wellington.

Ohmae, K. (1995). *The End of the Nation State: The Rise of Regional Economies*. New York: Free Press.

Oughton, C., Landabaso, M., & Morgan, K. (2002). The Regional Innovation Paradox: Innovation Policy & Industrial Policy. *The Journal of Technology Transfer, 27*(2), 97-110.

Richardson, R. (2002). *Information & Communication Technologies & Rural Inclusion*. University of Newcastle upon Tyne: CURDS.

Rio, C. R. d. (2001). *Learning to Innovate: Learning Regions*. Andalucia: OECD/IDR.

Saxenian, A. (1994a). *Regional Advantage: Culture and Competition in Silicon Valley and Route 128*. Cambridge, M A.: Harvard University Press.

Schollman, A., O'Neill, D., Doczi, M., & Kelly, F. (2002). *Regional Innovation, Learning & Governance - Rediscovering New Zealands Regions: A Central Government Perspective.* Paper presented at the Learning Cities and Regions, Melbourne.

StatisticsNZ. (2003). *Innovation Survey*. Wellington.

StatisticsNZ. (2005). *Business Indicators.* Retrieved 28 July, 2005, from http://www.stats.govt.nz

Storper, M. (1995). The resurgence of regional economics, ten years later: the region as a nexus of untraded interdependencies. *European Urban & Regional Development Studies, 2*(3), 191-221.

Tatnall, A., Burgess, S., & Singh, M. (2004). Community and Regional Portals in Australia. In N. Al-Qirim (Ed.), *Electronic Commerce in Small to Medium Sized Enterprises: Frameworks, Issues and Implications*. Hershey, USA: Idea Group Publishing.

Thompson, H. (2002). *Creating and Sustaining Online Communities - Replicable Web-Based Services Meeting the Diverse Needs of Regional and Rural Australia.* Paper presented at the Learning Cities and Regions, Melbourne, Australia.

Trauth, E. M. (2000). *The Culture of an Information Economy: Influences & Impacts in the Republic of Ireland*: Kluwer Academic Publishers.

Original article at: http://ijedict.dec.uwi.edu//viewarticle.php?id=134&layout=html

Business undergraduates learning online:
A one semester snapshot

Krassie Petrova and Rowena Sinclair
Auckland University of Technology, New Zealand

ABSTRACT

Online learning was first introduced into an undergraduate business programme in 1999 starting with just one single course. Currently online learning is used across the whole programme either to enhance classroom teaching or to reduce class contact time. In the second half of 2004, a broad review of online learning within the programme was undertaken, with the purpose to enhance understanding about online learning and provide recommendations about further development and improvement. The study presented here was carried under the umbrella of the review and was aimed at identifying key characteristics of student perceptions about the two online models implemented, and the actual usage patterns of the online learning platform. It provided information about student perceptions of online learning and a picture of the online platform usage.

Keywords: *online learning, e-learning, flexible delivery, New Zealand, business education, student perceptions, online usage*

INTRODUCTION

Online learning can be defined as an implementation of e-Learning using Web-based technologies (Petrova 2001). E-Learning on the other side   is often used as a comprehensive term to identify the use of a variant of information and communicating technologies to enhance and support learning, sometimes blending their use (OECD 2005 p.11). Today online learning and e-learning have become an accepted educational paradigm across universities worldwide (Ling et. al. 2001, ANTA 2002, Lee & Nguyen 2005, OECD 2005).

Students have been identified and recognised as stakeholders in the development and implementation of online learning. Studies in the area of change processes related to the introduction of new educational technologies have found that students might be resisting change. Organizational formats developed to accommodate the new educational paradigm need to be managed carefully in order to avoid early disillusionment and the subsequent failure of students to realise the full education potential of online and e-learning (Hunt, Thomas, & Eagle 2002, McPherson 2002, Zentel, Bett, Meister, Rinn & Wedekind 2003).

Student participation in online learning and student perceptions in particular have been the emphasis of a significant research effort – see for example Swan 1995, Phillimore 2002, Lizzio, Wilson and Simons 2002, Lind and Soams 2003, Sahay 2004, Selim 2005, Wells, Fieger and de Lange, 2005. Other studies have highlighted usage patterns in terms of time, place and functional components (McKnight & Demers 2002, Burr & Spennemann 2004, Parry 2004). It is beyond the scope of this article to provide a comprehensive summary and comparison of the relevant literature. However the results of the reviewed research studies point out that in order to improve the scholarship of teaching online, it is necessary to study student perceptions and obtain timely feedback on what students value in 'online', and corroborating data on 'what' they use online, and 'where' and 'when'.   Students' perceptions can provide valuable input to the continuing

processes of curriculum development and management (McKnight & Demers 2002, Burr & Spennemann 2004).

The study presented here attempts to provide a one semester snapshot picture composed of student perceptions about online courses in business programme, and to supplement the picture with data about online platform usage.

The article is organised as follows: the next section provides background information about the structure and online content of the programme used in the study and explains its motivation. The main objective is stated in the section following which also describes the study design. The next two sections describe the data collection methods implemented and present the findings. These are followed by a summary and a brief conclusion, highlighting priority areas for future work. Some specific terms used are explained at the end of the article.

BACKGROUND

The Bachelor of Business programme (BBus) at the New Zealand University used in this study is a three year undergraduate programme with eleven separate majors and is offered by the Faculty of Business. It aims to develop graduates capable of working in electronic contexts in business and in the wider community. The BBus is committed to student centred learning. Students are involved in learning and assessment activities which prepare them for their future roles in industry and the wider community. The significant growth experienced over the last five years, both in terms of increasing student numbers and in adding majors, has also led to a change of the student profile. Students are transferring to the BBus through multiple entry points. Characterised by their ethnic diversity, some students have experienced different learning cultures and speak English as an alternative language. Many fulltime students work long hours.

Online Learning Models

Online learning was first introduced into the BBus in 1999 in a single course. Since that time, there has been considerable expansion. Currently online learning is used within the programme to:
- Enhance the three hours per week classroom teaching ("enhanced mode"), and
- Provide flexible offerings by way of reduced class contact for some courses i.e. one class hour replaced by an hour equivalent online activity ("flexible mode").

The Faculty of Business was one of the early adopters of online learning within the university, and initially built its own proprietary online learning platform (Parry 2004). However, since then online learning has become more widespread across the university and its importance is recognised within the university at a strategic level with regard to providing a learning environment that promotes student success.

A variety of curriculum and staff development strategies have been implemented, including grants. In early 2005 a full-time Flexible Learning Advisor was appointed to the Faculty of Business, who was charged with the task of supporting future online learning development. Following a number of pilot activities, a new university-wide online learning platform was introduced in early 2004 (AUTonline, based on BlackBoard[®]). A university wide infrastructure with regards to online learning emerged.

Motivation

In their article on the use of information technology to enhance education in business schools, Leidner and Jarvenpraa (1995) pointed out that there was a need to better understand the role of students in learning models involving information technology, and suggested that students would be 'likely to resist the new learning models' (Leidner & Jarvenpaa 1995 p. 287). Lizzio, Wilson and Simons (2002) found that student perceptions of the teaching and learning environment and the assessment practice contribute to the development of deep approaches to studying. More specifically they established that positive perceptions of the environment directly influence both measured academic outcomes e.g. academic achievement and also qualitative learning outcomes e.g. workplace related skills.

Therefore, it was considered important to investigate students as stakeholders in the online teaching and learning process. An opportunity to design and conduct a study was provided in the second half of 2004, when a broad review of online learning within the BBus programme was undertaken. The purpose of the review was to enhance understanding about online learning and provide recommendations about further development and improvement.

The review included: two groups of stakeholders (students and lecturers), the two online delivery modes (enhanced and flexible), and the online course sites (Figure 1). Lecturers were seen as participants in online learning both as course developers and as course implementers while students interact with the online learning platform in the context of the online course and delivery model.
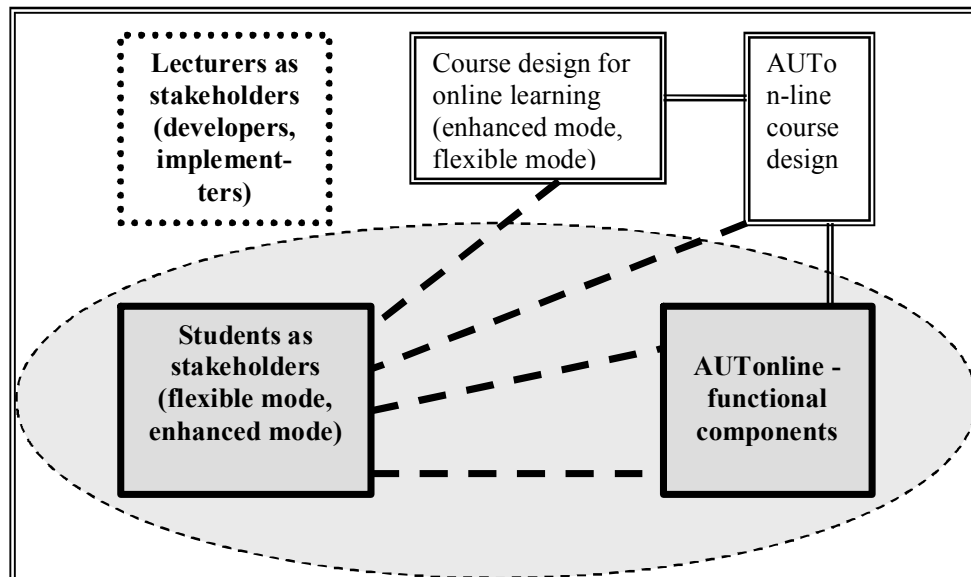
Figure 1: The general online learning framework.

The shaded part of the framework in Figure 1 shows the scope of the study reported here. The work was motivated primarily by the need to understand how the quality of student learning and the student learning experiences could be improved, whilst working within the environmental and academic constraints.

An additional motivation was to investigate further the usage pattern of the online platform in terms of time. A better understanding of student behaviour online in terms of time might help develop better course designs (for example, better timing of important announcements). Furthermore, research in the area of information technology supported learning has identified "time flexibility" as an important advantage (Petrova 2001). Parry's (2004) work presents some interesting examples of time and place patterns of online use for BBus staff and students but the results reported in the Parry's study did not allow the drawing of significant conclusions.

STUDY OBJECTIVE AND DESIGN

The main objective of the study follows on from the need to better understand student behaviour and perceptions in relation to the online teaching and learning process. It can be broadly formulated as follows:

> *"To identify patterns of student online usage and to understand the key characteristics of student perceptions as active participants in online learning".*

It was assumed that student perceptions about online learning would be influenced by the type of online learning models i.e. flexible and enhanced, by the course design as implemented in AUTonline, and by the use of the specific functional components of the online platform (Figure 1). To address the study objective and based on prior work (Gerbic 2002, Capner 2004, Petrova 2002, and Sinclair 2003), two specific research questions were formulated:

1. What are the trends and patterns of the general use of the online platform including:

   - time dimensions,

   - functional components usage.

2. What are the trends and patterns of student perceptions and perspectives of online learning (enhanced and flexible) including:

   - satisfaction with online learning,

   - perceived value of online learning.

DATA COLLECTION

The following approaches towards data collection were adopted.

To investigate Question 1, the in-built AUTonline statistics unit was used to collate data about the use of AUTonline functional components (including time of access). At the time the system was capable of producing summary reports for more than one month; hence statistical data was gathered separately for three one-month periods, covering effectively the whole semester. Some of the more common AUTonline components used in the reports on usage are explained below:

- Course Content Area - uploading and storing course material such as notes, MS Microsoft Power Point presentations.

- Course Announcements – posting an announcement to the whole class by the lecturer, permanent or temporary.

- Course Discussion Board - a number of discussion forums and separate threads can be maintained.

- Group Area – a group space fully enabled with its own forum and email facility, for group project work.

- Communications Area – includes email, discussion board, group area and other collaboration facilities.

To investigate Question 2, data was collected through the use of two anonymous questionnaires – one for each of the two online learning models. These were designed to differentiate flexible from enhanced mode but at the same time to allow for a comparison between the modes. Each questionnaire included a section about the perceived usage of AUTOnline components as well.

The BBus comprises courses at three academic levels, level 5, level 6, and level 7, equivalent to first, second and third year of undergraduate studies. The first year is a foundation course (First Year Integrated Programme – FYIP). All BBus students are required to undertake a core Cooperative Education course (a full semester course, equivalent to four single courses), and to complete a core Ethics course as well as a core capstone Business Development Project course (BBus, 2005).

In their second and third year students specialize in one or two professional majors, each comprising a set of "level 6" Professional Studies courses and a set of "level 7" Professional Studies courses. All students included in the study were studying courses at levels 6 and/or 7 i.e. the subjects of the survey were either second or third year undergraduates. All questionnaires were distributed at the end of Semester 2 2004, after students had had significant experience with online learning.

FINDINGS

Meeting the research questions would provide a one semester "snapshot" of BBus online learning, and a background for further development and improvement. Although the scope of this study was limited to courses offered in online enhanced and flexible modes, and distance education courses were not included, some information was gathered across the programme as a whole for comparison purposes (see for example, Tables 1 and 2). This section describes the structure of the programme under investigation and reports on the findings related to the two research questions formulated in the previous section.

Online Learning Spread

Data from AUTonline collected from August to October, 2004 indicating the type and number of courses taught in flexible and in enhanced mode in Semester Two 2004 are summarized in Table 1. It was found that:

- All core courses in BBus include elements of online learning within their course and this could comprise up to 58% of the course of study of an individual student.

- The BBus comprises a total of 83 courses and online learning in some form was offered in 54 courses during the semester i.e. in 65% of all BBus courses.

- Flexible mode courses are available in five BBus majors with a concentration in the management major.

- Online learning was used in enhanced mode in all majors, in at least one course, with a range from one to five courses across the different majors.

- No courses were offered during the study time in an off campus mode, although two courses are under development for that mode.

Table 1: Courses taught in flexible and enhanced mode in Semester Two 2004

Courses	Flexible	Enhanced	Total
Core Courses (Co-op, FYIP, BDP and Ethics)	1	6	7
Professional Studies - Level 6	6	18	24
Professional Studies - Level 7	6	17	23
Total	13	41	54

Course enrolment numbers were used as a guideline as to how many students access online learning (Table 2). It was found that:
- 84% of course enrolments are in courses which include online learning (flexible mode, enhanced mode).
- 64% of course enrolments are in courses which use online learning in enhanced mode.
- 20% of course enrolments are in courses in flexible mode.

Table 2: Number of student enrolled in BBus courses in Semester Two 2004

Enrolment	Flexible	Enhanced	Total
Core Courses – FYIP		1337	1337
Core Courses – Ethics	285	-	285
Core Courses - BDP	234	-	234
Core Courses - Co-operative Education	-	220	220
Professional Studies - Level 6	331	492	823
Professional Studies - Level 7	210	1224	1434
Total	1060	3273	4333

Time Dimensions

AUTonline statistical data from the Professional Studies courses, throughout the period of August-October 2004, indicates that students were using the online platform as shown in Figures 2 and 3.

In enhanced mode (Figures 2a and 2b), 60% of all online activity took place between 10 am - 5 pm. There was little variation across the semester, or by course level. The first three days of the week were characterised by the heaviest usage levels - almost four times than that of weekend use.

In flexible mode (Figures 3a and 3b), the most common hours of use were between 10am-6pm, regardless of the level studied. Similar to the use of AUTonline by students enrolled in enhanced mode courses, days in the early to mid week appeared to be most commonly used by 'flexible' students. However the use over the weekends was higher compared to the 'enhanced' courses – which was to be expected given that one advantage of a flexible mode is to extend time flexibility for study.
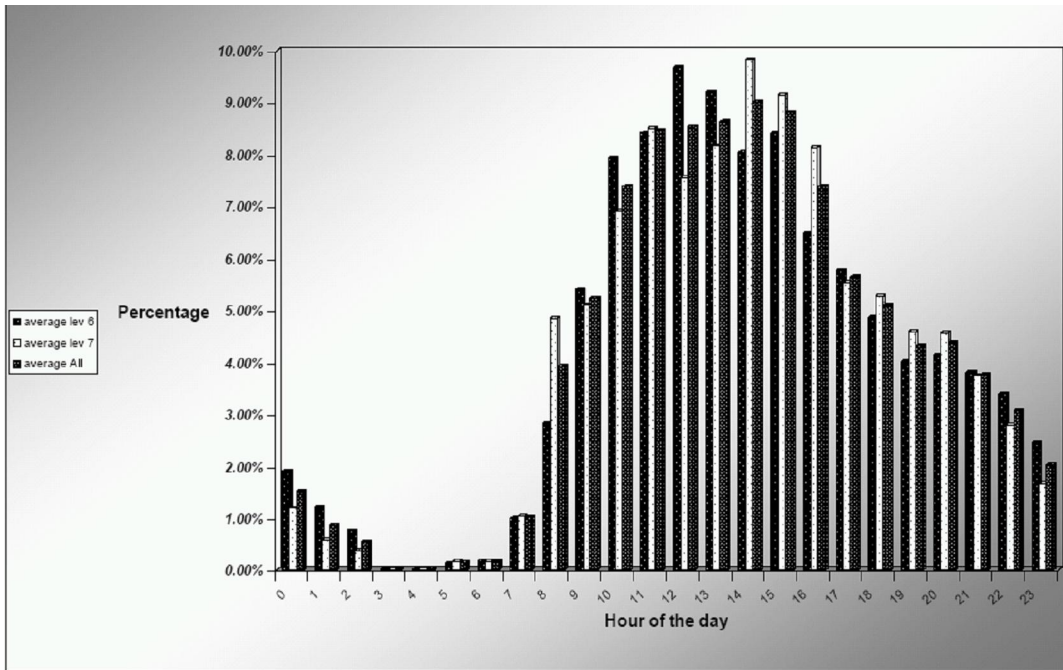
Figure 2a: *Enhanced mode online usage (hourly)*
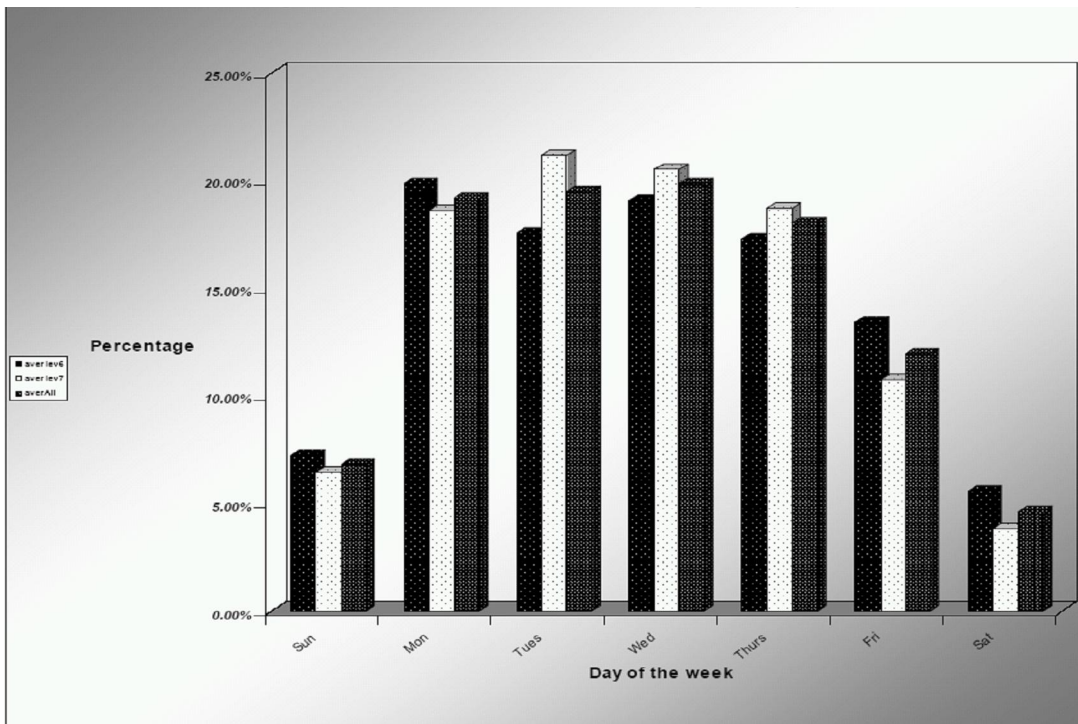
Figure 2b: *Enhanced mode online usage (daily)*
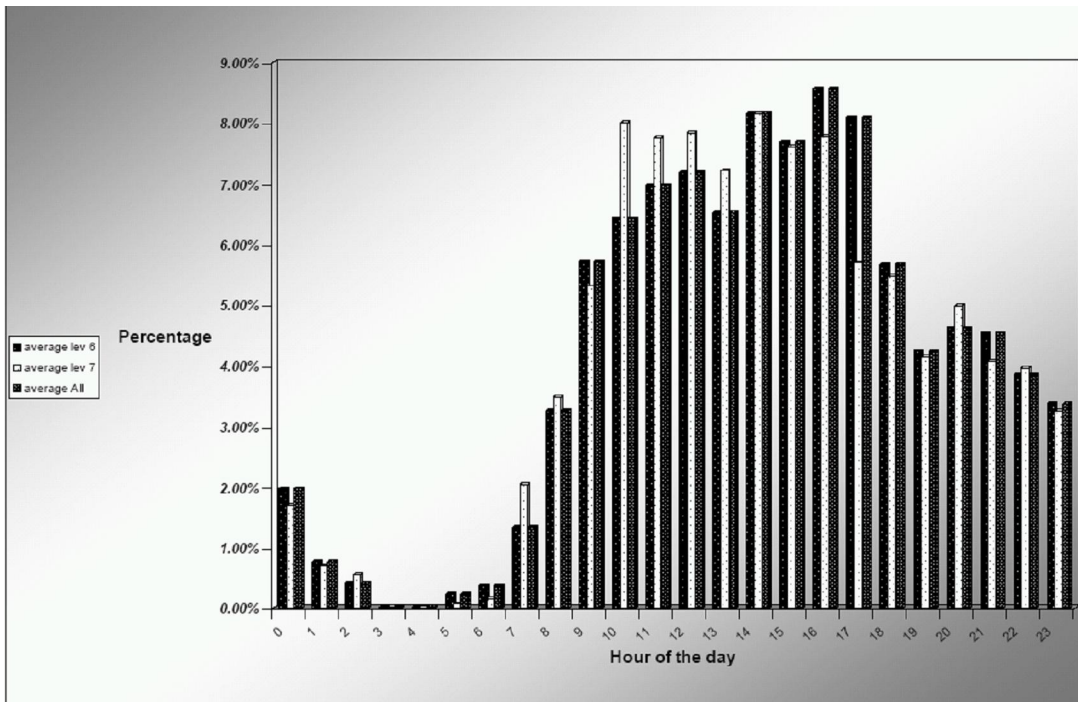
Figure 3a: *Flexible mode online usage (hourly)*
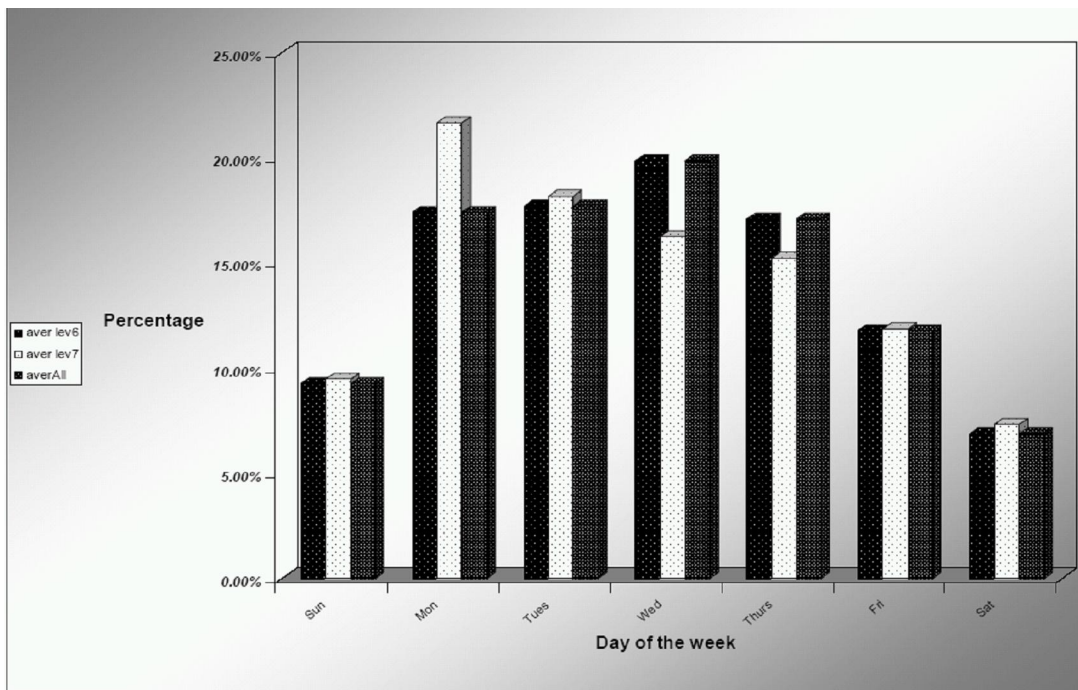
Figure 3b: *Flexible mode online usage (daily)*

Online Components Usage

AUTonline statistical data for the period of August-October 2004 indicates that students were using the functions of the online platform as shown in Figures 4 and 5.

In enhanced mode (Figure 4), the Content Area was the most commonly used feature of AUTonline overall, one third of the usage is associated with this component. Almost 20% of usage is of Announcements and the Discussion Board; however usage varies according to the level of the course. There was a range of 7% variation in the use of the Discussion Board, with level 6 courses using this component considerably more than level 7 courses (23.24% versus 16.10%).
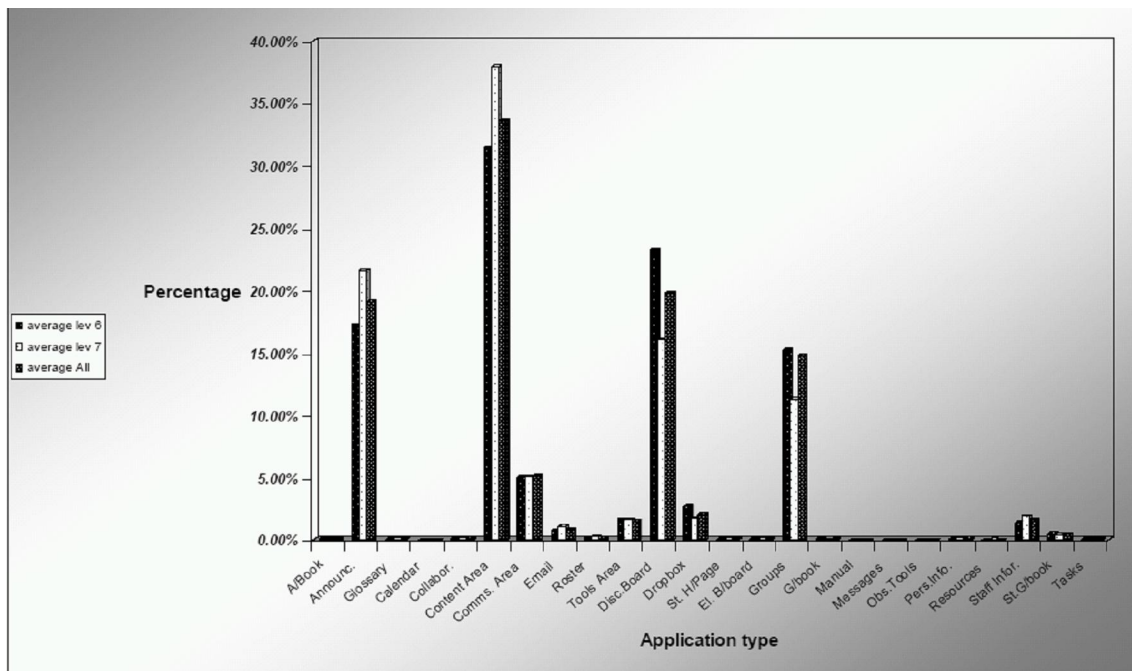
Figure 4: *Enhanced mode - online platform components usage*

In flexible mode (Figure 5), The Group Area was the most commonly used component of AUTonline (36.20%). This reflects the wide use of collaborative learning in flexible courses. This was followed by the Discussion Board (22.30%) and the Content Area (18.49%). There was a significant variation in the use of these components depending on the level of course. Students studying at level 7 flexible mode had a much higher usage of the Discussion Board (45.78% vs. 22.30%) compared to level 6 courses. At level 6, the Group Area had a higher proportion of use (36.20% vs. 21.19%).

Furthermore, there was a time variation in the use of the Group Area by students at level 6.   A growing increase of use from 29.83% in August, to 34.54% in September and 44.22% in October was observed. The use of the Discussion Board mirrors this variation in a contrasting manner, with a decrease in usage from 33.25% to 17.79% in September and 15.86% in October.
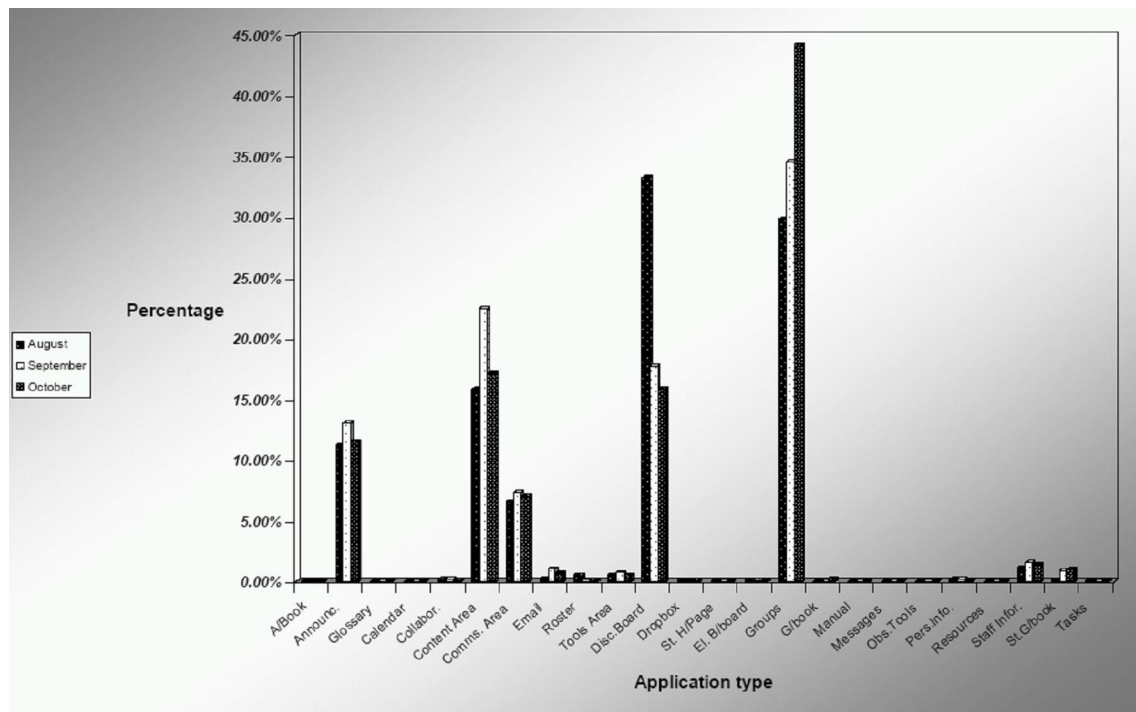
Figure 5: *Flexible mode - online platform components usage*

Students Perceptions

Data were collected through anonymous questionnaires. The questions addressed the review objectives (student satisfaction with online learning, the value of online learning for students, the role of the online experience in student's learning). Information was gathered from six courses offered in flexible mode and seven courses offered in enhanced mode. All courses were part of Professional Studies and were characterized by a substantial use of AUTonline. The responses to the questionnaires were summarised separately for courses in enhanced mode and for courses in flexible mode.

In enhanced mode, responses were received from 197 students, representing 71% of the students enrolled in enhanced mode courses. 84% of the responding students regarded themselves as full time students.

The responses (Table 3) indicate that 75% of students agreed they would choose another course in enhanced mode and 72% of the students agreed or strongly agreed that their experiences had been positive. The majority of the students agreed or strongly agreed that the enhanced mode met their expectations, and that it supported assessment (66%) and communication (72%). In other words, most students perceived the course as valuable and were satisfied with the enhanced mode of teaching and learning in terms of support for their work.

A total of 75% of students agreed or strongly agreed on the benefits of the online platform for notices, deadline notifications, changes and announcements. The majority of students agreed or strongly agreed on the benefits of the online platform for content storage (83%) and additional

materials (74%). The figures show that students value highly these online tools for organising course content.

A total of 58% of students would recommend this course in enhanced mode to another student, and 50% of the students agreed or strongly agreed that they preferred to take a course which uses AUTonline "a lot" while 19% disagreed. The figures show that more that about half of the students perceive the 'enhanced' course that they had undertaken in a positive way.

Table 3: *Enhanced mode – students' responses*

	Question	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree	N/A
Number of papers = 7							
Number of students enrolled 276							
Number of students responding 197 (71%)							
		1	**2**	**3**	**4**	**5**	
1	The online mode of this paper met my expectations	1(1%)	15(8%)	44(23%)	106(55%)	22(11%)	4(2%)
2	Assessment tasks were well supported by AUTonline.	1(1%)	20(10%)	43(22%)	92(47%)	37(19%)	4(2%)
3	AUTonline supported communication between lecturers and students well.	0(0%)	18(9%)	46(24%)	83(44%)	41(22%)	2(1%)
4	AUTonline helped me to keep up-to-date with changes, deadlines & notices	3(2%)	8(4%)	34(18%)	99(52%)	44(23%)	3(2%)
5	AUTonline provided adequate storage for course materials.	0(0%)	7(3%)	22(11%)	93(48%)	68(35%)	2(1%)
6	AUTonline provided adequate additional course materials.	0(0%)	13(7%)	35(18%)	92(48%)	50(26%)	2(1%)
7	So far my experiences with this paper have been positive.	2(1%)	11(6%)	32(17%)	91(48%)	52(28%)	1(0.5%)
8	I prefer to take a paper which uses AUTonline a lot	13(7%)	23(12%)	55(29%)	49(26%)	45(24%)	2(1%)
		Yes/No	**Y**	**N**	**n/a**		
9	Would you choose another paper with an enhanced online option?	**Yes/No**	144(75%)	44(23%)	3(2%)		
10	Would you recommend this paper to another person based on its 'enhanced online' mode of delivery?	**Yes/No**	110(58%)	76(40%)	4(2%)		
11	Are you a full time student?	**Yes/No**	161(84%)	31(16%)			
			Yes	**No**	**N/A**		
12	I used the following features of AUT online for this paper:						
0.1	Announcements	**Yes/No/NA**	152(80%)	21(11%)	16(8%)	.	
0.2	Content area	**Yes/No/NA**	139(73%)	37(19%)	15(8%)		
0.3	Discussion board	**Yes/No/NA**	111(58%)	66(35%)	13(7%)		
0.4	Communication area e.g. chat	**Yes/No/NA**	65(35%)	92(49%)	30(16%)		
0.5	Roster	**Yes/No/NA**	30(16%)	115(61%)	43(23%)		
0.6	Group area	**Yes/No/NA**	87(46%)	75(40%)	26(14%)		
0.7	Other - specify: repository for documentation, course material, ISQL oracle UNIX handout resources, related info, digital drop box, course material	**Yes/No/NA**	32(24%)	22(17%)	77(59%)		

In flexible mode (Table 4), responses were received from 294 students, representing 65% of the students enrolled in flexible mode courses. For 43% of the responding students, this was their first course in flexible mode. 85% of the responding students regarded themselves as full time students.

Table 4: *Flexible mode – students' responses*

Number of Papers = 6						
Number of students enrolled =458						
Number of students responding = 294 (65%)						
	Question	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree	N/A
		1	2	3	4	5	
1							
2	The flexible mode of this paper met my expectations.	9(3%)	21(7%)	69(23%)	163(54%)	23(8%)	2(1%)
3	Assessment tasks were well supported by AUTonline.	19(6%)	19(6%)	49(16%)	171(57%)	40(13%)	2(1%)
4	AUTonline supported communication between lecturers and students well.	7(2%)	19(7%)	53(18%)	139(48%)	64(22%)	6(2%)
5	AUTonline helped me to keep up-to-date with changes, deadlines & notices	3(1%)	12(4%)	33(11%)	159(55%)	77(27%)	4(1%)
6	AUTonline provided adequate storage for course materials.	4(1%)	5(2%)	50(17%)	141(49%)	82(28%)	6(2%)
7	AUTonline provided adequate additional course materials.	5(2%)	23(8%)	50(17%)	141(49%)	60(21%)	9(3%)
8	My experiences with this paper have been positive so far.	6(2%)	20(7%)	54(19%)	161(56%)	45(16%)	2(1%)
9	I would prefer to take papers in this mode (*cf*. 3 hour class mode)	18(6%)	35(13%)	77(28%)	93(33%)	52(19%)	12(4%)
10	I had a choice between AUTonline and 3 hour face-to-face classes.	0(0%)	44(16%)	201(72%)	33(12%)	0(0%)	0(0%)
		Yes/No/NA	Y	N	N/A		
11	Was the choice of online time flexible enough for you?	Yes/No/NA	232(81%)	49(17%)	7(2%)		
12	Were the constraints of the weekly tasks compatible with your style of learning?	Yes/No/NA	197(68%)	83(29%)	8(3%)		
13	Would you choose another paper with a flexible option?	Yes/No/NA	211(73%)	68(24%)	93(3%)		
14	Would you recommend this paper to another person based on its 'flexible mode of delivery'?	Yes/No/NA	189(66%)	92(32%)	7(2%)		
15	Is this your first paper in flexible mode (hours class time, 1 hour online)?	Yes/No/NA	125(43%)	161(56%)	20(1%)		
16	Are you a full time student?	Yes/No/NA	246(85%)	38(13%)	4(1%)		
17	Did you experience problems with meeting weekly deadlines? If yes, please pick from the list below:	Yes/No/NA	89(30%)	110(38%)	94(32%)		
0.1	Computer access - explain: more comp. labs.	Yes/No/NA	39(13%)	164(56%)	90(31%)		
0.2	Internet access - explain:	Yes/No/NA	44(15%)	163(56%)	86(29%)		
0.3	Study related work	Yes/No/NA	72(25%)	146(50%)	75(26%)		
0.4	Work commitments	Yes/No/NA	83(28%)	135(46%)	75(26%)		
0.5	Family commitments	Yes/No/NA	47(16%)	161(55%)	85(29%)		
0.6	Other - specify: Sport commitments	Yes/No/NA	22(8%)	120(41%)	151(52%)		
18	I used the following features of AUTonline for this paper:						
0.1	Announcements	Yes/No/NA	243(83%)	26(9%)	24(8%)		
0.2	Content area	Yes/No/NA	212(72%)	51(17%)	30(10%)		
0.3	Discussion Board	Yes/No/NA	264(90%)	22(8%)	7(2%)		
0.4	Communication Area e.g. chat	Yes/No/NA	135(46%)	117(39%)	41(14%)		
0.5	Roster	Yes/No/NA	14(5%)	86(29%)	193(66%)		
0.6	Group area	Yes/No/NA	250(85%)	32(11%)	11(4%)		
0.7	Other - please specify:	Yes/No/NA	40(14%)	37(13%)	216(74%)		

The tables indicate that 62% of students agreed or strongly agreed that the flexible mode met their expectations and 73% of students would choose another course with a flexible option. The majority of students agreed or strongly agreed that the platform supported assessment (70%) and communication (70%). In other words, a significant percentage of the students perceived the course they had undertaken as valuable and were very satisfied with the flexible mode of teaching and learning in terms of support for their work.

A total of 82% of students agreed or strongly agreed on the benefits of the platform for notices, changes and deadlines. The majority of students agreed or strongly agreed on the benefits of the platform for content storage (77%) and additional materials (70%). The figures show that students value highly these online tools for organising course content.

A total of 52% of the students agreed or strongly agreed that they preferred this mode to 3 hours of face-to-face classes while 19% of students disagreed or strongly disagreed with this statement. 66% of students would recommend the course in flexible mode to another student. The figures show that more than half of the students perceive the 'flexible' course that they had undertaken in a positive way.

The table in the Appendix provides a comparative summary of the responses to each question for the two groups (flexible and enhanced modes). The following are some specific findings relating to these responses.

It needs to be noted that the positive responses to questions relating to the AUTonline functional usage, in particular 'keeping up to date' and 'assessing course material' was backed up by relatively high usage rates in the Announcement and Content Area components of AUTonline for both enhanced and flexible mode courses. In other words, the online platform is recognised by students as having an important role as course content organiser and a communication channel between them and the lecturer.

The pattern of responses for questions relating to experiences in the enhanced mode shows that although students were generally positive about taking further enhanced courses themselves, they were less inclined to recommend enhanced courses to others. This suggests some uncertainty on the part of students as to the benefits of AUTonline in enhanced mode. This pattern was not replicated for flexible mode courses. In other words there are no strong grounds to believe that students clearly see online learning as more beneficial to students compared to face-to-face learning.

Enhanced mode may appear to show a broader level of satisfaction at level 7 than at level 6, but this is heavily biased by the small sample at level 7 with one of the two courses showing a very strong positive response. This is likely to be confounded with topic, course structure, and lecturer at least. In other words there are reasons to believe that third year student might be better prepared to take advantage of the benefits offered by online learning in some subject areas.

SUMMARY

As shown previously, every student enrolled in the BBus will have some experience of online learning because of the adoption of online learning by the core courses within the programme. Depending on students' course of study, this could amount to 58% of the overall points needed to complete the BBus). At its greatest impact, this would include two courses in flexible mode and five courses in enhanced mode. Beyond the core courses, a student's experience would depend on which major(s) the student is enrolled in.

The study proposed to investigate two research questions: (1) What are the trends and patterns of the general use of the online platform? and (2) What are the trends and patterns of student perceptions and perspectives of online learning (enhanced and flexible modes)?

Research Question One

It was found that students are taking advantage of increased time (and place) flexibility in both modes. Most of the use is during the early/mid part of the week, although weekend use is a little higher in flexible mode. However, most students still prefer to login between 10am - 5/6pm. Similar results were reported by Burr and Spennemann (2004) and earlier by McKnight and Demers (2002).

It was found that the most extensive use of online learning is for enhancement of face-to-face classes, with 40 out of the 83 courses (48%) using online learning in that way. The flexible mode is less prevalent. Two of the compulsory courses were offered in this mode and the remaining eleven courses were in five majors, with a concentration in one of them (management).

Use of the Online Platform in Enhanced Mode.

Similarly to the results reported in Phillimore (2002), in the enhanced mode the Content Area component was used most especially for retrieving MS PowerPoint slides, followed by Announcements and Discussion Board. There was less emphasis on the use of the online environment to develop student capabilities**.**

This is probably a fairly typical pattern for many universities, where existing courses are enhanced with online learning (Lee & Nguyen 2005).There are several possible reasons for this. It may indicate that the enhanced mode is being used to support face-to-face classes, which are more interactive and capability focused. It may also reflect the absence of interaction or student centered approaches in the course. It may also be indicative of an early stage of development as teachers familiarize themselves with the environment and start to understand what it might offer for learning. There is probably a time and workload issue as well because any online activity must be fitted into the existing course structure and this implies either replacement (for the teacher) or additional work (for the teacher and for the students).

Use of the Online Platform in Flexible Mode.

In the flexible mode, there was a much greater use of online learning for communicative activities, i.e. group work and online discussions. While the platform was used to put a wide variety of content online, none of the teachers mentioned MS PowerPoint slides! A much wider range of capabilities were being addressed and there was much more emphasis on using the online platform for this purpose.

Here, it would appear that lecturers have used the flexible mode in a different fashion compared with the enhanced mode. This may be because this mode required significant curriculum appraisal and thinking in order to ensure student development, as opposed to the enhanced mode which appears to be more of an "add on" or support mechanism. What is noticeable is that students are more active in flexible mode; this may be because flexible mode represents a "transfer" of class activity due to the reduced time in class. It may also be that teachers who engage in flexible mode have different ideas about teaching and learning (Selim, 2005).

Research Question Two

With regard to the trends and patterns of student perceptions and perspectives of online learning (enhanced and flexible modes) it was established that there was a reasonably high level of

satisfaction from students enrolled in courses using both enhanced and flexible modes, with over 70% of students rating their experience as positive and being prepared to do a course in that mode again. There is a slightly higher level of satisfaction in flexible mode with the ways in which online learning related to various aspects of the course, e.g. assessment, communications and notices.

However, students' overall expectations from the course they had taken are not being met to the same extent, and it is notable that there is a big difference in the number of students that would take a course again in the same mode and recommend the course in the mode to a friend. A possible explanation to this might be found in the fact that the study did not take into consideration the subject complexity of their course neither factors related to the individual characteristics of other stakeholders – such as lecturers and peers. All these might have contributed to the final answer to the question.

In both modes students appear to be fairly evenly split in their preferences for face-to-face and online learning. There could be many reasons for this. Students may not understand the role of the medium in an on campus university and will still be adapting to the greater demands of independent and student centred learning and time management (Hunt, Thomas, & Eagle 2002). Lecturers may also be uncertain of the role of online learning in their courses and the ways in which it might be used to benefit learning in tandem with face-to-face classes.

CONCLUDING REMARKS

The findings reported here confirm to a large degree the macro-conclusions of a recently published report (Marshall 2005) which analyses the institutional capability to develop and implement e-learning in a way that meets the needs of students and staff in a sustainable fashion. However the study is limited to investigating the student perspective only. Another limitation of the approach is it s programme orientation and the subsequent lack of specific data related to individual course design and subject specifics. Subject related surveys of student perceptions would complement a programme level investigation and might provide corroborating evidence: for example the results reported here are similar to the findings in (Wells, Fieger & de Lange 2005) about the key perception predictors, which include the use of Announcements and the Content Area of the online learning platform

Despite these limitations, the findings contributed to a better understanding of the role played by online learning in student learning experiences, allowed the identification of priority development areas, and provided a starting point for further discussion. As students are recognized as major stakeholders in the development of online learning, future work needs to focus on increasing their understanding of the role of online learning. Priority areas include:

- Implementing online learning to develop the specific skills and capabilities expected from a business graduate.

- Providing more flexibility within the course design to enable further student centered learning.
- Continuing to develop online learning as a complement to face-to-face classroom learning.

At an implementation level, promoting online learning through the enhanced mode first might help achieve the goals above. This would encourage the development of student capabilities and active learning.

The Marshall report (2005) found that the university performed well and had a strong focus on teaching and learning and development co-ordination. The report suggested that more needed to be done in the area of evaluation of online learning - a task partially fulfilled by this study.

However feedback about student perceptions of online learning needs to be gathered on a regular basis, to provide the information necessary to work successfully in the priority areas outlined (McPherson 2002, Zentel et al. 2003, Sahay 2004, Lindh & Soames 2004). A suitable vehicle for this is the existing course evaluation process, which might be extended to include questions specifically targeting online learning (enhanced mode, flexible modes), including parts of the framework used in Marshall and Mitchell (2002, 2004).

ACKNOWLEDGEMENTS

REFERENCES

ANTA (2002), Flexibility Through Online Learning. National centre for Vocational Education Research, Australia.

BBus (2005), "Bachelor of Business programme guide". Faculty of Business, Auckland University of Technology, Auckland, New Zealand.

Burr, L. & Spennemann, D. H. R. (2004), "Patterns of user behaviour in university online forums". International Journal of Instructional Technology and Distance Learning, vol.1, no. 10, pp. 11-28.

Capner, H. (2004), Managing the 'E" in elearning. Distance Education Society of New Zealand, Wellington, New Zealand.

Gerbic, P. (2002), "Learning in asynchronous environment for on campus students". In Kinshuk, R. Lewis, K. Akahori, R. Kemp, T. Okamoto, L. Henderson & C.-H. Lee (eds.), Proceedings of the 2002 ICCE International Conference, vol. 2, pp. 1492-1493.

Hunt, L. M., Thomas, M. J. W., & Eagle, L. (2002). Student resistance to ICT in education." In Kinshuk, R. Lewis, K. Akahori, R. Kemp, T. Okamoto, L. Henderson & C.-H. (eds.) Proceedings of ICCE 2002, Auckland, New Zealand, pp. 964-968.

Leidner, D. & Jarvenpaa, S. (1995), "The use of information technology to enhance management school education: A theoretical view". MIS Quarterly, September, pp. 265-291.

Lee, Y. L. & Nguyen, H. (2005), "So are you online yet?! Distance and online education today". Managing Modern Organizations with Information Technology, pp. 1035-1036.

Lindh, J. & Soames, C. (2004), "Are students' and teachers' views on online courses in accordance? A dual perspective on an online university course". Electronic Journal on e-Learning, vol. 21, no. 1, pp. 29-134.

Ling, P., Arger, G., Smallwood, H., Toomey, R., Kirkpatrick, D., & Barnard, I. (2001). The Effectiveness of Models of Flexible Provision of Higher Education. Department of Education, Training and Youth Affairs, Commonwealth of Australia.

Lizzio, A., Wilson, K. & Simons, R. (2002), "University students' perceptions of the learning environment and academic outcomes: Implications for theory and practice". Studies in Higher Education, vol. 27, no. 1, pp. 27-52.

Marshall, S. (2005), "Determination of New Zealand tertiary institution e-learning capability: An application of an e-learning maturity model." Ministry of Education Tertiary E-Learning Research Fund, New Zealand. Retrieved July 20, 2005 from http://www.utdc.vuw.ac.nz/research/emm/Documents.html#sector_report

Marshall, S. & Mitchell, G. (2002), "An e-learning maturity model?". In A. Williamson, K. Gunn, A. Young, & T. Clear (eds.), Proceedings of the ASCILITE 2002, ASCILITE, Auckland.

Marshall, S. & Mitchell, G. (2004), "Applying SPICE to e-learning: an e-learning maturity model?". Proceedings of the 6th Conference on Australian computing education, Dunedin, pp. 185-191.

McKnight, R. & Demers, N. (2002), "Evaluating course website utilization by stud using web tracking software: A constructivist approach." TCC 2002 Online Conference, University of Hawaii. Retrieved June 10, 2004 from http://kolea.kcc.hawaii.edu/tcc/tcon02/presentations/mcknight.html

McPherson, M. (2002), "Organizational critical success factors for managing elearning." In Kinshuk, R. Lewis, K. Akahori, R. Kemp, T. Okamoto, L. Henderson & C.-H. (eds.) Proceedings of ICCE 2002, Auckland, pp. 1540-1541.

OECD (2005), "E-learning in tertiary education: where do we stand?". Education & Skills, vol. 2005, no. 4, pp. 1-293.

Parry, D. (2004), "What do online learners really do, and where and when do they do it?". Bulletin of Applied Computing and Information Technology, vol. 2, no. 2. Retrieved December 17, 2005, from http://www.naccq.ac.nz/bacit/0202/2004Parry_eLearners.html.

Petrova, K. (2001), "Teaching differently: A hybrid delivery model'. In N. Delener & C. N. Chao (eds.) Proceedings of the 2001 GBATA International Conference, GBATA, Istanbul, pp. 717-727.

Petrova, K. (2002), "Course design for flexible learning". New Zealand Journal of Applied Computing and Information Technology, vol. 6, no. 1, pp. 45-50.

Plummer, D. (2005, December 14), "Gartner predicts 2006 and beyond". Gartner Research.

Phillimore, R. (2002), " Face to face lectures or econtent: student and staff perspective." In Kinshuk, R. Lewis, K. Akahori, R. Kemp, T. Okamoto, L. Henderson & C.-H. (eds.) Proceedings of ICCE 2002, Auckland, pp. 211-212.

Sahay, S. (2004), Beyond utopian and nostalgic views of information technology and education: implications for research and practice. Journal of the Association for Information Systems, vol. 5, no. 7, pp. 282-313.

Selim, H. M. (2005), "E-learning critical success factors: an exploratory investigation of student perceptions." In M. Khosrow-Pour (ed.) Managing Modern Organizations with Information

Technology. Proceedings of the 2005 IRMA International Conference, San Diego, pp. 340-346.

Sinclair, R. (2003), "Components of quality in distance education: Distance education guidelines from different countries'. In Quality Education @ a distance: IFIP TC3/WG3.6 Working conference proceedings, Kluwer, Boston, pp. 257-264.

Swan, M. K. (1995), "Effectiveness of distance learning courses – students' perceptions." Proceedings of the National Agricultural Education Research Meeting, Denver. Retrieved December 3, 2003 from http://www.ssu.missouri.edu/ssu/AgEd/NAERM/s-a-4.htm.

Wells P., Fieger, P., & de Lange, P. (2005), "Integrating a virtual learning environment into a second year accounting course: Determinants of overall student perception ". Proceedings of the AAA Annual Meeting, San Francisco.

Swan, M. K. (1995), "Effectiveness of distance learning courses – students' perceptions." Proceedings of the National Agricultural Education Research Meeting, Denver. Retrieved December 3, 2003 from http://www.ssu.missouri.edu/ssu/AgEd/NAERM/s-a-4.htm.

Zentel, P., Bett, K., Meister, D. M., Rinn, U., & Wedekind, J. (2003), "A change process at university – innovation through ICT?" In Williams, R. (ed.) Proceedings of the 2nd European Conference on e-Learning, Glasgow, pp. 507-513.

DEFINITIONS OF THE KEY TERMS USED IN THE REPORT

AUTonline: The online platform used in at the university. It is based on Blackboard® and is linked to the student enrolment system. AUTonline provides controlled access on and off campus, 24/7.

BBus: Bachelor of Business – a three year undergraduate degree offered by the university's Faculty of Business.

Core Courses: These are the compulsory courses in the BBus. Include Ethics (15 points), Business development project (15 points), Cooperative Education (60 Points), and FYIP (First year Integrates Programme) – four double (30 point) point courses.

Course: An examined unit of study (in other programmes, known as "class", "module", "paper"). A single course is worth 15 points. A full time student typically takes four single courses in one semester'.

Enhanced Mode: Online learning is used as an additional teaching and learning strategy, with no change to the existing face-to-face class structure i.e. three hours of class contact per week.

Flexible Mode: Online learning is a more significant part of the course and there is reduced face-to-face contact i.e. two hours of face-to-face activity and more intensive online activities which replace a one hour class.

Level 6, level 7: The Bachelor pf Business programme comprises a mix of courses at three academic levels (5,5 and 7) - roughly equivalent to studies in Year 1, Year 2 and Year 3 of the degree.

Major: In the Bachelor of Business programme students typically complete the requirements for at least on major specialization ("major"). A major contributes 90 points out of the 360 points required to complete the degree itself.

Distance (Off Campus) Mode: There are no or few face-to-face classes and online learning is the dominant teaching and learning mode.

Online Learning: The use of the online platform (AUTonline) within a course as a teaching and learning strategy.

Professional Studies: These comprise non-core professional courses, associated with each BBus major.

Semester: The academic year in New Zealand universities starts in Semester 1 during late February or early March each year, Semester 2 starts in July of the same year and Summer Semester starts in early December.

APPENDIX

A Comparative Summary of Student Responses

Questions	Enhanced Mode	Flexible Mode
1) The flexible mode of this course met my expectations.	The majority of all replies agree with this comment but a significant number are undecided/indifferent.	The majority of all replies agree with this comment.
2) Assessment tasks were well supported by AUTonline.	The majority of the replies agree but the pattern is less strong with a wider spread of responses. ~10% disagree.	Somewhat more positive than enhanced mode but again a more spread pattern.
3) AUTonline supported communication between lecturers and students well.	The pattern is very variable here from 45% to 100% agreement	Somewhat more positive than enhanced mode but again a more spread pattern.
4) AUTonline helped me to keep up-to-date with changes, deadlines and notices.	Between 47% and 100% agree with this statement. (The 47% is a single course outlier). Most students agree.	Most students (60% to 80%) agree here with no outliers.
5) AUTonline provided adequate storage for course materials.	There is majority agreement across all courses. Most are positive.	There is majority agreement across all course responses. Most are positive.
6) AUTonline provided adequate additional course materials	There is majority agreement across all courses but a significant number are undecided/indifferent.	There is majority agreement across all course responses.
7) My experiences with this course have been positive so far.	70% or more agreement across all courses. Replies are generally favourable.	60% or more agreement across all courses. Replies are generally favourable.
8) I would prefer to take courses in this mode (cf. 3 hour class mode).	The views here are very wide with ~30% in the "neutral zone". Despite the positive responses above, students do not seem to regard enhanced mode as a "selling" point.	The response here is more positive than the enhanced mode courses, with fewer neutral replies.
9) I had a choice between AUT online and 3 hour fact-to-face classes.	Question not asked for enhanced mode.	Responses range from 0 to 47%. The choice options don't always line up with timetable realities.

Questions	Enhanced Mode	Flexible Mode
10) Would you choose another course with a flexible/enhanced option?	Responses are between 60% to 90% positive.	Responses are between 60% to 90% positive.
11) Would you recommend this course to another person based on its 'flexible mode of delivery?	More variable responses here, from 13% to 70%. Students seem less willing to recommend enhanced mode to others than their own enthusiasm would suggest.	A wide range of response here from 44% to 80% positive with no discernable pattern. Students seem less willing to recommend flexible mode to others than their own enthusiasm would suggest.
12) Is this your first course in flexible mode (2 hours class time, 1 hour online)?	Not asked for enhanced mode.	Varies from 36% to 64%
13) Are you a full time student?	~85% overall.	~85% overall.

Original article at: http://ijedict.dec.uwi.edu//viewarticle.php?id=100&layout=html

Towards a profitable and sustainable future for grain growers:
A professional development model for farm partners

Chris Murray and Jillian Condell
Apsilon, Toowoomba, Australia

Peter Murray
University of Queensland, Australia

ABSTRACT

Many Australian grain growers need to change their management approach to ensure their continued viability, but do not have the required knowledge and skills. Uptake of relevant education and training is poor, despite the positive correlation between learning, change and farm viability. As men are generally occupied with the operational aspects of the farm, much of the management role has been taken on by their partners, despite their lack of relevant formal qualifications. Professional development of farm partners therefore has the potential to improve the viability of grain growers. A model combining learning circles and action learning projects is proposed.

Keywords: *Professional development; agriculture; farming; grain industry; Australia; learning circles; action learning.*

INTRODUCTION

A large proportion of Australian grain farms require a change in management focus to ensure their continued viability. However, uptake of education and training to equip farmers with the relevant knowledge and skills is poor. This paper briefly reviews some of the reason for farmers' resistance to education and training, explores the changing role of women on the farm and proposes a professional development model for farm partners which has the potential to bring about change at farm level.

THE NEED FOR CHANGE IN THE GRAIN INDUSTRY

In the period 1998-2002, 25% of Australian grain farms returned an average cash income of $173,624. In marked contrast to this, the mid 50% of grain farms returned an average of $48,916 and the bottom 25% averaged a *negative* return of $35,947 (Clark & Harrop 2004). Once allowances are made for depreciation and imputed labour costs, 50% of grain farms in Australia are not making enough money to meet their farm succession and stewardship obligations (Clark & Harrop 2004).

Australia's relatively poorly educated farm workforce, compared to overseas competitors and other Australian industry sectors, limits productivity. It also has a compounding effect by inhibiting further training, which further limits farmers' capacity to be flexible, adaptable and responsive to change (Kilpatrick 1996).

Current public policy therefore focuses on achieving profitable and innovative agricultural industries, sustainable resource management and vibrant rural communities based on a culture of

change (Bellamy *et al.* 2003). In fact, Australia's grain growers are unlikely to remain globally competitive unless farmers can change their focus from yield and 'paddock' to a 'whole farm' approach (Clark & Harrop 2004).

BARRIERS TO ON-FARM LEARNING AND CHANGE

Change and learning are inter-linked (Bellamy *et al.* 2002) so that there is a growing need for continuous (life-long) learning in the agricultural sector to match the pace of change (Taylor 2003). Life-long learning has been shown to promote responsiveness, flexibility and an ability to make successful changes among farm managers (Kilpatrick 1998).

For example, studies show that farmers who participate in training other than field days are more likely to make changes to their practices which result in improved profitability (measured by value of assets) and those who attend more training events are more likely to make a change than those who attend fewer events (Kilpatrick 2000). Those farmers who both attend field days and make changes to practice are reported to have a higher average gross operating surplus ($73,170) than farmers who do neither or only one ($55,335) (Kilpatrick 2000). In addition, those farmers who attend training other than field days and make changes to practice have an even higher average gross operating surplus ($83,651) (Kilpatrick 2000).

Despite this positive correlation between learning, change and profitability, participation in post-school education by the farming sector is low compared to the rest of Australia's population. For example, although 80% of Australian farm businesses participate in training (AFS data), 25% attend only field days and only 3% participate in courses of several sessions (Kilpatrick 2000). This is contrary to the reported steady increase throughout the 1990s in participation rates amongst the Australian working age population (DEST 2003). In particular, farmers are not participating in the type of training that industry leaders and agricultural educators see as a priority, such as marketing and management (Fulton *et al.* 2003).

The reasons for these low levels of participation in learning or change opportunities by farmers are many and varied (Fulton *et al.* 2003) and include barriers such as:

- personal characteristics of the farmer, including personality type, current level of education (better educated farmers are more likely to engage in continuing education), previous unsatisfactory learning experiences, low actual or perceived literacy levels and lack of confidence as a learner (Kilpatrick 2000). For most farm women, care of the family, particularly the children, is the first priority, and provision of suitable child care is difficult: child care centres are heavily regulated, so that informal care is no longer an option, and the distances involved eat further into limited time available for women's own pursuits (Strong Consulting Group 1997);

- characteristics of individual and institutional providers of education and training which appear ineffective for farmers' purposes, inappropriate and inflexible training models and inflexible funding arrangements for training providers (Condell 2005);

- learning content is seen as irrelevant or inapplicable to a farmer's individual context;

- accessibility of learning opportunities, which are often poorly publicised, involve lengthy travel and time off-farm and are rarely scheduled to meet farmers' needs;

- method of delivery, in that information and activities are not targeted to meet the specific and individual learning needs of participants (Fulton *et al.* 2003).

These barriers to professional development were confirmed by farm partners surveyed in South-West Queensland (Condell 2005) who stated that they have not participated in vocational education and training because:

- time-tabling of training does not fit with the partners' child care responsibilities;

- available training is not tailored closely enough to their specific enterprise context.

The result of the poor uptake of business management training was illustrated by respondents to the same survey which revealed that:

- the majority of respondents had no formal business plan or marketing plan for their farm business;

- the business plans of the minority were generally completed by their accountant and had a financial planning focus to satisfy financial institution requirements;

- more than two thirds of respondents had no formal succession plans for either land ownership or farm management;

- none of the respondents had developed a human resource policy;

- only one farming enterprise provided staff with formal induction at the beginning of employment, including coverage of workplace heath and safety requirements. Although a few provided informal instruction on workplace health and safety, an introduction to physical setting of the workplace and familiarisation of equipment, this is not documented and staff are not given handbooks for referral;

- some respondents believed that hiring contractors relieved them of their responsibilities for both industrial relations and workplace health and safety (Condell 2005).

THE CHANGING ROLE OF WOMEN IN FARM BUSINESS

Historically, farm men and women generally occupied traditional gender roles in relation to domestic and farm tasks, with partners of farmers taking the role of homemaker (Kilpatrick & Bell 1999). These traditional roles carried over to the management and decision making areas of the business, with women ignored when strategic farm management decisions are made (Kilpatrick & Bell 1999).

For example, although women contributed 48% of real farm income in Australia in 1997, fewer than 20% of agricultural decision makers were women (Elix *et al.* 1998) and fewer than half of Western Australian farm women surveyed considered themselves equal decision makers in their family business (Haslam-McKenzie 1998). In times of stress such as drought or recession, however, women's leadership in rural, regional and remote Australia has often been the difference between a community surviving or failing (Haslam-McKenzie 2003). This leadership role has historically been largely under-valued and often unrecognised.

> *The preconception of rural life as a predominantly male domain is false, as women have always played a major role in rural work, on the farm and in communities, and will continue to do so (Black et al. 2003 p.102).*

However, traditional gender roles are now being challenged on farms in the same way as other areas of Australian society. Over the past decade, farmers have increasingly recognised the need to run the family farm as a business requiring strategic planning and other business/management skills. As men are generally occupied with the operational aspects of the farm business, much of

the planning and business management role has therefore been taken on by women, despite their lack of formal qualifications. However, the majority of women surveyed in Victoria were found to have little confidence in their abilities and often underestimated the contribution they made (Strong Consulting Group 1997). This is further illustrated by the finding that 'where women undertake work in family businesses . . . the work women perform is perceived/construed as 'help' rather than 'work' ' (Whittenbury 2003 p.156).

By 1998, 32% of Australia's farm work force was female, with more than 70,000 women defining themselves as farmers or farm managers. The contribution of these women to the market value of farm output was estimated to be at least 28% or a gross figure of $4 billion annually (Elix *et al.* 1998). While women have always contributed significantly to farm production by way of their unpaid domestic work (Black *et al.* 2000), this contribution was estimated at about $8 billion in 1998 together with about $1.1 billion contributed to the overall viability of farming through off-farm work (Elix *et al.* 1998).

Thus, today's farm partners are increasingly involved in and concerned about their farm businesses, with key issues raised by rural women in Western Australian being farm business viability, community sustainability, farm and business succession, health and education provision, ageing rural population, availability of labour, disposable income and stress (Haslam-McKenzie 1998). Women play an important role in resource management strategies within the family farm, having 'opinions about farming, soil conservation, and environment that are not carbon copies of those of farm men' (Rickson & Daniel 1999 p.248).

In 1997, a survey in Victoria revealed that the primary contributions made by women to farm businesses were:

- care and maintenance of the family unit, as the first priority, ensuring that the necessary support structures are in place to allow the farm to operate. This requires the co-ordination of all activities including:

  - the consideration of the need to separate the farm business from family life;

  - highly developed communication skills;

- business, administrative and communication skills with an increasing perceived need to succeed in marketing;

- earning off farm income to allow the farm business to remain/become viable. Approximately 55% of those women surveyed earned off farm income;

- gathering, interpretation and dissemination of information by accessing various media sources including the internet, magazines, television, papers and attending groups that provide learning opportunities;

- assisting in the farm operations by driving machinery, overseeing Occupational Health and Safety issues, marketing grain and coordinating the pick up of farm requirements e.g. chemicals, seed and machinery parts (Strong Consulting Group 1997).

On the women's own rating of the skills they contributed to their farm business, the largest proportion (39%) was business/marketing skills (Strong Consulting Group 1997). These contributions overlap with many of the traditional roles of the male farmer. The biggest barriers to increased involvement of these partners in the farm business were perceived to be lack of clear role (14%), care of family (13%) and lack of time (12%) (Strong Consulting Group 1997).

Thirty six per cent of women on grain farms surveyed in 1997 had a post-school qualification (Strong Consulting Group 1997). The proportion of farm partners with post-school qualifications

continues to increase, accelerating the pace of change in attitudes and traditional gender roles. For example:

- twice as many farm women as farm men now hold tertiary qualifications (Black 2000);

- women in rural, regional and remote Australia have more and higher formal qualifications than men and are increasingly taking overt leadership roles in traditional and non-traditional spheres (Haslam-McKenzie 2003);

- a survey of 40 partners of grain producers in South-West Queensland revealed that the majority had tertiary qualifications (Condell 2005). However, these qualifications are primarily in teaching, nursing or child care rather than agriculture, business, leadership or risk management.

Those partners who achieve the transition from traditional roles to that of management within the farm business do so by restructuring their role and introducing different solutions to ensure all responsibilities are met. For example:

> *'I had to make a choice, whether my skills were better utilised sewing, cleaning, ironing and washing or marketing our grain. We decided to buy in home help and have since paid for that three times over with the achievement of better product prices' (Strong Consulting Group 1997, p.5).*

FARM PARTNERS AND LEADERSHIP

The attributes required by future business leaders in Australia have been identified as:

> *. . . people skills, strategic thinking, vision, flexibility, capacity for self management, the ability to solve complex problems, high ethical standards and team players (Karpin 1995, cited in Alston 2000 p.55).*

Women very often possess these attributes as well as contributing cooperativeness, collaboration, empathy and rationality in problem solving to decision making and management tasks (Kilpatrick & Bell 1999). Women who work or have worked off farm may bring an additional range of skills including financial and high level people management skills. The combination of attributes and skills that women bring to the farm business can therefore enhance its capacity to be flexible and adaptable.

In management and leadership roles, women reveal transformational leader's traits in which the needs and growth of others are central (Haslam-McKenzie 2003). Seeking advice, creating a network and building a team have been identified among core influencing strategies for management used by women (Sinclair 2005). In addition, women often bring a more holistic and future-orientated perspective to complex social, environmental and economic issues (Bellamy *et al.* 2003).

These strengths can be fostered by business, leadership and life skill programs which 'operate within a community or industry and focus on networking, mentoring and partnership, in the context of meeting local goals' (Williams 2003, p.172). The women surveyed by Strong (1997) welcomed the opportunity to support one another and their partners in a business type networking forum and most women who attended the focus groups were grateful for the opportunity to discuss farming on a professional basis.

Rural women identified training, confidence building and support/encouragement as being the three most useful strategies for their personal development (Alston 2000). The latter two strategies are often met best by the women's peer group rather than in a training situation. For example, the participants in a Rural Women in Leadership Program acknowledged that they learnt as much from each other as they did from the skilled presenters, and that this rekindled their belief in their own ability to be effective leaders (Haslam-McKenzie 2003). Some also noted that they felt it was important to learn how to mentor others.

In addition, a recent study noted that the 'farmers who demonstrated that they were least likely to participate in or seek out learning that did not produce direct on-farm production benefits tended to obtain information through links and services they knew well and could trust. The first source of information many of them mentioned is the family' (Andrew *et al*. 2005, p.xi). This suggests that professional development of farm partners may have more than just individual benefit:

> *Through improved communication, the diverse goals of family members are acknowledged and incorporated into better planning and direction for the business. The result is better coordination of effort that recognises and uses the skills of all family members (Kilpatrick & Bell 1999, p.7).*

THE BENEFITS OF GROUP LEARNING

Relevant learning increases awareness of the range of possible innovations, improve decision making capacity and ability to allocate resources efficiently, and develop attitudes which encourage changes to practice (Kilpatrick 2000). However, participation in training does not in itself improve profitability and sustainability, or bring about change, because change occurs only as a result of the application of that learning in the individual's own context and:

> *Adaptation of ideas takes time, often revolves around the accumulation of information, the knowledge of their properties, and a range of other contextual factors. The timing of such changes tend to be very individualistic (Arnott & Benson 2001 p.181).*

The key to cost-effective training therefore is to develop long-term, flexible, easily accessed programs (Arnott & Benson 2001) which result in sustained change in behaviour among participants.

Application of learning and sustained change in behaviour are more likely outcomes from situations in which the learner is supported by others in a learning group which facilitates the processes of learning and implementing new practices (Kilpatrick & Bell 2000). Better outcomes also result when people use their knowledge and skills together with the knowledge and skills of others, through interactions which use networks, shared values and the commitment of others to the group (Kilpatrick & Bell 2000).

> *A member [of a learning group] summed up the advantages of having others available for interactive learning who are regarded as credible sources of advice and support: You can employ a consultant anytime you like ... but... he only has one point of view. One on one consultancy is never going to be as powerful as the group consultancy because everybody in our Board or in the group has got an area of expertise (Kilpatrick & Bell 2000, p.8).*

Group learning which draws on the learners' lives and with their full participation means that the participants 'do not distinguish boundaries between their group's learning and their lives. Thus, they infuse their learning into the larger community.' (Kasl 2001, p.93). Group learning therefore

has the potential to benefit not only the individual learner, but also their family, business and community (Kilpatrick & Bell 1999).

Group learning in the form of learning circles has been used by up to 50% of the population in Sweden for more than 100 years to engage in lifelong learning (Suda 2001). They are an effective and practical method of learning because they use participants' individual life experiences as the starting point for discussion of relevant concepts (Suda 2001) and allow them to process information and understanding in their own way, their own context and their own time.

Each learning circle of five to seven participants is guided by a trained facilitator to explore issues brought up by participants and direct them to relevant resources if required (Suda 2001). The facilitator is not an expert or teacher in the traditional sense but relies on their own communication skills and understanding of learning processes to empower the participants to construct their own learning. Emphasis is placed on identifying context-relevant issues, seeking, applying and evaluating solutions to those issues and reflecting on the process (action learning).

With the guidance of the facilitator, participants also share their existing knowledge and skills with one another and develop new skills or understanding collaboratively at their own pace. They are encouraged to recognise that skills acquired in other areas, including in their domestic roles, are transferable and so can be applied to their farm business. Where appropriate and/or relevant, participants are encouraged to identify gaps in their leadership, business and/or life skills and opportunities can be provided to address these, either within or outside the learning circle. In addition, the facilitator provides participants with timely and relevant resources such as tools for communication and working with others.

The aim of a learning circle is for transference of knowledge and development of skills, so that learning is valued for its own sake, rather than to meet specific competencies required for formal qualifications (Suda 2001). As the learning circle ethos accommodates and values the differing prior experiences and qualifications of participants, it has the added benefit of diminishing the fear of failure and lack of self-confidence in farm partners referred to previously.

Learning circle participants need time to develop their interpersonal skills and their self-confidence within the group. Only once this is achieved can individuals begin to develop the trust and shared values which enable them to gain maximum benefit from their participation (see Figure 1).

Figure 1: Development of a support network (Kilpatrick & Bell 2000 p.10)

An individual also needs more than a single learning opportunity (such as a workshop) to evaluate their farm business. Ideally, an activity-based (action learning) approach is needed over time. With this action learning approach, the learning process begins as information is gathered in an area or areas selected by each participant about how their farm business currently operates. Guidelines for this process are provided within the learning circle, but the activity itself occurs in the participants' own time and context. Participants are then assisted to review and reflect on both the information gathered and process of gathering it. The process of gathering, reviewing and reflecting on information about their own business raises participants' awareness and understanding of the principles of business excellence in their specific context.

Sharing of awareness and understanding among the group encourages individuals to input their own understandings, skills and experience which builds self-confidence/esteem. Where relevant and desired, participants are encouraged to develop action plans to implement improvement initiatives, and report progress and/or constraints and limitations of these. Thus the participants in the learning circle engage in the cycle of assessment, review, reflection, planning and implementation that is action learning.

Learning circles have been used successfully for professional development in areas such as teaching (Lovett & Gilmore 2003). Participants in an interdisciplinary learning circle which incorporated action research projects reported that 'the reflection and peer support woven into the learning circle experience had positively impacted their teaching' (Lynd-Balta *et al*. 2006 p.23).

COMMUNICATION INFRASTRUCTURE IN RURAL AND REGIONAL AUSTRALIA

Poor service and infrastructure and a lack of competition in rural and regional telecommunications in Australia have been highlighted recently by the proposed sale of the remaining 50.1% of Telstra. Ruth Povall, regional manager of Australian Business, reportedly commented that 'It is

not uncommon for an email to take more than four hours to reach Sydney. You can fly there faster than that. The lack of proper infrastructure also discourages interest in IT, hampering regional economic development even further.' (Thomsen 2005). Only a very few regional areas currently have access to the internet via broadband, although some farm businesses have invested in the more expensive satellite connection.

The Australian Government is committed to improving communication infrastructure in regional and remote, particularly in respect to access to broadband services, by way of the *Connect Australia* program (Anon. 2005). However, this program commences only in 2006, with a four year rollout. Hence, at present, the only reliable and widely available communications technology available to most farm partners is landline telephone.

PROPOSED MODEL OF PROFESSIONAL DEVELOPMENT FOR FARM PARTNERS

The following conclusions in relation to professional development for farm partners can be drawn from the above discussion:

1. Grain farm businesses need to implement strategies to accommodate change and improve profitability and sustainability.

2. Support in implementing a change is vital if the change is to be successful.

3. Many male farm partners are concerned primarily with production and operational considerations of the farm business, with little time or inclination to undertake traditional forms of professional development.

4. Women, particularly those with post-school qualifications, are ideally placed to learn and apply business and leadership principles to the farm business, and to pass on these skills and knowledge to their partners as, when and where appropriate to their individual situation.

5. It is to the benefit of farm business owners, their employees and the wider community for partners to gain relevant business expertise and skills in the context of their individual business enterprise.

6. Women value a networking and mentoring model of professional development, and many need support to deal with their low self-confidence/esteem and/or fear of failure.

7. Women's access to learning opportunities is constrained by time available, childcare responsibilities and distance. Providing access by way of telecommunications addresses these constraints, although this is currently limited to landline telephone (teleconferencing). Teleconferencing allows farm partners to participate in learning opportunities without the need to travel to a particular location, and while also meeting their family commitments (Tolhurst & Dean 2004).

Based on these conclusions, we therefore propose a model for professional development for farm partners which combines learning circles conducted by teleconference with action learning projects carried out in the participants' own time and context. A learning program delivered based on this model would comprise, for example, weekly one to two hour teleconferences over eight weeks to fit in with school terms. Participants would be encouraged to carry out tasks related to their action learning project between teleconferences to ensure that maximum benefit is obtained from their group interaction time.

A pilot program will commence in January 2006 to evaluate the effectiveness of this model for professional development of farm partners of grain growers in South West Queensland.

REFERENCES

Alston, M. (2000) *Breaking through the grass ceiling: Women, power and leadership in agricultural organisations*. Amsterdam: Harwood Academic Publishers.

Andrew, J., Breckwoldt, R., Crombie, A., Aslin, H., Kelly, D. and Holmes, T. (2005) *Fostering involvement – how to improve participation in learning*. A report for the Rural Industries Research and Development Corporation. RIRDC Publication 05/105, Project No. RPM-2A. Barton, ACT: RIRDC.

Anon. (2005) Australian Government Department of Communications, Information Technology and the Arts. Fact Sheet – Connect Australia. Available at: http://www.dcita.gov.au/__data/assets/pdf_file/30296/FACT_SHEET_Connect_Australia.pdf (accessed 31.12.05).

Arnott, A. and Benson, R. (2001) Learning, change and sustainability: Exploring the learning processes of pastoralist stakeholders in the tropical savannas. *In:* Falk, I. (ed) *Learning to manage change*. NCVER, Leabrook S.A.

Bellamy, J., Webb, V., Mayocchi, C. and Leitch, A. (2002) *Improving resource management through rural women's use of new technology: A pilot study on impediments and opportunities for learning activities.* Report to AFFA 'Skilling Farmers for the Future' program. CSIRO Sustainable Ecosystems, Brisbane.

Bellamy, J., Webb, V., Mayocchi, C., Leitch, A. and Pollock, L. (2003) Rural women's use of new communication and information technologies: Is it supporting learning on natural resource management? In: O'Hagan, R., Alston, M. and Spriggs, S. (eds) *Setting the agenda for rural women: Research Directions*. Wagga Wagga, New South Wales: Centre for Rural Social Research, Charles Sturt University, pp.125-132.

Black, A., Duff, J., Saggers, S. and Baines, P. (2000) *Rural communities and rural social issues: Priorities for research*. A report for the Rural Industries Research and Development Corporation. RIRDC Publication 00/130, Project No. ECU-4A. Barton, ACT: RIRDC.

Clark, N. and Harrop, F. (2004) *The changing face of agriculture in Australia*. New directions for a diverse planet: Proceedings of the 4th International Crop Science Congress Brisbane, Australia. Available at: http://www.cropscience.org.au/icsc2004/symposia/6/1/1857_clarkn.htm (accessed 17.11.05).

Commonwealth Department of Employment, Science and Training (DEST) (2003) Submission to the Senate Employment, Workplace Relations and Education References Committee Inquiry into Current and Future Skills Needs, Canberra.

Condell, J. (2005) *Skills and training needs.* Unpublished report to the Southern Queensland Partners-in-Grain Project, Toowoomba.

Elix, J., Lambert, J. and Gordon, J. (1998) *Missed Opportunities: Harnessing the potential of women in Australian agriculture*. Rural Industries Research and Development Corporation, Barton, ACT.

Fulton, A., Fulton, D., Tabart, T., Ball, P., Champion, S., Weatherley, J. and Heinius, D. (2003) *Agricultural extension, learning and change*. A report for the Rural Industries Research and Development Corporation. RIRDC Publication No. 03/032. Available at: http://www.rirdc.gov.au/reports/HCC/03-032.pdf (accessed 3.11.05).

Haslam-McKenzie, F. (1998) Case studies of rural business women in Western Australia and their contribution to the region. *Rural Society,* vol.8, no.3, 257-268.

Haslam-MacKenzie, F. (2003) A review of the status of women in rural, regional and remote Australia: Identifying leadership strategy successes and challenges. In: O'Hagan, R., Alston, M. and Spriggs, S. (eds) *Setting the agenda for rural women: Research Directions*. Wagga Wagga, New South Wales: Centre for Rural Social Research, Charles Sturt University, pp.133-149.

Karpin, D.D. (1995) *Enterprising nation: Renewing Australia's managers to meet the challenge of the Asia-Pacific century*. Report of the Industry Taskforce on Leadership and Management Skills. AGPS: Canberra.

Kasl, E. (2001) Chapter 11: Groups that learn and how they do it. Falk, E. (ed.) *Learning to manage change: Developing regional communities for a local-global millennium*. NCVER publication, pp 92-99. Available at: http://www.ncver.edu.au/pubs/falk2001/change2.pdf?PHPSESSID=ec245e3a6089a8750e59982bc2ed695e (accessed 17.11.05).

Kilpatrick, S. (1996) *Change, training and farm profitability*. National Farmers' Federation: Canberra.

Kilpatrick, S. (2000) *Education and training: Impacts on farm management practice*. Available at: http://www.crlra.utas.edu.au/files/discussion/2000/D03-2000.pdf (accessed 3.11.05).

Kilpatrick, S. and Bell, R. (1999) *Sharing the driving seat: Tackling the hard issues.* Centre for Research and Learning in Regional Australia Discussion Paper. Available at: http://www.crlra.utas.edu.au/files/discussion/1999/D04-1999.pdf (accessed 1.11.05).

Kilpatrick, S. and Bell, R. (2000) *Support networks and trust: How social capital facilitates learning outcomes for small business*. Centre for Research and Learning in Regional Australia Discussion Paper. Available at: http://www.crlra.utas.edu.au/files/discussion/2000/D02-2000.pdf (accessed 3.11.05).

Kirkpatrick, D.L. 1998. *Evaluating training programs – the four levels*. 2nd ed. San Francisco: Berrett-Koehler Publishers Inc.

Lovett, S. and Gilmore, A. (2003) Teachers' learning journeys: The quality learning circle as a model of professional development. *School Effectiveness and School Improvement*, 14(2), pp.189-211.

Lynd-Balta, E., Erklenz-Watts, M, Freeman, C. and Westbay, T.D. (2006) Professional development using an interdisciplinary learning circle. *Journal of College Science Teaching*, 35(4) pp.18-24.

Rickson, S.T. and Daniels, P.L. (1999) Rural women and decision making: women's role in resource management during rural restructuring. *Rural Sociology*, 64(2), pp.234-50.

Sinclair, A. (2005) *Doing leadership differently*. Melbourne: Melbourne University Press.

Strong Consulting Group (1997) *Situation analysis*. Unpublished report to the Victorian Women in Grains Reference Group, Ballarat.

Suda, L. (2001) Learning circles: Democratic pools of knowledge. *ARIS Resources Bulletin*, 12(3), pp,1-4.

Taylor, J. A. (2003) *Building capacity in Australia's rangelands*. In: Allsopp, N., Palmer, A.R., Milton, S.J., Kirkman, K.P., Kerley, G.I.H, Hurt, C.R. and Brown, C.J. (eds) Proceedings of the VIIth International Rangelands Congress, Durban, South Africa, pp.1801-8.

Thomsen, S. (2005) *Business calls for better lines*. Article available at: http://www.nrg.com.au/~porkbarrel/new/telecoms12.htm (accessed 31.12.05).

Tolhurst, H. and Dean, S. (2004) Using teleconferencing to enable general practitioner participation in focus groups. *Primary Health Care Research and Development*, 5, pp.1-4.

Whittenbury, K. (2003) Obscuring potential alternatives: How traditional ideology influences expectations of and for women in a rural community. In: O'Hagan, R., Alston, M. and Spriggs, S. (eds) *Setting the agenda for rural women: Research Directions*. Wagga Wagga, New South Wales: Centre for Rural Social Research, Charles Sturt University, pp.150-60.

Williams, R. (2003) Recognising and valuing women in developing policy for community capacity building: a focus on the interplay between leadership and social capital. In: O'Hagan, R., Alston, M. and Spriggs, S. (eds) *Setting the agenda for rural women: Research Directions*. Wagga Wagga, New South Wales: Centre for Rural Social Research, Charles Sturt University, pp.161-176.

The usage of ICT for secondary education in Mongolia

Sambuu Uyanga
National University of Mongolia, Ulaanbaatar-46, Mongolia

ABSTRACT

Mongolia is located in the Northern Asia, bordering with China and Russia (landlocked). Mongolia has a territory of 1,564,116 sq km. The population is 2,791,272 (July 2005 est.), the literacy rate is 97.8% (World Fact book, 2005). The education system consists of pre-school education (kindergarten), general education (primary school 1-5, secondary school 1-9, complete secondary school 10-11), and professional education (universities). Primary and secondary education is free to all by law. In 2004-2005 academic years, 557346 students were reported to be studying at 710 general education schools nationwide.

Information and Communication Technology (ICT) were introduced to the Mongolian education sector relatively late. The computer training and informatics as a subject has been included in the secondary school curriculum in Mongolia since 1988 and in the university curriculum since 1982.

This paper presents current situation of usage of ICT in secondary education in Mongolia, including national policies, strategies and programs, hardware and software, teaching staffs, informatics curriculum and related projects and initiatives. SWOT (Strength, Weakness, Opportunity, and Threat) analysis and conclusions are also presented.

Keywords: *Information and communication technology; ICT in education; secondary education; informatics; curriculum; ICT training; ICT policy; Mongolia*

NATIONAL POLICIES, STRATEGIES AND PROGRAMS

Concept of ICT Development of Mongolia by Year 2010, Government of Mongolia, 2000

In 2000, the Parliament of Mongolia adopted the ICT Vision-2010 as a blueprint for ICT development in the country. It recognizes ICT as an important pivotal tool for development in Mongolia. ICT Vision-2010 has three major components: government-legislation framework, business-economy framework and people-society framework. Within this concept, following activities related to ICT in education are to be implemented: Create structure to provide education on ICT for all citizens; Set up knowledge and education-based high-tech centers in Ulaanbaatar and in the centers of the socio-economic development regions; Create a set of opportunities to access IT at mobile sights running sustainable common services, libraries, aimags[1] and soum[2] schools; Create info structure for education; Resolve in detail human resource development issue of the national info structure (user, trainer, specialist); Introduce electronic version of library system such as ordering, searching and others; Develop lifelong learning through open and distance learning; Introduce electronic services such as leisure and entertainment (virtual libraries, museums, etc,.) (Government of Mongolia, 2000)

ICT Vision 2010 in Education Sector of Mongolia, MOECS, 2001

Meanwhile, the Ministry of Education, Culture and Science (MOECS) has used Vision-2010 as a model to implement ICTs in the education sector, developing an action plan which was officially approved in 2001. The vision for ICTs in education has four major components, covering following areas:

- Training: Full utilization of ICT in each educational level's curriculum and contents in order to introduce ICT possibilities and gain knowledge end skills in using it;

- Hardware: Supply of hardware allows the conduct of training according to different level of modern ICT development and provides possibilities of free access to information;

- Teaching staff: Supply of teaching staffs which have the capabilities to develop themselves in terms of their own knowledge and skills in line with rapid development of ICT;

- Information ware: Creation of possibilities of available and accessible information service by establishing educational information database and network (MOECS ICT Vision, 2001).

E-Mongolia National Program, Government of Mongolia, 2005

The vision of the e-Mongolia National Program is to establish the information society and the foundation of the Knowledge based society in Mongolia by enhancing extensive application of ICT in all society sectors. The e-Education goals within framework of this E-Mongolia program are:

- Develop human resource at all level for development of an information society

- Education obtained in Mongolia to be acknowledged around the world.

The following objectives were set for e-Education (Government of Mongolia, 2005):

1. Achievement of an average international ICT literacy level by 2012 (80% of all capable people);

2. 70% of soums, 100% of province centers, cities will attend in distance learning system by 2012;

3. Creation of the model e-schools (50% of schools will have e-school capability by 2012);

4. Development of R&D.

Education Sector Development Strategy for 2000-2005, MOECS, 2000

This strategy includes objectives to develop distance education, to provide computers for secondary schools, to teach informatics subject starting from 4th grades, and to connect educational organizations to the internet etc.

National Program on Distance Education 2002-2010, Government of Mongolia, 2002

The main goal of the program is to improve the quality of official and unofficial service to give people an opportunity to provide lifelong learning for improvement of their living standards and to build a national distance education system. The immediate goals are to establish a distance education strategy coordination and management; to create a mechanism for distance education services and activities; to develop the ability of human resources to train distance education specialist; to create a quality, beneficial, sufficient distance education environment; and to choose toe most apt distance type, to process and implement its content and methodology.

The legal environment of this sector can be said it is reached at satisfactory level, considering the existence of various laws and government resolutions to effectively use ICTs in education, culture and science sectors such as 4 laws, 3 state parliament resolutions and 9 resolutions of government (Khaltar, 2003). 11 national programs are implementing in education sector.

HUMAN RESOURCE

The "ICT Vision 2010 in Education Sector of Mongolia" has objectives to conduct training and re-training of teaching staff in secondary schools, expansion of professional teachers' training activities considering the increase of professional teaching staff in information sciences up to 90% by year 2007. However, secondary schools still lack professional informatics teachers and other subject teachers to teach informatics subject.

According to the survey of "General Education and Information Technology" carried out by Beijing Branch of UNESCO and Mongolian National Commission of UNESCO in 2003-2004 academic year, 38.1% of the informatics teachers are professional informatics teachers, 38.1% are math teachers and 11.9% are physics teachers. The survey shows that mainly math and physics teachers teach the informatics at schools where there is no informatics professional teacher. In some remote area schools, the informatics subjects are taugth by un-licensed personnel, who is considered to be good at computer. According to the survey the working experiences of informatics teachers in their subject were 62.9% in range of 0-5 years, 14.3% in range of 11-15 years, 22.9% in range of 16-20 years and 2.9% in range of 26-30 years. The survey shows that 63.6% informatics teachers have graduated from tertiary education institutions since 1998 and 38.1% participated in re-training (Batjargal et al., 2003). Result of surveys shows that supply for informatics teacher is increasing.

Secondary schools in rural areas started training their informatics teachers due to inclusion of informatics subject curriculum in primary education starting from 2005-2006 academic years. However, they still lack professional teachers and the most of the informatics subject teachers are graduates from basic computer training courses. However, any graduates related to ICT field works as an informatics teacher and teach informatics subject.

At present the following institutions offer undergraduate and graduate courses in ICT field: the Computer Science and Management School (CSMS), and Telecommunication and Information Technology School (TITS) of the Mongolian University of Science and Technology (MUST), School of Computer and Information Technology (SCIT) of the Mongolian State University of Education (MSUE), School of Mathematics and Computer Science (SMCS), and School of Information Technology of the National University of Mongolia (NUM), The State Agricultural University and several other private tertiary educational institutions. The number of graduated students majored in ICT were 378 in 2002, 443 in 2003, and 523 in 2004 year (NSO, 2004).

Only a few of above mentioned institutions train professional informatics teacher: the SCIT of the MSUE, the SMCS of the NUM, the Khovd Branch of the NUM and Arkhangai Teachers College. 380 students studied at the SCIT in the 2005-2006 academic year. The SMCS of the NUM offers math and informatics teachers training. 117 students studied at this academy in the 2005-2006 academic year. These institutions have compulsory courses such as Informatics didactic, Informatics contents which aim to deliver vision, contents and assesments of informatics standard. Future informatics teachers are participating in the practice of teaching informatics at secondary schools 2-3 times for a month during their study. Due to inclusion of informatics subject in primary education curriculum starting from 2005-2006 academic year, forementioned institutions are planing to update thier curriculum to reflect the changes. Updates will be made to

the curriculum to cover areas such as teaching informatics to primary schools pupils; use of modern active teaching and learning methods; developing curriculum; choice of training content materials.

In order to increase informatics teacher supply, government is taking various measures such as fostering applicants from rural areas in terms tuition fee discount; scholarship under local government contract; retraining of teachers etc., These steps still do not solve needs for informatics teacher. Graduates with informatics teacher certification in most cases move to work in non-educational sectors, in government, non government organizations, private enterprises and companies.

The SCIT of the MSEU and Institute of Education are responsible for Informatics teacher re-training and development. There are two curricula: one for Informatics teachers and another for non-Informatics teachers. Re-trainings for informatics teachers are being organized since academic year 2003 as to follow the new standards. Nationwide re-training for rural informatics teachers is being organized in academic year 2005-2006.

INFORMATICS CURRICULUM

For past years, a number of activities were implemented to enhance the informatics subject curriculum, such as development of standards, training of informatics subject teachers, development of training manuals and materials for the informatics subjects in secondary schools (Uyanga, 2005). Since 1988 developed following informatics curriculums for secondary schools: Informatics Curriculum (MOECS, 1991), MNS-5001-498: Informatics Standard (MOECS, 1998) and The Informatics Education Standard for Primary and Secondary Education (MOECS, 2004).

The first curriculum of Informatics was developed and used from 1991. This curriculum covers basic concepts of informatics, basics of algorithms and programming, word processing and spreadsheet. This curriculum was not fully covered due to lack of computers, trainings were mostly concentrated on providing programming and algorithm development skills.

In 1998 MOECS approved Informatics standard for secondary education. The standard is (Uyanga, 2002):

- Identification of level of learning materials for informatics subject for secondary schools;

- Formulation of informatics training requirements and necessary skills obtained from secondary education using scientific abstraction form;

- This standard is a blueprint that confirms presence of informatics subject in the training plan for secondary education.

This standard was active until academic year of 2003-2004, nationwide. From the results of the surveys (Table 1), it can be seen that the teaching of contents that complies with informatics standard such as basics of informatics is 60%, computer-60.5%, human and computer interface-21.9%, basics of algorithms-43.7%, Windows system-40.3%, text processing-35.8%, spreadsheet-27.8%, and solving problems of physics, math and other subjects-10.3% is not sufficient. Programming which is not included to the informatics standard is still being taught in some schools.

Table 1. *Teaching standard contents of informatics*

	Basics of informatics	Computer	Human and computer interface	Basics of algorithms	Windows system	Text processing	Spreadsheet	Solving problems of physics, math and other subjects
1998-1999	69.1%	55%	25.8%	49.2%	31.5%	20.8%	25.3%	12.3%
1999-2000	61%	58.7%	16.3%	45.3%	33.1%	13.3%	22.7%	6.4%
2000-2001	42.1%	47.5%	18.3%	54.5%	29.2%	21.3%	23.3%	11.9%
2001-2002	61.3%	63.3%	27%	53.7%	40.8%	27.9%	32.9%	11.7%
2002-2003	65.3%	68 %	23.3%	30.5%	50%	65%	30.4%	9.3%
2003-2004	62.8%	70.6%	20.4%	28.7%	57.2%	66.5%	32.6%	10%
average	**60%**	**60.5%**	**21.9%**	**43.7%**	**40.3%**	**35.8%**	**27.8%**	**10.3%**

While using ICT in teaching, the main attention should be paid not only to technical provision of tools but also to the account of the ICT impact on students' mentality, their abilities to construct their own knowledge, teacher – students relationship and the roles of students and teachers. Until year 2000, above mentioned issues have not been addressed while developing curriculum. One of the most important steps taken from government to improve informatics training was development of first standard for informatics education in year 2000-2004. It is notable here that this curriculum included fore mentioned points to some extent. In 2004, Mongolian National Center for Standardization and Metrology approved Informatics Education Standard for Primary and Secondary Education. Its implementation commenced from September 2005 and will be updated by 2009. Within this standard Informatics subject should be taught starting from 5th grades from the academic year 2005-2006. This standard has following advantages:

- Development of the educational standard of informatics by using the content standard of informatics in complete secondary,

- Focused more on competence based goal than the subjective goal,

- The content standard is based on domains of systematic knowledge of the informatics science,

- Assess not only knowledge and capability, but also the competences accumulated,

- Abundance of individuals needs, more than the social needs,

- The standard is tailored to primary, secondary and complete secondary education respectively,

- The content standard has clear focus, that the trainees gain knowledge and skills to use the informatics, computer and information technology effectively and efficiently, and to resolve the issues met in practice and the other trainings by using them,

- Needs and demands of informatics education and standards are determined based on the needs of individuals and society,

- The standard is supervised that teachers of informatics not only teach the informatics, computer and information technology, but also develop the skills of students to use them effectively and individually,

- The standard instructs that the teachers of informatics should create the environment to implement the standard successfully by supporting other teachers to widely use informatics, computer and information technology in their teaching,

- Comprised the correlation between other educational fields,

- The content is well suited to the international standards according to the contents of following documents and standarts for ICT education by specialized international organizations:
  o UNESCO/IFIP Curriculum - ICT in Secondary Education, UNESCO, 2000
  o UNESCO/IFIP Curriculum - Informatics for Secondary Schools, UNESCO, 1994
  o Model Curriculum for K–12 Computer Science, ACM K–12 Task Force Curriculum Committee, 2003
  o National Educational Technology Standards for Students, ISTE

- Independent of certain tools and types of information technology.

There are five content domains: Information, Computer, Algorithm, Model, and Information Technology (Tables 2, 3, 4). Each piece of information in particular domain is tightly linked with other pieces of content within the same domain and closely linked with that in other domains. Correlations to other subjects are clearly described in each content domain.

The currently used "Informatics 9-10" (S.Jagdal, L.Choijoovanchig, 2001) textbook consists of following chapters: "Structure of Computer", "Microsoft Word", "Microdoft Excel", "Internet", "Computer Algebra and Logics", "Àlgorithm and Basics of Programming", "Introduction to Pascal", "Basics of Pascal". Each topic has related questions, tasks and tests. Due to the implementation of new Informatics Education Standard in 2005-2006 academic year, textbooks for 5-11 grades are being written.

The teaching materials for informatics teachers are not limited to only informatics textbook but there are related CDs, computer and IT related books like programming language, application programs and Internet usage. In addition the educational broadcasting television programs provide some training for ICT.

Table 2: Topics of Informatics Content Standard for Primary Education (Grades I-V)

Competences/skills	Knowledge
Domain name: Information	
Students should be able to identify and categorize information; compile, exchange, define, transfer and store information; find appropriate information and use it in daily life; to analyse information; to share information with others.	Information (simple types, various forms of information); Representation of information (text, image, sound and video information); Information processing (input, output, transfer, storage, processing, information collection, examples)
Domain name: Computer	
Students should be able to identify and name main components of computer in use and to explain their functions; give examples of the computer usage; use the keyboard with correct fingering; follow a technical and safety instructions while working with computers; to use computer.	Computer hardware (computer architechture, main components of a computer and their functions, technical and safety issues relating to computers); Computer software (major types of software, widely used application software, user interface, operating system, standard and simple applications, touch/fast typing)
Domain name: Algorithm	
Students should be able to explain the sequence of operations; to draw operations using shemas and to execute it; to define ways to reach goals; to understand roles of executor and manager.	Algorithm and its characteristics (operation, sequence, objective, sequence with linear operations); Algorithm executor and its command system.
Domain name: Model	
Students should be able to identify and name entity and occurrence, to give examples of physical models, to explain the importance of modeling; to explain and compare a characteristics and physical models of entities; to classify objects and entities; to give examples of a simple models; to evaluate with others the classification of entities and objects.	Object, entity, and its characteristics (entity, occurrence, object and its characteristics, physical and abstract models); Model (physical model, representation of an model of object, characteristics and forms of models); Modeling (role of modeling in life, needs of modeling, examples).
Domain name: Information Technology	
Students should be able to explain simple technology and use of IT in daily life, to use and explain various function keys of keyboard; to draw simple pictures; to perform text entry and editing operations in creating a document; to listen music and watch videos using computer.	Information technology (simple technology and its examples, IT); Use of IT.

Table 3: Topics of Informatics Content Standard for Secondary Education (Grades VI-IX)

Competences/skills	Knowledge
Domain name: Information	
Students should be able to identify and discuss the role of information in society; to represent information in abstract; to process text and graphical information; to present information in basic forms; to compile and process information; to use information effectively; to evaluate information and share with others.	Characteristics of information (measuring information, size and parameters, role of information in society, selection, use and evaluation of information); Representation of information (basic forms of representaion of information, abstract representation, analysis of representation of information); Information processing (information processing, coding, security, basics of information search, basic steps of processing information; evaluation of computer processed information).
Domain name: Computer	
Students should be able to explain role and importance of computers in society, to solve problems using operating systems and applications, to identify software and hardware requirements and make selection of appropriate computer; to perform text entry with correct fingering; to use computer in learning activities; follow a technical and safety rules relating to computers and home electronic devices; follow a regulations and rules relating to IT.	Computer hardware (operation of computer system and its peripherals, printer, scanner, external storage devices); Computer software (operating system, file and its parameters, file and folder organization, standard applications, widely used menu and commands, multiple applications operating environment); Evolution of computers (history, role of computers in society, use and parameters of modern computer)
Domain name: Algorithm	
Students should be able to use algorithms in daily life; to identify types of algorithms; to select an algorithm executor and develop its commands; to demonstrate knowledge and skill in working with algorithms; to use widely available devices using its technical documentation.	Representation of algorithm (word and image representation, using symbols); Computer's algorithm executor (computer algorithms, examples); General types of algorithm (types, linear and conditional algorithms, repetitions, examples)
Domain name: Model	
Students should be able to identify object environment and types of objects; to explain basics of modeling; to experiment, compare and analyse models; to report result of modeling.	Object, operations on object (object environment, operations on object); Model and its types (geometrical and math models, logical models, examples); Modeling (relationship between problem and model, modeling, experimenting and analysing of model).
Domain name: Information Technology	
Students should be able to classify technology; to explain differences of text, image and spreadsheet; to discuss electronic development; to select appropiate tools; to demonstrate touch typing skill; to search information from internet; to exchange e-mail; to demonstrate key knowledge and skills processing documents; to follow ethical issues in electronic communication and network; to use information with others and exchange it; to define and select appropriate tools.	ICT development (ICT, use of IT, selection of IT, electronic development, examples, e-commerce, e-learning); Use of IT (touch typing, document processing, drawing application, spreadsheet, network, data exchange, internet, e-mail, coding standards, standard for mongolian cyrillic).

Table 4: Topics of Informatics Content Standard for Complete Secondary Education (Grades X-XI)

Competences/skills	Knowledge
Domain name: Information	
Students should be able to demonstrate advantages of using IT; to represent information in various ways; to use IT for problem solving; to select appropriate tools.	Information (information is a basic of cognitions, linkages between information and knowledge, information based society, roles of information in society, needs of information sharing, analysis and evaluation of information); Representation of information (various forms of representation of information, analysis of representaion of information); Information system (components of information system, simple systems, reresentation of information system, analysis of systems)
Domain name: Computer	
Students should be able to understand computer as a learing tool; to use network; to understand secirity and privacy of networks; to select appropriate hardware and software to addreaa a variety of tasks and problems; to use spell checking, translators and thesaurus programs; to identify and solve problems that occur during use a computer; to work cooperatively and collaboratively when using network hardware and software; to follow ethical issues that relate to computers and networks.	Computer hardware maintenance (functions of various peripheral devices, installation of peripherals, network, basic components of computer networks); Computer software maintenance (installation of applications, maintenance, hardware and software problems, spell checking, translators and thesaurus programs, multitasking environment).
Domain name: Algorithm	
Students should be able to explain command system of algorithm executor; design and develop algorithms; to demonstrate knowledge, skill and culture in working with algorithms in daily life;	Representation of algorithm (linear and conditional algorithms, repetitions, loops, types of representaion of repetition, checking and analysing algorithm).
Domain name: Model	
Students should be able to explain basics of modeling; to define, design, test and compare activities; to classify activities; to analyse, test and maintenance models; to analyse and evaluate activities in cooperation with others; to make appropriate decision; to analyse results of tasks and problems; to improve model	Model of information system (basic steps of modeling of information system, examples, design, anaysis and development of systems); Models of physical, math, biological and economics information systems (examples, design and analysis, computer processing of models, analysis and evaluation on computer produced models);
Domain name: Information Technology	
Students should be able to demonstrate knowledge of ICT development; to give examples of ICT usage; to discuss current situation of electronic development; to evaluate electronic services; to change information and ideas with others via electronic communications; use internet services; to use internet as a tool for learning and communicating; to define which technology is useful and select appropriate tool and technology resources to address a variety of tasks and problems;	Information technology (current situation and development trends of ICT, ICT in society, electronic development, e-commerce, e-learning, e-governance); Use of IT (positive and negative impact of technology on human culture, document processing, multimedia presentation, spreadsheet, network); Internet usage (electronic communication tools, search engines, principles of searching information on the net, e-mail, internet based services, internet and web based learning, e-commerce web sites, downloading resources from internet, use of internet for other subjects).

HARDWARE AND INTERNET ACCESS

The Government of Mongolia is working to achieve goal of computerization of all schools and started supplying computers for secondary schools and providing access to Internet. Compared to the beginning of 2000 when statistics show that there are about 600 computers at secondary schools, the situation has changed as a result of the Government activities: - in total 4776 computers are available in 524 secondary schools, or nine computers per school in average (MOECS, 2004). Most of the computers are used for teaching Informatics in grades VII to X with a limited number of computers available for use by staff and teachers.

Table 5: Number of computers per secondary school, June 2004 (MOECS, 2004)

	Aimags	Number of schools			Number of computers used for teaching			Number of computer per school		
		Total	Secondary	Complete secondary	Total	Secondary	Complete secondary	Total	Secondary	Complete secondary
1	Arkhangai	21	7	14	176	36	140	8	5	10
2	Bayan-Ulgii	22	5	17	191	28	163	9	6	10
3	Bayankhongor	23	16	7	154	82	72	7	5	10
4	Bulgan	19	9	10	141	48	93	7	5	9
5	Govi-Altai	23	16	7	184	112	72	8	7	10
6	Dornogovi	17	10	7	137	62	75	8	6	11
7	Dornod	23	10	13	178	51	127	8	5	10
8	Dundgovi	19	14	5	138	84	54	7	6	11
9	Zavkhan	30	12	18	208	64	144	7	5	8
10	Uvurkhangai	23	2	21	192	11	181	8	6	9
11	Umnugovi	16	12	4	124	73	51	8	6	13
12	Sukhbaatar	14	10	4	108	59	49	8	6	12
13	Selenge	30	7	23	248	39	209	8	6	9
14	Tuv	30	14	16	206	76	130	7	5	8
15	Uvs	23	14	9	205	93	112	9	7	12
16	Khovd	21	-	21	158	-	158	8	-	8
17	Khuvsgul	27	6	21	196	30	166	7	5	8
18	Khentii	24	16	8	165	84	81	7	5	10
19	Darxan-Uul	12	2	10	195	10	185	16	5	19
20	Ulaanbaatar	94	5	89	1272	35	1237	14	7	14
21	Orkhon	8	-	8	162	-	162	20	-	20
22	Govisumber	5	2	3	38	13	25	8	7	8
	Total	524	189	335	4776	1090	3686	9	6	11
	Rural	430	184	246	3504	1055	2449	8	6	10
	Urban	94	5	89	1272	35	1237	14	7	14

In 1999, a network of academic institutions and schools - ErdemNet Internet Service Provider was established. Currently more than 70 secondary schools and provincial education centers have access to Internet. 102 secondary schools have connected to e-mailing system; however they do not use it on regular basis due to tiny financial resources allocated to cover their telecommunication fees.

Table 6: *Number of students per computer, June 2004 (MOECS, 2004)*

	Aimags	Number of students	Number of VIII-X grade students	Number of computers (above PC-486)	Number of students per computer	Number of VIII-X grade students per computer
1	Arkhangai	19013	4010	176	108	23
2	Bayan-Ulgii	20226	4427	191	106	23
3	Bayankhongor	18479	3840	154	120	25
4	Bulgan	12439	3048	141	88	22
5	Govi-Altai	12363	2780	184	67	15
6	Dornogovi	11095	2473	137	81	18
7	Dornod	16610	4285	178	93	24
8	Dundgovi	10112	2191	138	73	16
9	Zavkhan	17701	4169	208	85	20
10	Uvurkhangai	21160	4387	192	110	23
11	Umnugovi	10300	2275	124	83	18
12	Sukhbaatar	11555	2639	108	107	24
13	Selenge	23049	5866	248	93	24
14	Tuv	19572	4463	206	95	22
15	Uvs	18814	3724	205	92	18
16	Khovd	20055	4644	158	127	29
17	Khuvsgul	25149	5397	196	128	28
18	Khentii	14060	2939	165	85	18
19	Darxan-Uul	20215	5024	195	104	26
20	Ulaanbaatar	169741	43339	1272	133	34
21	Orkhon	20446	5065	162	126	31
22	Govisumber	2987	696	38	79	18
	Total	515141	121681	4776	108	25
	Aimags	345400	78342	3504	99	22
	Ulaanbaatar	169741	43339	1272	133	34

The 218 rural schools (31 of them complete secondary schools) and 6 schools of Ulaanbaatar city do not have any computer. It means these secondary schools do not fulfill the requirements of teaching informatics subject. Moreover, 39 secondary schools have 1-4 computers, which indicate the difficulty of teaching informatics subject.

Each year MOECS promotes computerization of schools by providing specific number of computers and public, private and government entities do provide some support for the computerization of schools. Secondary schools both in urban and rural areas are provided with computers mostly by projects funded by foreign donor organizations. So far the number of schools benefited from such foreign funded/aided projects are very few as there are still many soum schools remain out of their reach. Among such projects Education Sector Development Program, SAKURA and ICT for Innovating Rural Education of Mongolia are the greatest in terms of its coverage for rural area schools. For example ICT for Innovating Rural Education of Mongolia project covers 37 soum schools from 4 aimags, directly over 500 teachers, indirectly over 10,000 students, 4 schools of Ulaanbaatar city, education and cultural departments of aimags, and mentor schools of aimags.

Computer usage and training in urban areas are continuous in relation to the infrastructure development, however computer usage and training at rural schools are limited by computer hardware and skilled teachers supply moreover electricity supply creates unavertable problems unless solved by the government. Many soum[ii] has electricity problem due to their financial strengths to pay its fee. Also most schools lack trained personnel to handle and configure their computers except few teachers with basic computer skills who does not even fully understand and utilize the computer systems.

SOFTWARE

Operating system: There are no technical standards defined for software for computers in secondary schools and universities. The most of the secondary schools use pirated Windows operating system. But versions of existing Windows operating systems of computers vary. This creates difficulties for the inexperienced users to share information and use computer hardware and software. There were a number of initiatives to introduce open source Unix based operating systems in secondary schools, however most of them failed due to inadequate graphic user interface and uncommon use for home and office.

Application programs: The most of the secondary schools use non-license application programs such as Microsoft Word, Microsoft Excel, and Microsoft PowerPoint etc. There are no educational applications. We have no experience of developing such kind of programs and standards adhering to that direction. Some software applications in Mongolian language were developed in the market such as touch typing, spell checking, translators and thesaurus programs etc. The "ICT Vision 2010 in Education Sector of Mongolia" has a provision that says "School textbooks, guideline materials and teaching aids prepared on software programs and Internet web sites should be available for students and teachers. In this regard there should be a mechanism to protect Intellectual property and authors' copy rights (from the academic year 2001-2002)." however, a few professional companies, schools and universities are starting to implement.

Projects and Initiatives

There are more than ten national programs are being implemented in education sector. Despite of these there are number of initiatives and projects engaged in introducing various facets of ICTs. Followings are projects and initiatives those directly linked with ICTs for secondary education.

Knowledge Network, www.knowledge.mn: A project was initiated in 1998 by the Internet and Information Centre NGO, funded by International Development Research Centre (IDRC) of Canada and supported by MOECS. The aim of the projects is to provide news and information for

teachers and students through web site. Within framework of this project 2 schools (one of them from rural area) connected to the Internet.

Internet for Schools: In 1999, the Internet for Schools project was developed and supported by Mongolian Foundation for Open Society (MFOS). Within framework of this project MFOS supplied 10 computers to each aimag school and 32 secondary schools connected to the Internet via dial-up connection.

International Education and Resource Network, www.iearn.org: Project was implemented by MFOS since 1998. The aim of this project is to enable Mongolian teachers and young people to use the Internet and other new technologies to collaborate on projects that both enhance learning and make a difference in the world.

Think Quest, www.gateway.mn/thinkquest: A project was implemented by the Internet and Information Centre NGO and funded by MFOS in 1998-2002. Think Quest fosters collaborative learning and cooperation among students and teachers from 80 nations around the world and is sponsored by the Oracle Help Us Help Foundation. Currently as a Think Quest national partner, the Mongolia Development Gateway NGO organizes local competition, supports participation of selected teams in the international competition providing professional consulting on translation, technology and content development.

Education Sector Development Program, www.esdp.mn: A project was implemented by MOECS and funded by Asian Development Bank (ADB) since 1998. The aim of the projects is to furnish over 90 secondary schools in rural and urban areas with computers, providing training for Informatics subject teachers and providing technical support for the equipment supplied.

Academic Network–ErdemNet: As an initiative within the Education Sector Development Program of ADB, in 1999, a network of academic institutions and schools established an Internet Service Provider, ErdemNet. It was set up at the CSMS of the MUST.

Sakura: A project was implemented by Japanese International Cooperation Agency (JICA) since 1998. Goals are to update the textbooks, re-train the IT teachers, update IT equipment, provide e-mail access facilities and establish a school support center. This project provides secondhand computers using open source software (Linux-based operating system), the Star Office package and access to an e-mail system to soum schools. The connection to the Internet was made available through ErdemNet. Within the framework of the project, manuals were developed using Linux OS and the Star Office package and training was provided to teachers and students on their use. Within framework of this project 388 computers along with networking equipments to soum schools (average 7.6 computers per school) were supplied. All schools involved in the project use the internal e-mail on their LAN and amongst them 16 schools use the internet e-mail (Ide, 2003).

Mongolian Information Development Application Scheme-MIDAS, www.ict.mn/midas: The project, supported by MFOS, United Nations Development Programme (UNDP) and Asia-Pacific Development Information Programme (APDIP), has assisted in the development of a variety of Mongolian language education software packages, such as the Library for University software, RENOR 2 (an application for teaching Math and the alphabet to primary school pupils), online and offline dictionaries, online Math applications, Mongolian-language typing tutor and others.

Distance Education in Mongolia, http://www.elearning.mn: The project, initiated and funded by the IDRC, started in January 2001. The aim of the project is to introduce Internet-based distance education methodology and experiment it to selected Mongolian learning communities. The

project is to offer experimental web-based instructional courses on specific subject such as English Language, IT and computer skills, gender issues and legal rights.

Evaluation and adaptation of Open Source Software for Distance Learning in Asia, http://www.infocon.mn/eng/index.php?inf=projects#9; The objectives of this project are to evaluate existing distance learning software, both commercial and open source, and to identify suitable software that can be customized to meet specific needs of educational institutions in Asian region. The customization would include individual institutional requirements of the system, as well as language localization, of the partner countries involved in the project (i.e. Mongolia, Sri Lanka, Indonesia, and Vietnam). The project is support by IDRC, Canada.

Education Portal: www.mongoleducation.mn: The goal of this portal site is to establish and support educational information online networks within the Mongolian education community, and to increase public awareness of education reform issues.

Cyber Aimag Project: As part of this project of MFOS, three secondary schools of three aimag centers were connected to the Internet via wireless radio-modem connection, enabling access to the Internet. This access has now broadened training on both basic computer and application skills and web page development for teachers and pupils.

Indian Government Project: The Indian Government committed support of US$ 1 million for ICT in Mongolia. A teleconferencing facility with computer labs was established in the TITS of the MUST. In addition, Internet centers with five computers were established in Arkhangai, Selenge, Khentii, Umnugovi and Govi-Altai aimags.

Video conferencing center: Video conferencing among 12 rural provinces has been facilitated jointly by the ICT training center and the MOECS within the framework of "Capacity building for Civil servants" project of ADB. They plan to extend the network to all other provinces. It is hoped that the video conferencing facility will be effectively utilized for the postgraduate studies of teachers by the means of distance learning.

Japan-Mongolian Centre: The Japan-Mongolian Centre, established in 2002, provides professional training for Mongolian ICT professionals. A number of scholarships and fellowships were offered to Mongolian ICT professionals to study in Japan for a period of six months or more.

United Nations Volunteer-Japanese Trust Fund Project for Disabled Children: The purpose of this project was to introduce a new communication tool to children who are deaf and mute. With the support of a sign language teacher, students from a special school No 29 were trained in the use of computers and development of websites.

My Computer IT Magazine: The bi-monthly magazine aims to introduce news and information on following issues: local and world ICT related events, internet, hardware and software, ICT in education, robot technology, artificial intelligence, mobile technology, home electronics, lessons of widely used applications, best practices of using ICT etc.

E-learning Center: The goal of the center, which was established with the support of the Center for International Cooperation for Computerization of Japan at the CSMS of MUST in 2003, is to develop e-content for distance education. The Center is equipped with two servers, four host machines and CULTIIVA-2 software.

ICT for Innovating Rural Education of Mongolia, www.iirem.mn: The project has been developed to establish a replicable model for using ICT to bring education content, modern pedagogy and information to poor rural schools and communities. The pilot project attempts to develop a new

model for the use of ICT outside of the informatics classroom, to more broadly improve education opportunities for poor students and rural communities. Project implementation period: From May 1, 2004 till June 31, 2006.

Other: There are number organizations, projects and initiatives support computerization of schools. For example, as part of their election agenda, most members of Parliament included support for computer supplies in schools. At present no specific data is available on how many computers were supplied and to which regions and schools. The Rotary Club of Mongolia (See www.rotarymongolia.mn) and its branches have developed initiatives to furnish secondary schools with computers and equipment. At present, over 20 schools have been supplied with at least five computers each. The Mongolian Association of Cooperation with Oceania Countries has supplied 64 secondhand computers to 17 rural schools.

SWOT ANALYSIS

Strengths:

- High level of general education;

- Presence of key decision makers who see the importance of ICTs;

- Young population ready to learn new skills and languages;

- There is an adequate policy and regulation environment in introducing ICT into education sector;

- Latin letter literate;

- Has an ICT training experiences of 20 years;

- There are some public and private organizations to support computerization of schools;

- Recognition of the importance and needs of ICT education;

- Wide utilization of Information technology for daily life;

- ICT teacher supply is increasing;

- Government institutions train professional ICT/informatics teacher;

- The teachers see the main difference between a traditional and computer based lesson in saving time, motivating students, lightening work load, and displaying teaching aids easily.

Weaknesses:

- Underdeveloped infrastructure in remote areas;

- Obsolete PC in schools (there are 3100 computers in 613 schools, or five computers per school in average. Students per computer ratio are 1:80 in 2004);

- Physiological barrier of teachers and managers;

- Weak English language;

- No theoretical and methodology research of teaching ICT in primary school and integrating to other subjects;

- Re-training of teachers;

- No universal standard of computer software and hardware specifications;

- Financial problems;

- Earlier, emphasis was given to IT and programming subjects rather than informatics subject;

- Due to lack of computers and professional teachers the skills and knowledge transferred to learners do not meet the minimum standards of informatics education;

- Due to insufficient number of computers at general secondary school of Ulaanbaatar there werre 50% of students sharing 1 PC per 3 and more students. The students of rural schools had 83.6-86.2% of sharing 1 computer per teaching hour (Chimedlkham, 2004);

- No mechanism to repair and maintain school computer;

- Lack of professional informatics teachers. Non-informatics teachers and graduates from basic computer training courses teach the informatics. Some schools could not conduct informatics training due to lack of teachers;

- No penalties for using pirated copies of software,

Opportunities:

- Bring together educational organizations and businesses;

- To develop ICT curriculum on international level;

- To integrate contents of informatics and ICT to other subjects;

- Conduct research about ICT in education;

- Further develop the informatics subject content for the specialized training classes;

- Foster active cooperation of goverment, public and private sectors and international and donor organizations in computerization;

- Resolve computer supply by realizing and providing mobile computer laboratory and switching to the voucher system;

- Allocate specific amount of expenses in the state budget for the computerization of secondary schools;

- Re-train teachers and involvement of graduates on informatics teacher in training.

Threats:

- There is misunderstanding that ICT education is just a computer literacy or knowledge of widely used applications;

- Instability of trained staff. Graduates on informatics teacher in most cases move to work in non-educational sectors;

- Consequences of inadequate computer supply will result in suspension of teaching informatics subject;

- If the government does not resolve issues related to preparation and education of Informatics teachers, in a centralized way, few years later we will face a lack of teaching staff.

CONCLUSIONS

Recently great emphasis was given for setting up ICT infrastructure and providing computer literacy. At present, specially designated policy is needed to support effective use of ICT in education and to incorporate it into the policy on educational innovations and activities like teaching and learning. It is crucial to integrate ICTs with the curriculum of each subject so this could replace traditional teaching methods by new teaching tools and technology (Uyanga et al., 2004). Impact of ICTs on students' behavior, development of student skills to use ICTs for their life long learning activities and teacher student relationships are some critical issues to be considered for developing curriculum. Internet and computers are not widely used for teaching except in Informatics class. On the other hand, there is not much opportunity to initiate the trainings based on ICTs at the schools, like in developed countries. This is directly related to the hardware supply and the infrastructure problem. There are 3100 computers in 613 schools, or five computers per school in average. Students per computer ratio were 1:80 as of 2004. We do not have experiences regarding computer and technology based training except few actualized experimental projects for limited audience. Considering above mentioned situation and current circumstances, it is appropriate to improve Informatics teaching and to initiate ICT education on the basis of informatics subject with direct involvement from informatics teachers.

Endnotes:

[1] A second by size administrative unit of Mongolia. There are 21 aimags in Mongolia with a population of 15,000 to 45,000 each.

[2] A primary administrative unit like a county

REFERENCES

Batjargal, A., Choijoovanchig, L., Chimedlham, Ts., Ganbaatar, D., & Muratbek, G. (2003). *General Education and Information Technology*, Research report. UNESCO, Ulaanbaatar.

Chimedlkham, Ts. (2004), *Use of ICT in Secondary Schools*, Research report. ADB.

Government of Mongolia. (2000), *Concept of ICT Development of Mongolia by Year 2010*.

Government of Mongolia. (2005), *E-Mongolia National Program*

Ide, H., (2003), *SAKURA project*, Final report

Khaltar, T., (2003), *ICT Policy and Regulations*, Research report, IDRC.

MOECS. (2003), *Statistical information*. Ulaanbaatar.

MOECS. (2004), *Statistical information*. Ulaanbaatar.

MOECS ICT Vision. (2001), *ICT Vision 2010 in Education Sector of Mongolia*.

MOECS Standard (2004), *Informatics Curriculum Standard for Primary and Secondary Education*, Ulaanbaatar.

NSO (2004), *Mongolian Statistical Yearbook*, National Statistical Office, Ulaanbaatar.

Uyanga, S., (2002), *The Invariant Model of the Computer Curriculum.* PhD thesis, National University of Mongolia, Ulaanbaatar.

Uyanga, S., Chimedlham, Ts., Tsogtbaatar, D., & Choijoovanchig, L. (2004), *Recommendations on the Informatics Curriculum Standards for Primary and Secondary Schools*. Ulaanbaatar.

Uyanga, S., (2005), "ICT in Secondary Education: Moving from Informatics towards e-Learning." *Future of Open and Distance Learning Conference*, UNESCO, National University of Mongolia. Ulaanbaatar.

World Fact Book. (2005), http://www.cia.gov/cia/publications/factbook/geos/mg.html