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using Information and Communication Technology**

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**ICT for education and development in Southern Africa**

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## **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;  
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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 (but not peer reviewed) reviews of books that are relevant to the use of ICT in education and/or development.

#### ***From the Field***

This section includes edited (but not peer 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 not peer reviewed.

#### ***Project Sheets***

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

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#### ***Editorial***

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  - 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.
- 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 - of mastery, progress and moral superiority through the development of reason".

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).

- Further information about the Harvard editorial style can be found at:  
<http://lisweb.curtin.edu.au/referencing/harvard.html>  
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- All URL addresses are activated and ready to click (e.g., <http://pkp.ubc.ca>).
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## **Editorial: ICT for education and development in Southern Africa**

**Stewart Marshall**

**The University of the West Indies, Barbados, West Indies**

**Wal Taylor**

**Cape Peninsula University of Technology, Cape Town, South Africa**

Welcome to this very special second issue of the *International Journal of Education and Development using Information and Communication Technology (IJEDICT)*.

*IJEDICT* is an e-journal that seeks to support the community of researchers and practitioners involved in ICT for education and development, especially in those developing contexts in which people are at risk of "being left behind and being further marginalised" ("Declaration of Principles", WSIS-03/Geneva/Doc/4-E, Principle 10). *IJEDICT* seeks to provide this support in a variety of ways, including by:

- Providing free and open access to the knowledge contained between its "covers";
- Encouraging collaboration and the sharing of knowledge between researchers, practitioners, and all concerned with ICT for education and development; and in particular,
- Encouraging South-South collaboration and knowledge sharing.

This special issue of *IJEDICT*, which concerns the application of ICT in education in Southern Africa, is a clear example of how the latter, viz., South-South collaboration and knowledge sharing, can provide the means for local knowledge to become part of a global discourse.

This special issue has been compiled by Guest Editors Tony Carr and Laura Czerniewicz of the University of Cape Town in South Africa. The articles in this issue are based on papers presented at an African regional online conference, *e/merge 2004*. Tony and Laura saw the importance of making this rich material available to a wider audience concerned with ICT in education and development, and so undertook the onerous task of working with the authors to reshape the papers so as to be suitable for online publication in *IJEDICT*.

Thank you Tony and Laura for an excellent job well done, and for making this important knowledge available to the *IJEDICT* readers.

Stewart Marshall and Wal Taylor

Chief Editors, *IJEDICT*

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## **Guest Editorial for Special Issue on Southern Africa**

### **Growing communities of practice among educational technology researchers and practitioners in development-oriented contexts: Linking local and global debates**

**Laura Czerniewicz and Tony Carr**

**University of Cape Town**

#### **ABSTRACT**

This editorial starts from the context of disparities in access between the North and the South and within the Southern African region. The authors then explore the origins of the papers in the *e/merge 2004* online conference which was designed to support the growth of communities of practice of educational technology researchers and practitioners across Southern Africa. This special issue represents a shift from a time-bound community of practice event to publication within an ongoing community focussed on the use of educational technology within and across developing countries.

#### **SOUTHERN AFRICA AS A GLOBAL ICT MICROCOSM**

This special issue of IJEDICT concerns the application of information and communication technologies (ICT) in education in Southern Africa. This is a region in which global disparities between technologically well-endowed and economically restricted uses of ICT in education are starkly apparent. The articles in this issue point to many of the challenges facing educators and researchers concerned with finding and building contextually appropriate and flexible approaches to the uses of ICT in development-oriented settings. The focus on Southern Africa in this issue is the outcome of an earlier regional online conference, *e/merge 2004*, which we saw as providing rich material for a wider ICT and education audience. Economic conditions frame access to ICT nationally and regionally, and play an enormous role in determining how ICT is situated and contextualised in less developed countries. They often mask innovations and local initiatives which are important illustrations of what it is possible to conceptualise and realise. It is crucial that the work of early adopters, of devoted educators and of centres, units and research groups is seen against the backdrop of prevailing issues of access to ICT. Again and again, access is a primary factor which enables and yet also restricts our students' changing literacies, of which ICT is now a part.

In order to provide context for the articles in this special issue we will:

- Discuss inequalities in access across and between regions and within countries in Southern Africa;
- Make some brief observations concerning national policy frameworks;
- Explore the emergence of communities of practice of educational technology in Southern Africa;
- Explain the genesis of this issue in the *e/merge 2004* online conference on Collaborative Blended Learning in Southern Africa;

- Offer brief summaries of the articles in relation to the key themes of access conditions, pedagogy and case studies; and
- Suggest the synergy between the *e/merge 2004* online conference and IJEDICT.

#### **GLOBAL/LOCAL LINKAGES AND DIVIDES FRAME ICT IN EDUCATION**

Global inequalities in ICT access and skills used to be easily understood in terms of North-South differences of power and wealth. However as economic and social geography is being fundamentally altered by globalisation and the use of ICT (Carnoy 2001; Castells 1996), our notions of regional homogeneity in relation to other regions are being substantially challenged. Our identities are increasingly defined in or out of information-based economic nodes, within and across regions, and within and across countries. Thus in the Southern African region, South Africa is becoming a producer of software and ICT-related services within the global market (Hodge & Miller 1997; Otter 2005), although (as noted below) most of this activity is limited to a few major cities.

There are, however, still real differentials between the North and the South, especially with regard to connectivity and readiness to engage with technology, and concerning educational technologies in particular. These differences are stark when considered in the light of variables which are important for the take-up of ICT and learning technologies. A comparison of the US with the countries in the Southern African region yields some illuminating examples. The US has 129 times more landlines per 1,000 people than Mozambique, the country with the least landline infrastructure in the region, and six times more than South Africa, the best-off. The US has 164 times more computers per 1,000 people than Mozambique and eight times more than South Africa. Even more shockingly the US has 204 times more Internet users per 1,000 people than Mozambique and eight times more Internet users per 1,000 than South Africa. There are far smaller differentials in cell phone access which is growing rapidly across Africa (Baumgartner 2003; BBC News 2005; Nettel Africa 2004). The ownership of cell phones at 304 per 1,000 people in South Africa and 241 per 1,000 in Botswana is relatively close to the 488 cell phones per 1,000 people in the US, yet these figures obscure differences in cell phone features and the effects of free local landline calls in many parts of the US. The explosive growth of wireless connectivity across developed countries has only started to impact on Southern Africa in forms such as wireless hot spots in some airports and venues frequented by business travellers (Cafenet News 2004) and projects to develop community wireless connectivity (Association for Progressive Communications 2005). It is evident that there is still a significant North-South divide between access conditions in developed countries and all Southern Africa countries even while access is sharply polarised across countries within this region.

The stark differences within the Southern African region require further exploration to provide context for the articles in this issue. We can start by considering e-readiness which refers to “a country’s ability to take advantage of the Internet as an engine of economic growth and human development” (Global Internet Policy Initiative 2005) and can be measured in several ways (Bridges 2001). South Africa has the most advanced infrastructure and scores the highest on African e-readiness assessment analyses (Ifinedo 2005). South Africa is also the highest-ranking African country on the Economist Intelligence Unit’s (2004) International E-readiness Rankings – being the only African country rating above 5 out of 10. It is one of only four African countries in the 100 countries listed, and the only Southern African country on the list<sup>1</sup>. It is therefore unsurprising that so much of the regional activity is taking place in South Africa. Although e-readiness assessments are not specifically about education, they inevitably frame educational possibilities. The differences between Southern African countries are depicted in Table 1.

Botswana – with its vast land mass and small population – is relatively well provided with communication infrastructure, especially in relation to the number of computers per 1,000 users.

**Table 1: Communication infrastructure in four Southern African countries, US and UK**

|                            | Botswana | Mozambique | South Africa | Zimbabwe | US  | UK  |
|----------------------------|----------|------------|--------------|----------|-----|-----|
| Population (millions)      | 1.7      | 18.4       | 43.6         | 13       | 291 | 59  |
| Literacy rate              | 78.9     | 46.5       | 86           | 90       | -   | -   |
| Landlines per 1 000 people | 87       | 5          | 107          | 25       | 646 | 591 |
| Cell phones per 1 000      | 241      | 14         | 304          | 30       | 488 | 841 |
| Computers per 1 000        | 38.7     | 3.5        | 68.5         | 12.1     | 574 | 460 |
| Internet users per 1 000   | 29       | 2.7        | 68           | 43       | 551 | 423 |

**Note:** All 2002 figures. From:

<http://africa.rights.apc.org/>;

<http://www.mapsofworld.com/world-top-ten/world-top-ten-personal-computers-users-map.html>;

<http://hdr.undp.org/statistics/>

The rural/urban separation typical of many African societies must be added to the list of divides as “it is safe to say that [Internet] users in the cities and towns vastly outnumber rural users” (Jensen 2002a). In Southern African countries universities are concentrated in urban areas, and rural schools are hampered by constraining factors such as the lack of electricity. While the number of cybercafés across the region is indeed growing rapidly, this growth is almost entirely concentrated in urban centres (Jensen 2002a, 2002b). This leaves most rural Internet users dependent on “public access communication and information services, commonly known as Telecentres” (Jensen & Esterhuysen 2001, p.4). Unfortunately much of the installed telecentre capacity is crippled by poor maintenance and training (Benjamin 2003; Ebam Etta & Parvyn-Wamahi 2003). The implication is of widening access differentials between urban and rural areas.

## CHANGES IN POLICY AND PRACTICE

There are many national ICT policies which define the policy environment for ICT projects in the region. This can be seen in the development and implementation of e-commerce policies, general ICT policies, telecom competition policies, telecom regulatory policies and e-government policies (ECA 2001). Botswana has emphasised the development of ICT infrastructure and an IT industry in its 9<sup>th</sup> National Development Plan. Mozambique has a National ICT Policy approved in May 2000, and is presently implementing a strategy plan developed in 2002, which makes reference to education in its medium-term project planning (Council of Ministers 2002, p.xii). Zimbabwe is currently in the process of developing a National ICT Policy Framework working towards an ICT Strategies Document (Njini 2004; Zunguse 2005). In all three countries ICT is seen as a driver of development and of incorporation in the global economy. Unlike many other parts of the world, however, there are few specific educational technology policies guiding, enabling or funding new educational technology activities. If such policies can be understood as the allocation of values

and resources then there is little indication of governments prioritising computers in education in the region. Botswana, which included basic ICT literacy as a goal in the Revised National Policy on Education in 1994, is a notable exception.

The development of networked societies (Castells 2004) in Africa depends crucially on the effectiveness of a small but growing number of educational technology researchers and practitioners in modeling and teaching the technical skills and communicative practices of effective participation in networked knowledge exchange and knowledge creation communities. There is evidence of diverse emerging practices in the use of educational technologies across Southern Africa, in both the school and higher education sectors. Educators are exploring new possibilities for blended learning and distance learning as physical access improves, often doing more with less as they innovate within limited infrastructure and highly constrained budgets. As examples we can cite the initial use of an online learning environment in a Mozambiquan university (Muianga, in this journal, 2005), the production of an online newspaper by journalism students (Turkington & Frank, in this journal 2005) and a project to provide underresourced rural schools with a single computer per school and the skills to use it to facilitate learning (Rosario & Molapo, in this journal, 2005).

We suggest that the effectiveness of educational technology researchers and practitioners within our region requires the growth of effective communities of practice. The social learning theory of communities of practice developed by Lave and Wenger (1991) links informal and formal learning by educators and researchers to institutional goals and may cast new light on the possibilities for the transformation of educator and researcher identities, perspectives and practices. A community of practice thus denotes “the community that acts as a living curriculum for the apprentice” (Wenger 2004). In addition, communities of practice are “groups of people who share a concern, a set of problems, or a passion about a topic and who deepen their knowledge and expertise in this area by interacting on an ongoing basis.” (Wenger, McDermott & Snyder 2002, p.4). This is a particularly apt foundational concept in our context given that they “provide a shared ground that allows participants to collectively develop the knowledge and skill needed for successful professional development” (Wideman & Owston 2003).

Communities of practice among educational technology researchers and practitioners have existed in Southern Africa for a long time both in units responsible for supporting situated uses of educational technology, and within discipline-specific educator groupings. There is a regular and active circuit of local face-to-face conferences.<sup>2</sup> Financial constraints mean that relatively few local researchers and practitioners are engaged with international communities of practice and international conferences. Nevertheless several of our leading practitioners and researchers are involved in the international conference circuit and in influential professional lists. In these settings practitioners and researchers are able to “share information insight and advice... help each other solve problems ... ponder common issues... and act as sounding boards” (Wenger, McDermott & Snyder, pp.4–5). Unfortunately these interactions within global communities of practice tend to feed only sporadically into community of practice conversations across the region.

While educational technology can be seen to be an emerging field in Southern Africa with rapid growth in the number of practitioners and researchers since the late 1990s, the experience of educational technology communities of practice within the region is generally local, often limited to a single organisation, or sometimes even a single unit. This leads to overlap and fragmentation of activities including the reinvention of good practice, since information concerning innovation of practices may remain limited to localised pockets of practitioners for extended periods. Furthermore in our experience, most international educational technology conferences provide limited opportunities for in-depth discussion of educational technology research in relation to the diverse development-oriented needs seen in Southern African education. This is probably

because their driving questions, research agendas and dominant discourses are focused primarily on the challenges faced in developed countries.

### **AN ONLINE CONFERENCE AS A REGIONAL FORUM**

Out of these circumstances the concept of a regional online conference was born. While online conferences have been in existence for well over a decade – the first one having taken place in 1992, according to Garrison & Anderson (2003, p.45), they are generally associated with teaching and learning, often being integral to distance education courses (as in, for example, Fry, Ketteridge & Marshall 2003, and Anderson 1996). They may also form part of a blended approach to facilitate the growth of research networks, as they are often used as a mechanism to extend face-to-face conferences, thus providing access to a more extensive community. The use of online conferences as alternatives to, or complementary to, face-to-face conferences, is now growing. While many examples are located with the related fields of learning technologies (as was the case with *e/merge 2004*) or associated areas such as information systems or library studies, their potential is also being exploited in subject areas as diverse as chemistry, (see Haver 1999 for a reflection of this event), parasitology (see Cross 2001), religious studies (see Keown, Prebish & Husted 1998) and literature (a rare South African example being the multilingual Litnet 2004<sup>3</sup>).

Although there is some evidence of increasing interest in online conferences, they are still new as a focus of study in their own right. The emerging literature on online conferences contains numerous examples of articles, manuals and related documents which provide guidance and advice especially to new practitioners (see for example, Cakir 2002; Green 1998). Research has been published in design, Human Computer Interaction (HCI) and Computer Science. Here attention has been paid to questions such as what constitutes an effective conference space (examples include Chiu, Tsou, Kvan, Morozumi & Jeng 2003 and Kobayashi & Siiio1993) as well as to more specific elements of online conference virtual spaces. In addition, studies are often located within Computer Mediated Communication (CMC) which treats such conferences as a special event and as a particular form of computer mediated collaboration. This kind of work contributes to broader investigations into issues in online communication such as gendered participation roles (Lawlor 2004), embodied interaction (Cuddihy and Walters 2000) and online interaction patterns (Fahy 2002). Other work using online conferences as a site of study can be more closely associated with new media, multimodality, languages or literacy studies (see for example, McLivenny 2000).

Organisers of online conferences are still faced by the challenge that many potential participants with ample physical access to technology, sufficient technical skills and some familiarity with the communicative practices of online conversation have never taken part in an online conference and experienced the benefits of rich, massively networked communication in a community of practice. Thus limited understanding of the benefits of online conferences may inhibit their use in growing researcher and practitioner communities. One of the goals of *e/merge 2004* was therefore to develop a constituency of researchers and practitioners who could fuel demand for further online conferences.

In Southern Africa limited physical and psychological access to suitable technology serves as a further constraint. Educational technology practitioners and researchers are among the best placed exceptions especially if they are located in tertiary education. Access is generally better in higher education than in most other sectors. Moreover learning technology practitioners are among the most likely professional groups to be curious about the scope for sharing and growing knowledge with their peers in an online conference. In order to succeed *e/merge 2004* would have to provide educational technology researchers and practitioners across Southern Africa and

beyond with diverse opportunities for exciting, rich professional learning experiences both with and about the effective use of educational technologies.

### **A Southern African Online Conference: *e/merge* 2004**

The *e/merge* 2004 conference aimed to share good practice and knowledge about educational technology innovation within the tertiary and secondary education sectors in the region, as well as to strengthen communities of practice of researchers and practitioners. The idea germinated a good 18 months before the conference actually came to fruition, and arose from discussions in 2002 about how to promote online collaboration among educational technology practitioners and researchers in Southern Africa. Using technology to discuss technology seemed an obvious answer as a means of both bridging distances and experiences across Southern Africa and to involve presenters and delegates from other regions.

*e/merge* was designed to provide intense time-bound shared experiences of participation in networked community of practice interactions to facilitate conceptual and experiential learning by participants about educational technology literacies, discourses and practices. *e/merge* would also provide opportunities for both peripheral participation, in keeping with the Communities of Practice design, to “encourage newcomers and provide a sense of how the community operates” (Wenger 1998, p.100) and high-level interactions with peers and experts from across the region and further afield. The first objective of the conference was therefore to facilitate the growth of communities of practice among e-learning researchers, practitioners and technologists across the region. There were several other objectives too, these being: to discuss topics related to e-learning (especially blended and collaborative learning) in secondary and tertiary education in Southern Africa; to apply and promote a range of asynchronous and synchronous ICT communication and collaboration tools; and to provide opportunities for papers to be peer reviewed, research to be disseminated and selected papers to be formally published.

The *e/merge* conference was funded by TENET’s<sup>4</sup> Development of IT Capacity in Higher Education (DITCHE) programme, convened and hosted by the then Multimedia Education Group (MEG) at the University of Cape Town<sup>5</sup> and supported by Schoolnet Africa, Western Cape Schools Network and the Southern African Network for Educational Technology and eLearning (SANTEC). The conference (<http://emerge2004.net>) was launched in February 2004 with a call for papers as an online conference with the subtitle “Blended Collaborative Learning in Southern Africa”.

Planning, developing and running the conference drew on the diverse contributions of 34 people including three organisational sponsors, ten academic reviewers, 13 online conference hosts and a production team of four with a combination of project management, online facilitation, web design, programming and server management skills. Although cost savings were made in terms of travel and accommodation costs, the conference required other kinds of resources, especially given its agenda to support the growth of regional communities of practice in Southern Africa. Preparation for the conference included the design and customisation of an open source online conference environment based on the *connect* online learning environment developed by the Centre for Educational Technology to support collaborative learning in courses at University of Cape Town.

Most of the participants in *e/merge* 2004 were attending their first online conference and could be considered newcomers both to the technology and to the temporary community. As has been repeatedly argued (Powazek 2002; Collison, Elbaum, Haavind & Tinker 2000), it was especially important to pay attention to online facilitation in order to model interaction that helps grow a community, create sufficient safety to encourage participation, and ensure focused and meaningful discussion. Fifteen potential conference hosts were trained through an online course



created and delivered in partnership with All Things in Moderation (<http://www.atimod.com/>), a UK consultancy specialising in online facilitation and the training of online educators. The conference hosts included secondary and tertiary educators from Botswana, Namibia, South Africa and Zimbabwe with a balance of online teaching experience, mentoring experience and familiarity with the participant community. These hosts played crucial roles in facilitating the conference. Their tasks included welcoming participants; creating a sense of community; posting regular summaries of conversations; asking enabling questions; and providing validating feedback to participants.

The conference took place over two weeks in mid-2004. A total of 163 participants took part, mostly from seven Southern African countries including delegates from 21 Southern African higher education institutions. The 41 presenters – from Australia, Botswana, Italy, Mozambique, Norway, South Africa, the UK and the US – delivered 24 papers and presentations and three online workshops. *e/merge 2004* served as a boundary object (Wenger 1998) in mediating interaction both within Southern African-based communities of practice and between these communities and global communities by bringing in experts from other regions and giving profile to Southern African experts.

Dr Derrick Cogburn, of Syracuse University, US, presented a real-time video-streamed opening keynote address to a roomful of people at the conference opening physically located in Cape Town (South Africa), while international online participants engaged in text-based dialogue with both him and the participants physically present. Dr Gilly Salmon of the University of Leicester, UK, gave her keynote address as an online presentation and then led asynchronous discussion stimulated by the presentation. Presented papers were clustered by theme, including macro-level issues, theoretical debates and Southern African case studies. There was a vibrant mix of asynchronous online discussions and synchronous chats. In addition to more formal forums devoted to discussion of the prepared papers, there were informal conversational forums. Some conversations took on a social character and in others participants initiated conversations on topics not covered by the formal papers and presentations.

The public *e/merge* website at <http://emerge2004.net> includes the full programme, recorded presentations, other papers and information about the open source software used for the conference. Open access to much of the conference content and its mediational technologies together with information about the conference process provides readers of IJEDICT and colleagues across other regions with an applied, locally generated example of how online conferences may be developed and implemented. We offer this site as a resource for the ongoing building of a community of practice and research on online conferences. The role of online conferences in fostering the growth of practitioner and researcher communities is still under-researched so we hope that IJEDICT will provide opportunities for the publication of such research.

The nature of the conference interactions cannot be fully captured in this journal with its focus on formal, peer-reviewed, written articles. Our analysis of themes of 56 completed online evaluation surveys and 27 telephone evaluation interviews revealed a high prevalence of references to engagement in a community of peers, learning from experts, transferable learning, lurking as peripheral participation and the importance of social interaction and facilitation (Carr, Marquard, Brown & Cox 2005):

- The sense of engagement in a community of peers is expressed in statements such as: “Future partnerships that may result out of connections made” and “[I] work in isolation and it was fantastic to be part of this international community”.

- There were several statements naming particular experts and one which communicated a more generalised awareness of the benefits of expert participation, e.g., “A network of names and people who have great expertise”.
- The reflection concerning learning that could be transferred to practice appeared in the statement that *e/merge 2004* “gave new perspectives especially for research” and a reflection after the conference from a participant who is “now using the f2f time in a much more blended way”.
- Lurking was widely understood as a form of legitimate peripheral participation which could support learning from colleagues with greater expertise and experience in particular sub-domains and settings, e.g., “one has to lurk to a certain extent and the newer to an environment and the content the more inclined one is to lurk.” Lurking was also understood as promoting reflective learning because of the opportunity to “to read and think about things and ... to prepare answers”.
- Statements about social spaces and interaction mostly related to community presence and social conversation, e.g., “social interaction through the chat feature” and a participant who “preferred the conversations in the “corridors””. There were also statements which recognised the importance of social interaction in growing community, e.g., a reference to the “sense of community that develops” and a statement that “it was an NB part of helping people get to know each other”.

This special issue provides a selection of papers presented online in *e/merge 2004*. The articles have been edited for online publication and in some cases have been slightly updated to provide more recent commentary a year after the conference. They were selected for both the quality of the research and for the coverage of key conference themes of infrastructure, access, learning communities, research methodology and case studies across the region. In keeping with the IJEDICT objective to bring “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” (IJEDICT 2005), articles in the first section have been peer reviewed, and articles in the second section have been reworked with support from reviewers for publication. In this way, we have also tried to cover the diversity of material presented and discussed at *e/merge* and to formalise it for an international research community.

## **PAPERS IN CONTEXT: EMERGING UNDERSTANDINGS**

Given that South Africa has the most advanced infrastructure in the region and relatively better resources, it is unsurprising that the majority of the papers reflect on South African stories and issues. However, as noted earlier, there are inequalities even within individual countries and the South African examples provide evidence of this variety of conditions and possibilities. Local issues also echo global realities, with specific conditions providing relevant comments on internationally shared problems. The articles published in this issue were selected to provide unique perspectives on regionally situated yet globally recognisable issues, particularly factors affecting access to educational technology, pedagogical design, learning communities and academic literacies including multiliteracies. While we have tried to look outwards from our own experience and perspectives, most of these articles are still by university-based South African researchers and educators. A future *e/merge* would hopefully be able to include more papers from across the region and from secondary education.

## Access and Infrastructure

Macro-level strategic issues are addressed in three articles from South Africa. In the first by Paterson, a researcher for the Human Sciences Research Council, the impact of changing information systems in newly merging higher education institutions is explored in the light of the implications for teaching and learning. Greaves, who is the Executive Officer: Capacity Development Programs at TENET (<http://www.tenet.ac.za>) which is responsible for the bandwidth of tertiary education institutions in South Africa, presents a passionate argument that charging student fees for Internet access is incompatible with informal student learning about and with the Internet through play and exploration (Visser et al. 2003; Morteo & Mariscal 2002; Rouzie 2001). Pippa Moll, an ICT manager at the University of Cape Town, unpicks the philosophical debates raised in Greaves' arguments, by carefully outlining the implications for implementation.

The Paterson article considers ICT transformation in the light of higher educational institutional mergers in South Africa (Jansen 2002; Hay & Fourie 2002), currently a major policy response to the uneven higher education terrain inherited from the abnormal size and shape of apartheid education. This highly disruptive period of restructuring in most South African tertiary institutions has major challenges for the provision of IT infrastructure and e-learning capacity, many of which are only now being addressed. In particular the article considers the implications of implementing online blended and collaborative curriculum modalities in a context which requires responding to the sometimes competing pressures of access and equity, cost containment and systems integration. Paterson draws fluently on education policy documents and the literatures of mergers (Harman & Meek 2002), technology integration during institutional change (Hannah 1998; Giacomazzi, Panella, Pernici & Sansoni 1997), and educational technology (Alexander 2001; Bruggink 2003; Smart & Meyer 2005) to develop the implications of the current round of mergers for blended and collaborative learning and the scope for action by government and the institutions concerned to provide the requisite educational technology infrastructure.

In a resource-stretched environment with rapidly changing IT requirements, cost containment is crucial. Currently there is a divide between institutions who regard free student access to the Internet as part of their core educational service while others would choose to levy fees to students for Internet use above a minimum level. The article by Greaves challenges our assumptions about who pays for expensive and limited bandwidth. He argues that universities have a duty to supply Internet access as a public good to their students to support the development of information and computer literacies and broader educational goals. The notion of a public good comes from public choice theory in economics and describes goods for which there are positive externalities, non rival consumption and nonexcludability. These three characteristics mean that the benefits of consumption extend beyond the user; use by an extra consumer does not affect the enjoyment of the good by all other consumers; and that it is impossible to stop anyone from enjoying the good (Stiglitz 1993). These conditions apply to a pure public good such as defence but may not apply as closely to Internet provision in a university. In Southern African universities bandwidth is constrained to the point that consumption ceases to be non-rival at even low levels of Internet use. Furthermore it is possible to control the access of individual students to a network and the Internet. Where some South African universities levy student charges for Internet access, Greaves argues for other forms of bandwidth management. This article is complemented by a practice-driven response from Moll who, from her perspective as a network manager, unpacks the practical challenges of providing for student access without charges. The contributions by Greaves and Moll are featured in this special issue to provoke debate concerning Internet literacies as graduate skills, the nature of student learning about the Internet and the responsibilities of universities to provide student Internet access.

The article by Czerniewicz and Brown from the Centre for Educational Technology at the University of Cape Town interrogates the complexities of computer access, especially important

in a context where physical access inevitably dominates the terrain, but needs to be regarded as a necessary but insufficient condition for participation in online and blended learning. Elaborating on the work of Warschauer (2003), this article argues that access needs to be understood in terms of the different kinds of resources which people use, need and draw on in order to gain or acquire specific ICT uses and practices. The intricate nature of these resources is spelt out in the article which explains how they were specified through a large empirical study which explored access to a variety of resources in one of South Africa's five provinces, and across five higher education institutions. Given the theoretical focus of the article, only early findings of the study are revealed.

### **Social Constructivism and Scaffolded Learning**

The following two case studies describe the use of educational technology to scaffold the learning of the graduate skills of critical reasoning and argumentation. Spurrett, and Hodgkinson & Mostert, use very different technologies in their interventions but in both cases the pedagogical designs are influenced by social constructivism and emphasise effective scaffolding of learning including opportunities to practise new skills.

Spurrett, a Professor of Philosophy at the University of KwaZulu Natal (UKZN) in South Africa, describes the early stages of an ongoing initiative in the philosophy curriculum of two courses at the UKZN. Founded on understandings of distributed cognition (Hutchins 1995), and especially cognitive scaffolding, this initiative intervention uses software called *Reason!Able* to support the development of student critical reasoning skills in two undergraduate courses. The design of the initiative is also influenced by literature on 'deliberate practice' (Ericsson 1996), which argues for specific kinds and features of improvement through feedback. The article reports on the preliminary success of the project, stressing in conclusion that while sophisticated and complex, the software is not intrinsically intelligent. It can however be effectively used to support argumentation skills, enabling students to become intellectual actors rather than merely idea consumers.

Hodgkinson and Mostert, respectively Associate Professor of Education and the Educational Technology Co-ordinator at Rhodes University, theorise and describe the facilitation of online participation through the structured format of online debating. Drawing on the literatures of social constructivism (Jonassen, Davidson, Collins, Campbell, & Haag 1995; Palincsar 1998; Vygotsky 1978) and computer-mediated communication (Romiszowski & Mason 1996; Hiltz 1994; Riel 2002; Marttunen & Laurinen 2001), the article describes student and staff perceptions of an intervention which used scaffolded online debates to teach argumentation skills in a post-graduate education course at a South African university. The debate took place through basic email, an email distribution list, and a listserv. The findings underline the importance of providing explicit procedures to scaffold student participation in online debate and highlight the potential value of an online debate as a pedagogic strategy to support the development of argumentation and to encourage reflexivity. The authors cite Archer concerning the benefits of the preparation and reflection time built into asynchronous discussions for the development of practices such as "questioning ourselves, clarifying our beliefs and inclinations, diagnosing our situations, deliberating about our concerns and defining our own projects" (Archer 2003, p.103).

### **Learning Communities**

The next two case studies by Turkington and Frank, and Rosario and Molapo show how the use of ICT in education spills beyond the individual course or classroom in interventions with learning community designs. The Turkington and Frank article describes a successful campus-based learning community sharing their products on the Internet while in the second case the Rosario and Molapo article analyses an Internet-enabled school twinning project undermined by

organisational issues among the foreign partners and the practical challenges of a technology rollout to under-resourced rural schools.

The Durban Institute of Technology is a multicampus university of technology which “is committed to turning out highly skilled graduates who are equipped to meet the demands of the workplace and the special needs of a changing society” (DIT 2005). Turkington and Frank were at the time of writing lecturer and student in the Department of Journalism at DIT. They show how a skill development exercise in a journalism course took on a life of its own to provide student journalists with a web-based platform to voice their views and opinions and to most powerfully develop their professional practices and identities as working journalists with local and global audiences. Their strongly constructivist design and implementation of this community of practice intervention was influenced by action learning and action research theories as espoused by Zuber-Skerrit (1996) and by Dunlap and Grabinger’s (1996) research concerning Rich Environments for Active Learning.

The Shongololo case set in KwaZulu Natal is by Rosario and Molapo from the Directorate of Education Library, Information and Technology Services in the KwaZulu-Natal Department of Education and Culture. Rosario and Molapo propose that a single computer in an under-resourced school can have a catalytic effect if it is used to develop information literacies and to provide access to well designed multimedia resources, commonly used software and publicly available websites. This model is consistent with examples of good practice in the US in the mid 1990s (Weeg n.d.) and with more recent rollouts in South Africa and the Pacific Island States (Surtly 2005; Commonwealth of Learning 2002). Rosario and Molapo’s article confronts us with the practical challenges of rolling out the effective use of educational technology in poorly resourced rural schools and highlights the need for sound planning, persistence and flexibility. This case also illustrates the obstacles faced by networking projects across schools with starkly unequal access conditions.

### **From Learning Environment to Pedagogical Change**

In another example of introducing networked learning under difficult conditions, the case study by Xavier Muianga, who is a lecturer in the Department of Education at Eduardo Mondlane University in Mozambique, explores an early stage tertiary sector e-learning innovation of the kind that is now unusual in developed countries but still very topical in many developing country contexts. Thus the take-up and use of an online learning environment is shown to be an exciting innovation in an institution with highly constrained bandwidth, limited technical expertise and mostly transmission-based teaching which has not previously been exposed to such possibilities. In this case, an institution was able to leverage the e-learning infrastructure of a partner in a developed country for its pilot projects. These projects could then serve as extended feasibility studies to establish benefits in terms of student learning within changing teaching and learning models before committing scarce institutional resources to an investment in e-learning infrastructure. Muianga’s article draws on models developed by Collis and Moonen (2001) including the importance of shifting from an acquisition model of transmission towards a contribution model of engaging students in sharing and constructing knowledge. He asserts that the implementation of an integrated learning environment creates opportunities to re-evaluate tacit teaching and learning models.

### **Bridging North-South Divides**

Interestingly the two other regional examples both cross traditional north-south divides, albeit enacted in very different ways. The article by Giannini-Gachago and Seleka, who are respectively the Acting Manager of the Educational Technology Unit and an Information Systems lecturer at University of Botswana, reflects on attempts to support cross-cultural communication in online

discussions shared between two courses in Botswana and the US. Their article opens with a literature review concerning the key variables which affect student participation in online discussion including student characteristics such as gender (Im & Lee 2003), course design (Knowlton & Knowlton 2001; Edelstein & Edwards 2002), access to technology (Oblinger 2003; Masters & Oberprieler 2003), and the presence of learning community (Rossman 1999; Oliver 2003; Im & Lee 2003). They analyse student participation patterns both in terms of quantity measured by messages read and written and quality analysed in terms of the status of conversational moves (Pilkington, Bennet & Vaughan 2000; Oliver 2003) and level of critical thinking (Garrison, Anderson & Archer 2001), in relation to student characteristics and a range of success factors identified from the literature survey. Their results show that gender was the major influencing variable for participation patterns in terms of both quantity and quality. Course design, assessment of discussions and the presence of a learning community were also influencing factors. The article by Giannini-Gachago and Seleka suggests that the key success factors for online discussions identified in previous literature are likely to apply to online discussions across cultures and continents. It also highlights the importance of gendered online communication styles as an area of research.

The Zimbabwean-related accounts of students' production-based learning with ICT in the article by Morrison, an Associate Professor at InterMedia at University of Oslo, cross over time and space from Harare to Oslo. Morrison considers the interweaving of boundary crossing and expansive learning (Engeström 2001) of multiliteracies within the complex activity systems of three cases relating to Zimbabwe, one in fine arts and two in the performing arts. He foregrounds developmental and development-oriented learning with digital media in relation to the concepts of border crossings (Chambers & Curti 1996; Atkinson & Breitz 1999) and multimodal composition (Kress & van Leeuwen 2001). Border crossing refers to a transversal of disciplines and recombinations of elements across disciplines including local-global relations in knowledge building. Multimodal composition refers to the collaborative construction of multiliteracies across media types and discourse modes. Morrison shows how perspectives, pedagogies and innovation may move from their local genesis in a resource-strapped African higher educational and development setting to experimental works relating to Zimbabwe at a major university in one of the world's most technologically endowed countries. This article enriches multimodal discourse and activity theory through study of students' production of mediating artifacts.

### **Research Methodology**

In the light of all this innovation, we might well ask whether ICT in education can be studied in the same way as other educational or technological interventions. Botha, van der Westhuizen and De Swardt from University of Johannesburg draw on the methodological critiques of Reeves and colleagues (Reeves 1995; Reeves 2000; Reeves & Hedberg 2003) to challenge the reader to reconsider traditional approaches in the light of how research into educational technologies is currently undertaken. Botha is currently an educational consultant while van der Westhuizen and de Swardt are both Associate Professors at University of Johannesburg. In their view much current educational technology research suffers from poor quality, inappropriate design and lack of social responsibility. They assert that experimental research designs are inappropriate to educational research since they may assume behaviourist cognitivist approaches (Roblyer & Knezek 2003) or simply be unviable in educational research (Reeves 1995, 2000; Tellez 1993). Furthermore much case study research makes little contribution to theory. The authors make a strong case for design experiments as being appropriate in this emerging terrain. Design experiments or design research situate educational experiments in real world settings to discover what works in practice (Haas 2001). Design experiments have a strongly formative purpose in the improvement of educational interventions (Brown 1997; Reeves 2000) and can also contribute to the development of theory (Cobb, Confrey, Dinessa, Lehrer & Schauble 2003; Barab & Kirchner 2001). Botha et al. present an exemplar of a rigorous design experiment in a Masters-level

course which yields new, unique criteria for online learning design to facilitate the development of complex thinking skills. This article seeks to broaden the conversation concerning appropriate research methodologies for educational technology research beyond the default options of experimental design and case studies.

This special issue of IJEDICT seeks to encapsulate the theoretical and applied debates concerning access, infrastructure, academic literacies, pedagogical design, research methodology and the use of educational technology in resource poor environments, which were manifest in the online discussions and synchronous conversations during *e/merge 2004*. This snapshot of issues which occupy the minds of educational technology researchers and practitioners in Southern Africa is enriched by a combination of the more theorised approaches of the peer reviewed articles and the practitioner focus in the From the Field articles.

## CONCLUSION

In our view, the articles in this special issue make a useful contribution to the literature on the role of ICT in education in developing countries in several ways. Firstly, they provide and reflect upon rich examples of detailed and specific cases in practice. Secondly, they offer carefully-considered strategically-framed opinions on key issues in the region. Finally, they draw on a range of concepts and theories in order to analyse and frame understandings, thus contributing to the growth and consolidation of this area as an emerging domain of enquiry.

We believe that *e/merge 2004* was able to draw on the resources of both researcher and practitioner perspectives within Southern Africa, enabling multiple gazes on contextualised experiences. *e/merge 2004* creatively bridged conversations between researchers and practitioners and provided a space for key research debates on the specific conditions of Southern Africa. The conference provided a powerful forum for both the presentation and development of research which includes but looks beyond our developmental geography towards engagement in broader debates internationally.

In conclusion, we would like to make two observations about the nature of the articles presented here. First, there is the nature of the discussions that they evoked online. Second is the wealth of expertise among educational technology researchers and practitioners in Southern Africa which was so apparent in the conference exchanges.

Informal discussions, coffee-shop forums and chats were as important in *e/merge* as they would be at a traditional face-to-face conference. What was noticeably different, however, was the nature of discussion which took place in response to the presentation of formal papers represented by those published here. The online nature of the conference opened access to a broader group of people, predominantly from across Southern Africa, but also from as far afield as Australia, Europe, Iceland, the Philippines and the United States. The asynchronous nature of those conversations meant that everyone could participate at their own pace and in their own time, rather than competing for the short post-presentation time allocated in a face to face conference, and waving their hands to attract the chairperson of the session. The discussion of papers was time-bound, but rather than being grouped in one to two-hour slots, papers were open for discussion over three-day periods – averting the need to limit the interaction to a few questions or comments in the relentless pressure to move on to the next short presentation.

The open and extended structure of paper presentations created opportunities for greater participation by more participants, as well as enabling more intense discussions. For example, the forum about access issues containing discussion of the papers by Greaves, and Czerniewicz & Brown, expanded to 69 messages. This included an intense discussion about conceptual

frameworks for the research of access, and heated debate with sometimes profound disagreements about the philosophical and pragmatic challenges of bandwidth management. Another example is the forum on student learning communities which grouped discussion of the papers by Morrison, Turkington & Frank, and Giannini-Gachago & Seleka. This consisted of 67 messages of shared experiences and constructive feedback on the design and facilitation of student learning in communities of practice, as well as suggestions as to how these interventions could be theorised.

We believe that the online discussions of the papers were more vigorous and of a greater reflective depth than many similar conversations in face-to-face conferences. This observation is consistent with a growing body of international research concerning the reflective quality of online conversations (Hara, Bonk & Angeli 2000; Herrington, Herrington, Oliver & Omari 2000) and the nature of online participation. There is mounting evidence that a shift from scheduled face-to-face interaction to online learning conversations may indeed deepen, broaden and extend participation in discussion (Im & Lee 2003; Rourke and Anderson 2002; Bhagyavati, Kurkovsky & Whitehead 2005).

Southern African delegates to (face to face) educational technology conferences in developed countries are often met with a well-intended, but thinly concealed, sympathy because we have very little cutting-edge technology, miniscule yet exorbitantly expensive Internet bandwidth and generally overloaded networks. However, the constraints of physical conditions and budgets do not determine the quality of educational design or research. We hope that the articles in this journal and our reflections of the *e/merge* online conference experience reveal that appropriate pedagogical design by creative educators committed to facilitating powerful learning by their students is possible, and indeed overshadows our limited local infrastructure. Most of the conference expert presenters and participants were from the Southern African region, as are all of the authors of these IJEDICT articles. We hope that we have effectively shared the immense human capacity which exists among educational technology policy makers, researchers and practitioners across the region. We hope too that we have demonstrated the burgeoning commitment to understanding, knowledge and skills in the practical use of educational technologies in our sometimes very impractical circumstances.

It has been a great privilege for us to make available updated, and sometimes significantly revised, versions of a selection of peer-reviewed articles and articles From the Field in IJEDICT. We are grateful for the Chief Editors' foresight in recognising the need for such a journal which allows South-South collaboration as well as providing an opportunity to place local issues in global conversations. This journal has taken *e/merge* beyond a time-bound community of practice experience to a contribution to a bigger community of educational technology researchers and practitioners with related approaches in both similar and dissimilar contexts. We are committed to the on-going sharing of practices, discourses, experiences, questions and theoretical frames. The journal's excellent, global panel of editors and reviewers and the strong editorial focus on developing country contexts provides an excellent synergy between the papers emerging from *e/merge* and the broader community of IJEDICT.

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**Endnotes:**

- 1 South Africa is ranked 32nd with an e-readiness score of 5.7 out of 10. The highest ranking country in 2004 was Denmark with a score of 8.28. Other African countries in the top 100 rankings were Egypt, ranked 51st with a score of 4.8; Nigeria ranked 58th with a score of 3.44; and Algeria ranked 61st with a score of 2.56.
- 2 These include as the annual WWW Applications Conference and the biennial CITTE conference.
- 3 Sponsored by the Arts and Culture Trust in South Africa, event for young writers encourage the use of local languages. Forty five local writers were invited to participate and the conference was run over two months. Its innovation and potential was acknowledged by Nelson Mandela who officially opened the conference (online, of course). See <http://www.litnet.co.za/youngwriters/mandela.asp>
- 4 The main purpose of the Tertiary Education Network- TENET- is to secure information society technology services for the benefit of South African Universities and Technikons involving, inter-alia: the management of contracts with service providers; ancillary operational functions in support of service delivery; and the provision of other value-added services as may from time to time be needed in support of the higher educational sector in South Africa. See <http://www.tenet.ac.za>
- 5 The Multimedia Education Group (MEG) was succeeded in January 2005 by the Centre for Educational Technology at the University of Cape Town.

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## **Changing the 'landscape' of learning: The future of blended learning provision in newly merged South African higher education institutions**

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### **ABSTRACT**

This article analyses the implications of recent institutional mergers for information systems development and in particular for the provision of blended and collaborative learning in the South African higher education system. The merged institutions are only beginning to address these challenges. The article therefore draws attention to current conditions, key systems integration challenges and strategic decisions that can influence the outcome of information systems integration. Particular emphasis is given to access, equity, competition and cost outcomes of planning, and implementing online blended and collaborative curriculum modalities in the context of the institutional mergers.

**Keywords:** *Information systems, distance learning, online learning, merger, higher education, knowledge management*

### **INTRODUCTION**

Higher education mergers in South Africa have been undertaken in order to achieve a variety of goals in a wide range of institutions and national systems. Globally, the move toward bigger institutions is driven in part by government's intention to widen participation, expand student numbers and reduce wasteful overlaps in programmes (THES 2001; Utley 2002). The achievement of economies of scale in geographically adjacent institutions is another reason cited for mergers, and it is also claimed that within a merged and unified administration substantial savings will be produced in purchasing, estates management, student services and information technology provision (Light 2002; Gould 1997).

It is argued, moreover, that information systems have a key role to play in leveraging many of the key benefits expected from higher education mergers. The period within which higher education mergers have taken place on a large scale across the globe also overlaps with a phase characterised by the extremely rapid take-up of information technologies in higher education. From the 1990s, the Internet connectivity boom opened up competition in local and global education environments (Castells 2000). Internet technologies have enabled higher education institutions to expand their operations beyond traditional face-to-face learning, by supplementing contact-based learning modalities or by offering fully Internet-based distance education programmes.

The focus of this article is on the impact of mergers on information systems in terms of their capacity to deliver learning opportunities in South African higher education institutions. The merger phase presents challenges and opportunities for those 'new' institutions that seek to develop their capacity to provide online, collaborative and blended forms of learning to current and future generations of students. In order to properly take advantage of these opportunities the new institutions must integrate information system planning with strategic planning processes around curriculum delivery.

The merged institutions are only beginning to address these challenges. For this reason it is too early for the article to describe what has actually happened in particular instances of mergers. The main emphasis is rather on identifying the main challenges, and considering possible approaches and strategic options for institutions engaged in the process.

## **THE MERGER PROCESS IN SOUTH AFRICA**

The development of policy on higher education in South Africa is strongly politicised and is subject to competing demands for local equity-driven and global competitive-based performance frameworks (Jansen 2001). As reflected in the National Commission for Higher Education Report of 1996 and the White Paper (No.4) of 1997, the challenge for government is how to balance the need for equity while allowing for competition and sustainability in the same higher education environment.

The Department of Education (DoE) produced a number of key documents that act as reference points for higher education transformation. The 2001 National Plan for Higher Education outlined five policy goals that guide the framework for transformation (DoE 2001). These goals are to:

- Increase access
- Promote equity, to redress past demographic inequalities
- Ensure diversity, to meet national and regional skills and knowledge needs
- Build research capacity
- Re-organise the institutional landscape; establish new forms and identities.

The equity, access, human capital development and research motives for the move towards institutional mergers – as a form of reorganising the institutional landscape – are clearly reflected in these goals.

Shortly thereafter the DoE published a document entitled “Transformation and Restructuring: A New Institutional Landscape for Higher Education” (DoE 2002) (hereafter the ‘Institutional Landscape’ document) which outlined the intended rationalisation of the sector, giving specific recommendations for the regional consolidation of universities and technikons.<sup>1</sup> The clustering recommended in the report reduced the number of higher education institutions in South Africa from 36 to 21. The selection and allocation process by which institutions were grouped together for mergers has been strongly contested, but this is not the focus of this article which seeks to consider the challenges for information systems in facilitating these mergers.

To provide some perspective on the size of the project, the 36 higher education institutions in 2000 consisted of 21 universities and 15 technikons. In all, there were 591 161 students enrolled, of which 65.7% were enrolled in universities and the balance in technikons. There were some 14 789 permanent and 24 002 temporary academic staff employed at these institutions. The 2003/04 budget for the sector was R8.9 billion (US\$1.27Bn).

The timescale given in the ‘Institutional Landscape’ document specified that institutional implementation plans should be developed for the period, 2004–2006. The Ministry was – and still appears to be – adamant that “substantive” integration can take place in a relatively short timescale, and argued that “it is a three-to-five year process depending on the type and organisational complexity of the merged institutions” (DoE 2002, pp. 34–38). By January 2005, all

of the mergers were legally enacted which means that some of those institutions were only then only able to begin their substantive integration.

The 'Institutional Landscape' document clearly recognises the importance of "the core activities necessary to give effect to the merger such as integrating administrative, financial and *computer systems*" (DoE 2002, p. 35, emphasis added). That the structure and functioning of information systems must be redesigned in order to support such institutional arrangements is indisputable.

A scan of the challenges for mergers that the 'Institutional Landscape' document raises (DoE 2002, pp. 38–39) shows that there are multiple dimensions through which information systems can contribute. These include supporting integration at the substantive or institutional level, and at the technical and systems level such as in:

- Establishing a new culture and ethos;
- Developing new academic structures;
- Integrating academic programmes;
- Integrating research support and intellectual property management systems;
- Integrating administrative, financial, procurement and computer systems and procedures;
- Developing financial plans and consolidated budgets;
- Integrating support services;
- Integrating facilities and infrastructure planning and utilisation.

## KEY QUESTIONS

This article specifically focuses on the impact of institutional mergers on information systems and on the capacity of these information systems to support current and future blended learning provision. This aspect of mergers has not been addressed in the literature. (For recent contributions on other aspects of the merger process, see for example, Jansen 2002a; Jansen 2002b; Harman & Meek 2002; Hay & Fourie 2002).

The article asks two main questions. First, how will the South African higher education merger plan, and the characteristics and capacities of information systems of the former campuses influence the integration of information systems in the new institutions? Second, how will the configuration of information systems in the merged higher education institutions facilitate or limit curriculum development based partly on blended and collaborative learning forms? This is admittedly an ambitious task, since the article deals with a range of interconnected elements: information systems, learning technology infrastructure, curriculum development, distance and blended forms of learning and strategic institutional planning. In addition, the mergers have upset the old spatial arrangement of higher education institutions in relation to their student populations, leading to potentially new alliances of institutions providing different, and even competing, patterns of access.

The article consists of two main parts. The first deals chiefly with higher education mergers and information systems. Accordingly it will discuss the key implications of mergers for information systems in South African higher education. The second part of the article explores how the provision of blended and collaborative learning in the merged institutions will be influenced by

strategic choices of delivery mode, curriculum development and inter-institutional collaboration in order to reach student populations.

In this article, 'information systems' refers to: the combination of information and communication technologies arranged in a systematic fashion in an institution, for the purpose of capturing, processing, analysing, creating, transmitting and storing data and information. This assumes a non-technicist understanding and recognises the importance of interaction between human and information systems.

## **MERGING INSTITUTIONS AND INFORMATION SYSTEMS**

Mergers consolidate organisational entities in ways that have implications for information systems. Different kinds of merger will have consequences for information systems, as sketched below.

- There is a *weak* merger where the partners retain their original identities. There are low levels of strategic linkages in the information systems. Therefore semi-autonomous information systems are hardly affected.
- There is a *strong* merger where constituent organisations retain limited independent identity. Strategic interdependence is high. Post-merger information systems integration is complex.
- There is *full absorption* with pressure to assume a unitary institutional identity. Full operational consolidation is required. There is greatest difficulty in post-merger integration of information systems infrastructure because it requires high levels of strategic interdependence.

The mergers envisioned in the new South African 'Institutional Landscape' document accord with the *strong* or *full absorption* models described above. The 'Institutional Landscape' document presses for what it terms as 'substantive' integration of institutions that goes beyond the formal adoption of new policies, procedures and structures. The document argues that the fundamental aim of mergers is "the creation of a new institution in the full meaning of the term, that is real integration with a new institutional culture and ethos that is more than the sum of the parts" (DoE 2002, p. 39).

Table 1 is a summary of the plan for merged institutions as envisaged in that document. As indicated, 36 institutions have been reduced to 21 through mergers. The left-hand column shows the number of new institutions that are the product of the merger of a number of formerly independent universities or technikons. In effect, many of the new institutions consist of multiple campuses each with a particular number of constituent sites.

Seven of the set of 21 institutions have not been made part of a merger, or have not been required to incorporate another campus or unit. These institutions have an advantage in respect to the stability of their information systems which will not be obliged to undergo major disruptions – at least on account of the mergers. However, there are eight instances where a proposed merger involves three campuses, one example that involves four campus entities, and five new institutions which consist of two campuses.

**Table 1: Summary giving the number of sites per new merged institution**

| Number of sites per merged institution       | Number of institutions |
|--|------------------------|
| 1 (ie: no merger with any other institution) | 7                      |
| 2  | 5                      |
| 3  | 8                      |
| 4  | 1                      |
| Total  | 21                     |

The number of sub-units and their geographical dispersion – in terms of distance from each other – represent a challenge for generating a unitary institutional identity. Arising from such configurations there are also significant academic and management challenges with respect to: consolidating learning programmes, sustaining programme quality, supporting academic staff communications and securing the integrity of administrative systems. The extent to which the new institutions meet these fundamental challenges will depend on the implementation of information systems that are based on, or are aligned with, the new mission of the institution and based on sound knowledge management principles.

This situation presents both challenges and opportunities. First, with increasing numbers of satellite campuses, all aspects of institutional management become more complex with obvious information system implications and challenges.

Second, the distance separating campuses from each other is a major factor. Distance has both positive and negative consequences. On the one hand, dispersed campuses present the opportunity of reaching a greater market of potential students. But this distance will have the unwanted effect of increasing time and travel costs associated with face-to-face interactions between staff members – academic or administrative. Consequently, information systems such as intranet infrastructures which facilitate communication become more important. This is not necessarily a simple matter of systems implementation, since technologically mediated interaction presents many challenges.

Third, the merged institutions are much larger in scale, which can bring potential economic advantages. But this cannot be realised until various systems have been put in place to leverage the potential advantages of economies of scale. Information systems can make a vital contribution toward accruing such benefits by cancelling out distance as a factor.

Lastly, the merger process presents a strategically important opportunity for institutions that hitherto have had poorly developed information systems to obtain the needed information system functionality as part of a newly merged mega-institution.

### **MERGING DIVERSE INFORMATION SYSTEMS IN SOUTH AFRICAN HIGHER EDUCATION**

Over and above fundamental issues regarding scale, the number of campuses, their spatial locations, and strategic decisions around integration strategy, attention must also be drawn to the actual characteristics of the information system(s) in each constituent campus that will influence the eventual shape of the information system of the merged institution.

- The campuses with a larger proportion of divergent legacy (old) systems and stored data will have higher initial investment requirements to make their systems compatible and functional. In some instances, the development of information systems may require the digitisation of administration, research and learning and teaching systems and processes.
- The purchase of software licenses is significant expenditure for higher education institutions. Decisions regarding such purchases have long-term implications. There is a need to avoid the problem of incompatibility by putting in place a shared approach to software selection and diversity in the institution.
- There will be campus constellations which between them have very different levels in information systems development and sophistication that is a consequence of historical and geographical disadvantage (Letseka 2001). Where there are one or more institutions in a merger, each bringing with them fairly well developed information systems, the challenge of integration must be informed by a decision regarding which pre-existing campus system will be taken as the benchmark for planning.
- The decision was made to create a new institutional form, the 'comprehensive institutions' through merging universities and technikons. Mergers at the intersectoral level (between a university and a technikon) may engender more challenges than intrasectoral mergers (for example, between two universities) (Patterson 2001, p. 6).
- The evaluation of information system investments is an essential precursor to planning, and should not be taken to mean merely obtaining an inventory (or due-diligence report) of the existing hardware and software systems. It is necessary to quantify the full value of systems that include the human skills base in the form of experienced information systems staff.
- The construction of information systems in the newly merged systems must also take into account how they will facilitate the uploading of data into the Higher Education Information Management System (HEMIS). This presents an opportunity to renovate systems at this level as deemed necessary.

### **INFORMATION SYSTEM INTEGRATION IN MERGERS**

A critical challenge for management in a merger is to identify the appropriate option for information systems integration in two strategic dimensions (See Table 2). The first dimension concerns the location of the computer architecture. This may range from full 'centralisation' to a fully distributed approach. Such a decision becomes more complex as the number of sub-campuses which will comprise the new merged institution increases.

The second dimension concerns the level of standardisation between software systems which can be fully standardised or structured at different levels of partial standardisation. The decision in this dimension becomes more complex where the constituent institutional systems have different levels of development (for example, bringing with them legacy systems) and different software applications (for example, from operating systems through to end-user software).

These two dimensions define the levels of inter-operability and data sharing that can be achieved between the constituent information technology sub-systems. Targeting the highest possible level of integration of the information technology systems will maximise the capacity of information systems to support integration of a range of business and communication activities at the technical level of operations.

**Table 2: information system integration options in a higher education merger**

| Software<br>Computer<br>architecture | Standardised         | Partially<br>standardised | Not standardised  |
|--------------------------------------|----------------------|---------------------------|-------------------|
| Centralised                          | Total<br>integration |                           |                   |
| Partially<br>distributed             |                      |                           |                   |
| Fully<br>distributed                 |                      |                           | No<br>integration |

*(Giacomazzi et al. 1997, p. 291)*

Total integration will not necessarily be the most appropriate option. This is because the application of the Internet can offer high levels of functionality where particular information system structures or functions are decentralised to one or more campus rather than brought to the centre. Although obtaining centralisation will be tempting as a 'big bang' plan which creates the opportunity for achieving inter-operability from scratch, planners may discover that the costs associated with implementing a new system are too expensive in terms of capital investment, the migration of old systems and the disruption of personnel.

The two main functions of higher education information systems – to support academic programmes and management functions – are increasingly inseparable at the systems level as the technology of Internet portals and of Enterprise Resource Planning (ERP) systems are capable of bringing together various levels of functionality together in one system. Nevertheless they must be considered separately as they have different cost drivers. The value of ERP for the purposes of higher education is that through such systems, all areas of the institution's operations can be integrated and made 'conversant' with one another. These systems can provide value in terms of savings from automating processes, improving workflow, tightening controls and providing a user-friendly interface. But this is the ideal. In practice, many ERP systems are only loosely integrated, and data sharing is limited to periodic batch transfers. Furthermore, ERP systems are long-term projects with a timescale of several years in implementation, and are expensive to put in place (Swartz & Orgill 2001).

**INFORMATION SYSTEMS AND THE DEVELOPMENT OF LEARNING INFRASTRUCTURE**

There are key generic areas of operation in which information systems play a role across most higher education institutions, and some of these are: course development and design; hosting and disseminating courseware; student services; academic staff administration; research; library services; facilities management; marketing; community engagement; and management information.

For the sake of this analysis, the contribution of information systems to higher education delivery can separated into two main activities:

- Support of higher education curriculum or programme delivery;
- Support of higher education management and administrative functions.

In the past, the higher education information systems requirements were defined largely in terms of internal business processes. Now we are seeing the shape of these systems being determined to a large extent by the outward focus on ICT-based learning platforms. For this reason, the section that follows will undertake an analysis of the challenges for curriculum and programme delivery in a merger situation.

Lest this paper be misconstrued as uncritically technicist in orientation, the following critical assumptions concerning the use of technologies in higher education learning infrastructures underly the discussion that follows. It is observed that ICT can support a learning process that is discursive, adaptive, interactive, reflective (Laurillard cited in Scholtz & Lovshin 2001, p.3) and adequately contextualised. However, there are clear challenges:

- “The use of information technology does not of itself improve learning” (Alexander 2001, pp.243–244).
- “Successful e-learning takes place within a complex system, composed of many inter-related parts, where failure of only one part of that system can cause the entire initiative to fail” (Alexander 2001, pp.240–241).
- From the point of view of learning as quintessentially a social activity, the use of technology cannot substitute for face-to-face contact with lecturers and with other students, and there are limits to how information systems can mediate such interaction.
- There are logistical and other challenges associated with the roll-out of online delivery including: system reliability (Hannah 1998, p.17); access bottlenecks from poor local connectivity services outside of the institution’s control; and variation in the sophistication of clients whose competencies are likely to affect their own perceptions of the value of the programmes for which they are registered.

## **INFRASTRUCTURE TO SUPPORT BLENDED AND COLLABORATIVE LEARNING**

The application of information and telecommunications technologies presents opportunities for flexible learning based on collaboration and the blending of online and face-to-face interaction. This implies having the technical capacity to provide services equivalent with 4<sup>th</sup> and 5<sup>th</sup> generation distance education modes (DETYA 2001). However, the capacity to deliver such programmes must be complemented by the capacity to create them. The aim in this section is to provide an overview of the different elements that will usually be identified in a fully-fledged learning technology system.

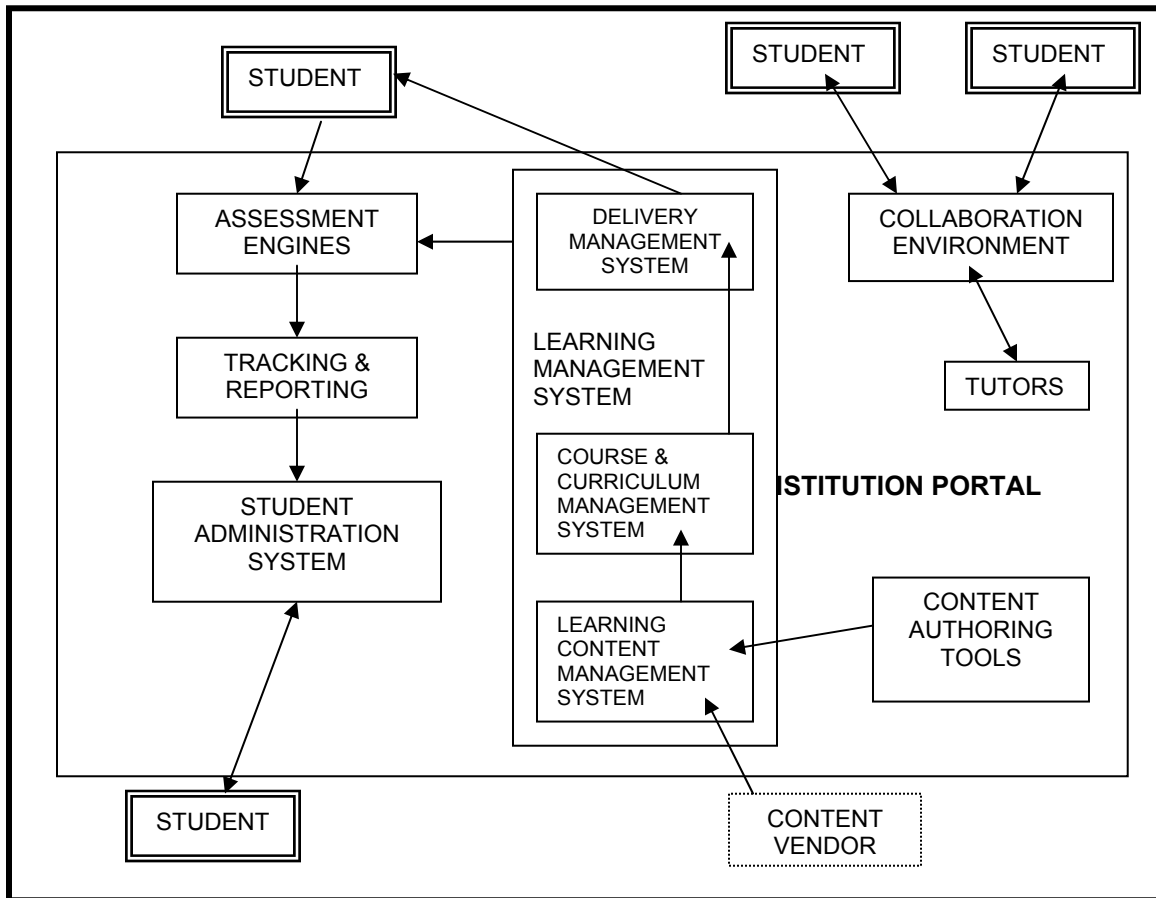
In higher education, a set of software systems will support the provision of learning opportunities by an institution whether in part or wholly by electronic means. The functionality required of a system of the kind suitable for installation by a higher education institution may be spread across a number of products or tools and vendors. These systems must be integratable and ensure inter-operability across platforms and environments. The extent of success in this aim is directly influenced by prior decisions regarding the shape and scale of the information system of the institution. The challenges for the integration of information systems discussed earlier will impact directly on learning technology selection and acquisition. As important is to recognise that decisions about learning technologies must be informed by the institutional strategy for curriculum planning based on an assessment of who and where the target student populations are, what



knowledge and programme areas will be presented, and what kinds of learning interaction will be supported.

A variety of different software products created by vendors provide functionality in more than one area of a learning technology system. The core components of a broad 'learning technology system' are described in Figure 1 below.

**Figure 1: Functions of a learning technology system**



- The Learning Management system manages the learning environment providing a place where content can be organised, catalogued and presented to learners, learning plans can be managed and where learning activities can be tracked and assessed. It will have a connection to a delivery environment for delivery of learning content, for example, click2learn, Docent, Thing, desire2learn and IBM Mindspan Solutions.
- The Student Administration System manages learner registration, planning and learner profiles, for example, PeopleSoft, SCT, DataTel.
- The Delivery Management System manages the content assembly, interacts with authoring tools and supports learning delivery, for example, WebCT or Blackboard.

- The Learning Content Management System is an environment where learning developers can create (author), store, reuse, manage and deliver digital learning content, for example, Trivantis, Macromedia Products, StarOffice, PowerPoint.
- The Collaboration Environment (CE) is an environment in which students and teachers can interact in an asynchronous mode outside of the more structured systems noted above, for example, Centra, Webex, Placeware and Interwise (Collier 2002, pp.10–13).

While choosing the most appropriate configuration of platform, architecture and software elements to meet institutional needs, decision makers must consider complex trade-offs between “affordability, features, flexibility and risk” (Czerniewicz, Ravjee, & Mlitwa 2005, p.62). Central to this strategic process is achieving the optimal balance between open source, proprietary and self-developed software systems, between which all kinds of combinations are possible (Bruggink 2003, p.3).

Those favouring an open source approach argue that moving towards standards compliant open source solutions will facilitate the development and sharing of third party applications and learning content – such as learning objects (LOs) - among institutions. However, even though open source software code may in general be used, modified and distributed without cost at source, many higher education institutions are not necessarily funded or appropriately equipped with the - potentially expensive - services necessary to develop, deploy or support open source software in their own environments. In addition, LOs - or small, stand-alone units of learning content smaller than a course (Godwin-Jones 2004; Gallagher 2005, p.5) which can be stored in an ‘object library’ and shared or distributed as needed – have been described as a technology rather than a model or approach to learning as such. It is argued that LOs lack the contextual specificity to enable certain forms of learning, and a theoretical framework necessary to inform learning programme design. The learning object debate has foregrounded the tensions between instructional design and constructivist approaches to learning (Mayes & De Freitas 2004, p.30) and demonstrates that learning technology choices have implications for curriculum theory and practice.

On the other hand, the risks associated with proprietary software are well known and include: cost, vendor lock-in and limitations on system flexibility (Smart & Meyer 2005). The full complexity of the issues cannot be explored here, but it is clear that decisions regarding software strategy in higher education will inevitably impact on immediate and future system development costs and system utility.

Developing a learning system is not just a technology challenge, but requires an understanding of the bigger strategic process within which learning programme development must take place. A major obstacle to designing and developing programmes for online communities is the large development times associated with these activities (Edling 2000, p.10; Alexander 2001, pp.245–246). The main resource allocation of the institution to the costs of developing online learning programmes lies in academic/faculty time, which can easily range from the hundreds of hours over a year into thousands of hours over a longer course development process (Hannah 1998, p.15). Many institutions have IT support centres and some have instructional support centres. Yet despite calls for greater integration of ICT into higher education curricula, academics in South Africa and more broadly have been slow to respond. In some cases, institutions expect academics to do more with technology, but do not incentivise the process. Typically, the formal mechanisms for academic recognition privilege research output, rather than the quality of an academic’s commitment to implementing ICT-based courseware.

## **THE ENVIRONMENT WITHIN WHICH BLENDED AND COLLABORATIVE LEARNING WILL BE OFFERED**

Before the merger process, South African higher education institutions had advanced to various stages of sophistication in the development of their online presence and their capacity to support learning. This produced an emerging segmentation of the higher education market based on the patterns of physical and online access among registered students. The reconfigured institutional shape of higher education in South Africa presents new opportunities and challenges for recently merged institutions to consider how to obtain an optimal pattern of delivery of learning opportunities. It remains to be seen how competitive this environment will be. In other contexts, mergers have been undertaken to improve institutional shares of markets (Borrego 2001; Maslan 2000). What follows is an attempt to identify the main drivers causing higher education institutions to invest in learning technologies for the purpose of providing blended and collaborative learning.

Institutions will seek the capacity to develop online learning opportunities for several reasons:

- As a means of adding value to their face-to-face courses (for example, online course information and materials, online library access);
- As a means of offering blended courseware;
- As a means of providing collaborative learning opportunities;
- As a means of offering distance education.

But the motives identified above do not take account of the competitive dimension. Yetton (1997 cited in McCann 1998, p.11) argues that information technologies produce opportunities for higher education institutions to differentiate themselves in at least four strategic dimensions:

- Value-added strategy where the 'traditional' or the 'elite' university uses ICT to enrich the value of its existing programmes on offer;
- Mass market cost-based strategy where a younger university uses ICT to develop and deliver a focused – restricted – range of programmes to a mass market;
- Niche market cost-based strategy may focus on niche market fields such as alternative therapies, visual and performing arts or business colleges;
- Hybridised strategy which involves using ICT to create a powerful standardised infrastructure for devolved educational programme which are flexible and distributed through several channels.

Each new merged institution will have to critically assess its capability to roll out the preferred strategy. Their analysis will have to take into account the following layers:

- The geographical reach of populations which can physically access one or more of the constituent campuses (either on a full-time or on a part time basis);
- The distribution of curriculum programmes between the constituent campuses;
- The compatibility of similar curriculum programmes between formerly different campuses;
- The extent to which face-to-face curriculum programmes are (a) complemented by existing online blended and collaborative learning resources, or (b) replicated in a fully online version.

This analysis is important since some degree of curriculum rationalisation may be necessary between different campuses in each of the newly merged institutions. Each campus – as a former independent institution – will have a historically unique set of programme offerings and a spatially limited range within which it can draw students.

None of these spatial challenges will affect a programme which is offered entirely on the Internet, and will therefore not be geographically bound. Unfortunately, this does not apply on the other side of the relationship where prospective students do not have either computer, telecommunications or Internet access. It is not possible in the constraints of this paper to address the complexities of competition between higher education institutions based on pure Internet-delivered courseware. Our concern is rather with considering how the new merged institutions will maximise their reach within the framework of a blended learning approach.

Those merged institutions which prefer to offer blended learning opportunities will confront clear spatial limitations on their ability to access student populations even where their campuses are widely dispersed. However, they can achieve greater reach through improved articulation of learning pathways in agreement with other institutions. They can consider collaborating with other institutions in reciprocal relationships in which access to each other's capacity is brought together in combination (for example, one merged institution can offer face-to-face contact while a partner institution can provide online support or vice versa). There will be considerable complexities in bringing together online courseware from one institution and face-to-face lectures and tutorials from another (for example, curriculum differences, quality assurance, co-ordination), not least of all the negotiation of financial rewards from such an agreement. Related to the possible evolution of such shared programme developments, is how the Higher Education Quality Committee of the Council on Higher Education will deal with accreditation of higher education programmes.

Based on this analysis, it is clear that a number of mission strategic decisions must be made in order for the newly merged institutions to properly plan and implement their learning management systems. These include crucial decisions on:

- The balance of emphasis between face-to-face, blended and online learning;
- Which part of the segmented market for higher education services in South Africa to focus on;
- Whether to engage in alliances with other public or private institutions to achieve further reach.

These decisions will not be taken without the influence of institutional politics and disciplinary turf disputes which will shape the merging of curricula through contestation over “whose content matters” (Jansen 2003, p.16) and how such content should be disseminated.

The creation of new merged campus constellations in a context of unequal access to information systems and learning technology infrastructures, together with different interpretations of the strategic mission of the institution may contribute in the long term to inequitable access to higher education opportunities, and provision of education of varying quality. Therefore, the creation of a set of rules for disbursing funding to institutions for developing their information technology resources may be advisable.

## **IMPLEMENTATION COSTS**

In order to support the merger process, R800million (US\$114million) was set aside within the government's Medium Term Expenditure Framework, for disbursement mainly for re-capitalisation of undercapitalised institutions, personnel retrenchment costs, harmonising systems and for physical infrastructure (DoF 2003). Presumably, information technology system funds will be bundled under more than one of these categories. But there may be some room for concern about the ultimate information system costs of mergers.

It is likely that the constituent campuses in each merger will bring very different contributions to the table for the design of the merged information system and the learning system that will be placed on top. The 'Institutional Landscape' document was not so detailed that it gave explicit consideration to balancing the information system capacity between each merged institution. An audit of capacity in each constellation of campuses prior to merger would reveal that some institutions have a clear advantage in terms of their inherited information systems and personnel capacity. To ensure that the outcome of the mergers does not disadvantage any merged institution in respect of its inherited information systems development – and by corollary its ability to roll-out online learning programmes – the Department of Education may elect to specify certain minimum standards that can be used as a base for budget allocations on information systems.

The 'Institutional Landscape' document states that the National Education Department will cover the direct financial costs to "ensure that the merged institutions are financially sustainable" (DoE 2002, p.35). It is the related ongoing costs that cannot be fully known in advance that may threaten sustainability. Ongoing upgrading and service costs of information systems will be determined by the level of ambition of current information technology plans. For example, an institution which elects to focus more intensely on online courseware is likely to have a much more substantial need for investment in learning technology infrastructures and learning management systems than an institution which aims to work mainly in the contact mode. This raises critical questions regarding the process of allocating budgets and resources between institutions which have taken on different – but equally important – strategic imperatives.

The implementation of ICT in higher education institutions has created important challenges for the management of expenditures and the management of costs. ICT has shown itself to be continuously transformational and disruptive (Kaludis & Stine 2001, p.49) – on account of the expanding power and utility of hardware and software systems. This suggests that high infrastructure costs should not be viewed as an investment because there is a constant need for upgrading. Furthermore, the cost of instructional technology must be measured as a part of the whole institutional development process and not as a stand-alone cost. As a consequence, institutions must find ways of absorbing expansion costs on an ongoing basis. This raises important financial sustainability considerations which must be taken into account at two levels. First, the Education Department should not be expected to fund information systems and learning technology plans which are not deemed sustainable. Second, in the long term institutions may be forced to absorb costs (through additional fund raising), to embed costs in overall fees, or to levy IT fees. The latter two options may prove disadvantageous to students who cannot afford such levies.

## **CONCLUSION**

The discussion in this paper emphasises that the fundamental question underlying the acquisition and development of information systems and learning technology systems is not only technical but also strategic in nature. In this regard, the costing of ICT-based curriculum development is difficult on account of the inability of standard accounting mechanisms to establish – or accurately

measure – costs that are allocated to the development and support of teaching programmes (McCann et al. 1998, p.7). This means that strategic decisions must not be supported solely by accounting/economic information.

The South African higher education merger process was initiated by government on a system-wide basis – though not for the first time internationally. The systemic impact of the merger has changed and will change the landscape of learning in South African higher education in ways that cannot compare with the limited, piecemeal and voluntarist basis on which higher education mergers have taken place between certain institutions in other national contexts.

The main aim of this article was to draw attention to how the creation of new merged campus constellations in a context of unequal access to information systems may reproduce the existence of unequal relations between new institutions in the newly merged institutional environment. This inequality will be expressed through different institutional capacities to mobilise operational information systems and to introduce learning technology infrastructures that will increase institutional capability to access and serve potential student clients.

This suggests three possible interrelated courses of action. The first would be to assess the relative status and quality of institutional information systems and learning technology capacity in relation to reasonable statements by the institutions of their future academic or teaching mission and plan. The second would be to scrutinise the knowledge fields covered by and the intended modalities of curriculum delivery of all institutions to assure adequate coverage and access across the country – quality assurance will remain an ongoing matter. The third would be to apply funding to institutions not only in terms of each individually stated strategic plan, and also in relation to how the combined provision of learning from all institutions - face-to-face, blended and other forms – maximises equitable access to education for students.

It would be an all but impossible task for a government to adopt the three courses of action identified above except where that government holds sway over higher education and where there is low institutional autonomy. Nevertheless, it may be necessary for some South African agent – if not government – to at least address the second course of action of co-ordinating curriculum on a regional and national basis.

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## **Endnote:**

- <sup>1</sup> Within South Africa's higher education system, technikons until recently specialised in the provision and promotion of quality career and technology education and research. They now constitute universities of technology in the new institutional landscape, similar to institutions found in Australia, Germany, Belgium for example.

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## **Access to ICT for teaching and learning: From single artefact to inter-related resources**

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### **ABSTRACT**

In the past few years, concepts of the digital divide and theories of access to ICT have evolved beyond a focus on the separation of the “haves” and the “have nots” to include more than just physical access to computers. Researchers have started considering the conditions or criteria for access and broadened the concept by including additional components. Terms such as “real access”, “thick conceptions of access” and “social inclusion” give some indication as to the change in thinking about access to ICT.

These broader views of access are particularly applicable in the Higher Education context. However, in examining the applicability of the existing theories of ICT access, we found that no single model fully encompassed that range of resources required for access to ICTs in Higher Education in South Africa. We therefore combined, simplified and enhanced the existing models to develop a comprehensive framework for ICT access. Our model of access describes what people use, need and draw on in order to gain or acquire access to specific ICT uses and practices in terms of different kinds of resources namely technology resources; resources for personal agency; contextual resources; and online content resources.

The applicability of this model has been tested in a survey of academic staff and students in Higher Education Institutions in the Western Cape, South Africa. The aim of this research is to explore access to and use of ICT and how they may support or hinder a range of educational technology practices.

**Keywords:** *Higher education, access, teaching and learning, digital divide*

### **INTRODUCTION**

The ideas described in this paper arose during the conceptual and planning stages of a project which aimed to investigate access to, and use of, Information and Communication Technologies (ICT) in teaching and learning in higher education institutions in the Western Cape of South Africa.<sup>1</sup> The project set out to develop baseline information through a survey of academic staff and students in the respective institutions, as well as to identify factors, which may be hindering or encouraging the use of computers for teaching and learning.

In the process of developing a survey instrument, it became evident that the project offered an opportunity to move beyond descriptive fact-gathering. The data to be gathered would (and will) certainly be useful since such baseline data does not exist at all, making planning particularly difficult. At the same time, it became clear that a richer and more nuanced analytic investigation could also be designed, one which would allow for identification of relationships and patterns both within and between access and use. This has the potential to enrich our understanding of the changing nature of teaching and learning in an increasingly technology-mediated environment.

We set out to develop a more refined and informed understanding of access to ICT for teaching

and learning in the South African higher education context. Our motivation was primarily to develop an analytical model which could be used as the basis of our empirical investigation. While we were able to draw on an established international theorist, Laurillard (2002), for usefully explaining ICT use for teaching and learning, we did not find a ready-made model of access which suited our purposes in the local context. And despite important enthusiastic national policy support for access to ICT, we found little local research to help us name and frame access to ICT in higher education.

This paper charts the journey we travelled to develop a conceptual framework specifically to understand access to ICT in higher education. Firstly, we examine the local and international literature on the purposes cited for ICT access, and we confirm our own focus on teaching and learning. The main part of the paper discusses ways of framing access in general and examines the debates around the concepts, as well as the dimensions we believe are relevant to our context and why. Our decisions were based both on our interpretations of the literature and on our findings from the pilot study we conducted in 2003 with 137 respondents from three Western Cape higher education institutions. Finally we describe the questions, relationships and patterns that we are investigating as part of our project.

## **ACCESS FOR WHAT?**

ICTs do not have any meaning in isolation – they have meaning only in relation to an implicit or explicit purpose. That purpose is the way they acquire meaning; this in turn contextualises them. As the South African Minister of Communications bluntly stated (Matsepe-Casaburri 2004), “There is no doubt that ICTs can be very effective tools. The question is, tools for what?” A discussion about access to ICT must therefore make explicit what its envisaged purpose is, or might be.

Most policy statements endorse broadly sweeping, apparently self-evident, purposes relating to the information age, the knowledge society or the digital age. The United States National Telecommunication and Information Authority (NTIA 1995), for example, called the Internet the “key to the Information Age” which should be part of a universal service for all Americans, while the South African government (Department of Education, 2003, p.16) views e-education as the platform to “ensure that all learners will be equipped for full participation in the knowledge society”.

Some researchers stress the economic importance of ICT, stating, for example, that access to information technology is crucial for governance and economic development (Jarboe 2001). Others foreground the democratic and citizenship possibilities which ICT enable, and prefer the term ‘knowledge democracy’ rather than ‘knowledge economy’ because of the participatory and social dimensions with which ICT is increasingly associated (Garnett & Rudd 2002). Indeed, access to ICT is considered a basic right of 21st century citizenship (Murdoch 2002).

Access becomes essential because “exclusion will mean severely limiting life chances” (Burbules & Callister 2000, p.19). This leads some researchers to focus on the value of social equity and inclusion. Warschauer (2003c), for example, argues that the very resources that people need access to are the same resources to which they will be able to contribute. Thus access and use are closely inter-related: access to resources and the use of resources are inter-dependent.

For many, ICT offers opportunities for improved education. Some international research focuses on how ICT can enhance efficiency (Cantoni et al. 2004; Mason 1998; Collis et al. 2001) and

provide new opportunities for learning through facilitation of contextual, social, active and reflective learning processes (Johnson & Aragon 2003). National South African policy at schools level states that ICTs can “create access to learning opportunities [and] improve the quality of learning and teaching and deliver lifelong learning” (Draft White Paper on e-Education, DoE 2003, p.8). In addition, “ICTs can accommodate differences in learning styles and remove barriers to learning by providing expanded opportunities and individualised learning experiences”. Higher education policy argues that the appropriate use of new media can support curriculum transformation and improve educational quality (The South African National Plan for Higher Education, National Department of Education 2001, S1.1). The Partnership for Higher Education in Africa (2003) extends this by proposing that ICTs “can enhance effective teaching, learning, and research in Africa”, thus providing “easier access to and input into the world of international scholarship”.

Our interest is ICT’s contribution to better teaching and learning. The model which we found useful in linking specific types of ICT to pedagogical elements is the conversational framework developed by Laurillard (2001) and used and extended by others (such as Britain & Liber 2004; and Conole, Dyke, Oliver & Seale 2004). This framework provides a way of organising prior pedagogical analysis around a classification of the media in terms of their logistics. It is not a way of classifying and delivering a verdict about quality in terms of use of new media forms; rather it is a way of linking and relating media types to learning and teaching interactions. We are therefore not seeking to make a value judgement about specific teaching or learning strategies or theories, but instead ask in which context a particular technology is or might be appropriate for a specified purpose.

#### **ACCESS TO TECHNOLOGY – FROM SINGLE ARTEFACT TO MULTI-DIMENSIONAL RELATIONSHIPS**

Given comparisons with countries in the developed world, and given the skewed access to resources and the fundamental inequalities that continue to characterise South African society internally, an emphasis on technological access is understandable. Teledensity rates are low: 11 in 100 people have fixed lines and 36 in 100 people have mobile phones (ITU 2003; Bridges 2002). Estimated personal computer density is lower at 7.2 in 100 people. In terms of Internet access, South Africa – with 6.8 in 100 people – is way ahead of the rest of Africa, which averages 1.4 in 100 people. But we still lag behind developed countries: 42 in 100 people for the United Kingdom and 55 in 100 people in the United States have Internet access (all figures ITU 2003).

Nationally 39% of South African schools have a computer and 26% have one for teaching and learning (DoE 2003). While direct figures are hard to pin down, it is clear that school access to computers in developing countries is substantially higher. For example, the percentage of computers available to 15-year-olds at secondary schools in the United States is 73% and in the United Kingdom 78% (OECD 2002).

Despite this rather bleak physical landscape, there has been a growing recognition that access to technology itself is necessary but insufficient. Internationally, researchers have been criticised for their pre-occupation with physical access and shallow demographics (van Dijk 2003), suggesting there is an overfocus on conditions and not criteria (Burbules & Callister 2000). People have argued for use of new terminology such as real access (Bridges 2001), thick conceptions of access (Burbules & Callister 2000), and social inclusion (Jarboe 2001; Warschauer 2002, 2003a), and are suggesting multifaceted concepts of access (van Dijk 2003), enabling resources (Warschauer 2002, 2003c), and dimensions of digital in/equality (Kvasny 2002, Di Maggio and Hargittai 2001). While there is little local academic research on ICT access in higher education

specifically, the same point has been made by the Minister of Communications (in Mbeki 2001), who has stressed that efforts to bridge the digital divide must be primarily about people, not technology.

We were encouraged by this growing consensus regarding the complexities of access and hoped to find a comprehensive model for our own purposes. Many studies (some cited in this paper) did not have explicit theoretical frameworks, or explicit theories of access/the digital divide. A few had developed frameworks of access which we found useful to varying degrees.

Van Dijk (2003) developed what he calls a cumulative model of access, whereby different kinds of access are experienced at successive stages and are conditional on one another. Mental access (motivation) is required first. Once this has been achieved, a person can mobilise material access (hardware). This will lead to skills access (which incorporates strategic, instrumental and informational skills) and only then is access to full usage obtained. We did not agree with this linear progression since our sense was that a more networked, relational perspective would be more useful. However, we had to agree that there were certain conditional aspects to access, with what he calls material access being, in our view, a primary condition.

Working from on-the-ground initiatives, Bridges (2001) developed a bottom-up theory by examining what worked best, what failed, and why. They concluded that access to technology was critical but that access to computers and connectivity alone was insufficient to sustain their use. They set out 12 determining factors ascertaining whether or not people had 'real access' to technology (making it possible for people to use technology effectively to improve their lives). Many of these factors have proved useful to us. However, for our purposes the model is too focused at the macro level (focusing at a regional level and including factors related to the economic, political and legal environment), is not scoped for higher education, and does not include the specific aspects of individual access that our pilot study results gave us reason to consider relevant.

We found Kvasny and Truex's (2002) framework insightful. They use Bourdieuan constructs to analyse how the digital divide is 'defined away' by policy makers. Their theoretical framework's core concepts include four kinds of capital: cultural (experience with computers); symbolic (expertise and training); social (relationships with others knowledgeable about computers); and economic (ability to acquire computers). In addition, they use the concepts of habitus (aspirations and attitudes), and symbolic violence (power and control). While we were concerned about some of their categories and interpretations, their suggestion that key concepts should be 'cross-mapped' also informed our relational approach. We found this very useful and note that our choice of the term 'resources' is close in meaning to 'capital'.

Indeed, Warschauer, who also uses the term 'resources', acknowledges his debt to literacy theorists such as Gee who in turn draw on Bourdieu. Examining the similarities between access to ICT and access to literacy, this theoretical approach notes (Warschauer2003 a, p.46) that: there are many types of ICT access; their meaning and value are specific to their social context; they exist in gradations; alone they bring no automatic benefits; they are a social practice; and acquisition of both is a matter not only of education but also of power. Similarly we found Warschauer's four categories for social inclusion – physical, digital, human and social – an excellent springboard to refine our own.

However, none of these researchers has provided a comprehensive model that describes all the resource elements or indicators which are relevant to people using ICT for teaching and learning. For example, Warschauer (2002, 2003c) does not include the practical aspects of time, autonomy and control and Kvasny (2002) does not consider content and form. Neither Bridges (2001) nor

van Dijk (2003) considers the role of social support and Bridges (2001) does not consider the specifics of human agency. For our purposes, we need a more widely ranging set of possibilities, given that we make no assumptions about which resources might be of particular importance. Indeed, this is one of our key research questions. We are interested in the relationship between resources at both a micro and a macro level.

We found the notion of access to different kinds of resources a powerful way to describe what people use, need and draw on in order to gain or acquire access to specific ICT uses and practices. This concept is used in both literacy studies (Lo Bianco & Freebody 1997) and sociology (Giddens 1979; Sewell 1992). In literacy studies, resources are about socio-cultural capital (Gee 1999). In sociology, resources are publicly fixed codifications (Sewell 1992), while the concept of 'rules resource units' describes rules which exist in relation to social practices (Giddens 1979).

On the basis of our readings and on the results of a pilot study survey with staff and students, we refined, polished and redeveloped four key areas until we agreed on four areas of resources to form the analytical foundation of our study. It was unavoidable that we would need some kind of dualist distinction between macro and micro, or structure and agency. Mindful that this is hotly contested and deeply theorised terrain, we acknowledge that structure and agency are interdependent (Freeman 2001) and interpenetrated (Lehmann 2003) and that they presuppose each other (Giddens 1979). In addition to personal resources and contextual resources, we suggest two other important resource categories: technological and content. While the former is inevitable, the latter may require some persuasion, arguments we take up later. Overall, we take a relational view (van Dijk & Hacker 2003) in order to map networks, conditions, positions and connections as explained in the last part of this paper. Mapping relationships between resources requires distinctly bracketed resource groupings. At the same time, in our view, resources are not static or absolute; they are not binarily present or absent. Because they can be available to varying degrees, we needed to track frequency and ease of access as well as availability of resources.

In the rest of this paper, we will describe in more detail each of our identified resources groupings: technology resources; resources for personal agency; contextual resources; and online content resources.

## **TECHNOLOGY RESOURCES: PHYSICAL AND PRACTICAL**

Clearly access to ICT as physical technology is the primary access required for use in teaching and learning. We note that such considerations are disappearing from investigations in some instances: two recent US higher education studies (Jones 2002; Allen & Seaman 2003<sup>2</sup>) simply assume physical access is in place. In the local context, as described earlier, this remains a burning issue.

In general, however, physical access is at the forefront of all accounts of access in the literature, *albeit* using slightly differing terminology. Most authors acknowledge the necessity for technological access, whether it is called physical (Wilson 2000; Warschauer 2003; Burbules & Callister 2000; Government of Japan 2002; NTIA 1995, 1998, 2000), technological (Kling 2000; Kvasny 2002) or material (van Dijk & Hacker 2003) access. In addition, almost every author asserts the importance of availability. Only three mention that the technology should be accessible (Bridges 2002; Warschauer 2003 a,b,c; Kling 2000), two that it should be adequate (Kling 2000; DiMaggio & Hargittai 2001) and one that it should be appropriate (Bridges 2002). We

also assume that teaching and learning needs can be quite narrowly defined. Our pilot study results suggested that user needs were about fitness for purpose, so rather than using appropriateness as an indicator, we decided that adequacy was a more useful physical indicator. Several authors (Kvasny 2002; Warschauer 2003; Burbules & Callister 2000; Government of Japan 2002; NTIA 1995, 1998, 2000) extend this category to telecommunication infrastructure, including all the physical infrastructure needed to “get wired” including the cost (to the individual) and maintenance of that infrastructure (Burbules & Callister 2000). Only one author mentions affordability (Bridges 2001). Given that in our context we assume that students and staff are not paying directly for ICT access, we did not track affordability as an indicator, although there is room for the issue to emerge in the survey instrument’s open-ended probes.

We believe that ICT is not neutral. Technologies exist in time and space, and they carry in their structural properties a particular culture and history (Bannon 1997; Leont’ov 1978). They are never used in a vacuum, but are shaped by the social and cultural context where the use is taking place (Vygotsky 1978). Their location is important (Murdoch 2002; Mkhize 2004). The implications are that, when investigating access to physical ICT, we need also to ascertain their location, availability and adequacy for use (or fitness of purpose).

It is also important to recognise that ICTs are objects which can be used to enhance or maintain power (Sewell 1992, p.9). They can even be understood to represent a supreme assertion of agency (Freeman 2001). The need for everyday matters to be factored into an analysis of physical resource considerations has been acknowledged in the literature. Having the time to use the physical resources is a criterion for access (Burbules & Callister 2000). This component can be further broken down to include control (where, when, and to what extent people use computers) and autonomy (whether people are competing for use, or if that use is monitored or limited) (Di Maggio & Hargittai 2001; Kvarsky 2002). In addition to time, childcare was mentioned as a potentially constraining factor in one study (Murdoch 2002). Thus our category of physical resources has been expanded to incorporate practical considerations such as time and autonomy.

Because our focus is on ICT, and because of our understanding of the mediating nature of such technologies, we prefer the term ‘technology resources’. In summary, we define technology resources as the tangible components of computers and associated telecommunication infrastructure. Our research indicators focus on location, availability and adequacy. We define practical resources as control over when and to what extent computers are used. Our research indicators focus on time and autonomy.

## **CONTENT RESOURCES**

Social scientists debating the agency-structure relationship have been criticised for neglecting content (Sewell 1992). It was not an object of interest for many of the researchers we have reviewed, who theorised and explored access to ICT, although a handful stressed that scarcity of suitable content is a factor contributing to the schisms of digital divides (Garnett & Rudd 2002; Bridges 2002; Warschauer 2003c).

While researchers studying ICT use in developed countries may not identify content as critical, it cannot be ignored in our context. The African continent generates only 0.4% of global online content and, if South Africa’s contribution is excluded, the figure drops to a mere 0.02% (UNECA, in Chisenga 1999). English remains the dominant language of publication for African producers, despite the fact that English first-language speakers comprise no more than 0.007% of the whole

African population (Boldi et al. 2002). Certainly the lack of local content has been identified by senior South African leaders as an essential issue to increase access to ICT for the majority of South Africans, who have called for local content (Mbeki 2001) and “information to bridge the digital and knowledge divide to ensure that our people can access information that can shape their lives in the languages of their choice” (Matsepe-Casaburri 2003).

Given our project’s attention to the use of ICT for teaching and learning, investigating access to online content is essential. We realise that content can potentially play several roles. It may be a mediational means (to use Wertch’s [1991] term); it may be the outcome of, for example, a collaboration; it may be the agreed discourse of a discipline community; it may be a knowledge domain; it may more prosaically be subject matter. However it is interpreted, content is essential to pedagogy. It is one of the three elements in a triangle of interaction comprising C-T-S, with the T being **T**eacher (or expert or facilitator) and the S being **S**tudent (or learner or apprentice) (Garrison & Anderson 2002; Laurillard 2001).

We presume that this is an issue for local students and academics. In particular, it has been observed that digital content relates closely to literacy and literacy occurs most effectively when it involves content that speaks to the needs and social conditions of the learner (Freire in Warschauer 2003c). We assume that this applies equally to digital literacy and to academic literacy. Others have noted the need to consider whether content is locally produced, relevant to user needs and in the required language (Bridges 2001). Language has also been mentioned as being relevant to identity and to people’s notions of themselves as computer users or not (Murdoch 2002). Finally, the form of the content is noted as important, given that access to content in new media forms often requires tacit knowledge of shortcuts, heuristics and conventions that travel within particular communities of users (Burbules & Callister 2000).

Now that ICT makes online content part of the pedagogical process in higher education, we need to know what access staff and students have to that content. We need to know whether access to content that is relevant, locally produced and in the required language is an issue, whether it is considered adequate or lacking. Therefore, we define content resources as the availability of suitable digital material online. Our research indicators focus on relevance, local production and language.

## **RESOURCES OF PERSONAL AGENCY**

In order for individual students or academics to use ICT meaningfully for teaching and learning, they need access to personal, collective and contextual resources. While we are committed to the importance of context (described in the next section), we argue it is important to identify specific resources which need to be accessed by individuals in order to give them agency. We found the notion of an active orientation useful. This suggests (Etzioni in Lehman 2003) that an actor in a social structure is more likely to become an agent when able to use or generate knowledgeability, power, commitment, and consciousness. The need for accessing personal resources allows an individual to exercise agency, to give meaning to objects and events and to act with intent (Drislane n.d.). What we need to know is which human resources are particularly necessary to enable staff and students to become agents who can mobilise resources and purposefully use ICT and how these may differ according to purpose. For example, are different personal resources required for teaching purposes as opposed to learning purposes?

Given that agents are assumed to be knowledgeable (Giddens 1979; Lehman 2003), it should not be surprising that the most commonly expressed concept is knowledge – variously expressed as know-how (Kling 2000), knowledge or cultural capital (Kvasny 2001), skills (van Dijk & Hacker



2003; Burbules & Callister 2000), mental access (van Dijk & Hacker 2003), literacy (Warschauer 2003 a,b,c; Garnett & Rudd 2002; Carvin 2000), competency (Jarboe 2001; Di Maggio & Hargittai 2001), and capacity (Bridges 2001). Allied cognitive dimensions are mentioned twice (Wilson 2000; Di Maggio & Hargittai 2001). In one case (Di Maggio & Hargittai 2001), different kinds of knowledge domains are mapped out – these being background, technical and recipe knowledge. In another, it is posited that different types of knowledge are required for the use of new technologies and they exist on a continuum (Warschauer 2003c).

In the light of the varying phraseology used in the literature, and based on our review of concepts based in the pilot study, we decided on a second resource grouping of aptitude. Aptitude is defined as knowledge and skills in using a computer and would allow us to probe knowledge and skill, as well as to ask specific questions about experience and training (in terms of length and type). Our indicators of this resource are therefore knowledge, skill, experience and training.

The other grouping – covered to a lesser extent in the literature – can be broadly described as dispositional. It would include attitudes (Warschauer 2003 a,b,c), dispositions (Burbules & Callister 2000), mental attitudes (van Dijk & Hacker 2003) and motivations (Harper 2003). It has also been called psychological access, including interest and fear (van Dijk and Hacker 2003) A more unusual element in this resource group is that of trust (whether, for example, people have confidence in and understand the implications of the technology they use, in terms of privacy or security) (Bridges 2001). Given anxieties and fears which exist generally about technology in universities, we decided on a two-pronged approach to disposition. We thought it important to find out about individual interest in and attitude to using computers in general. Mindful that these might be different, we decided additionally to explore a person's interest in and attitude to using computers for learning and teaching specifically.

Our definition of personal resources therefore includes a person's interest in and attitude to using computers (generally and specifically for learning), as well as her or his knowledge and skills in using a computer. Indicators include interest, purpose, experience, knowledge, training, and skills.

## **CONTEXTUAL RESOURCES**

In order to use ICT, people need access to resources in and from the context in which they function. These resources, together with mutually sustaining schemas, make up the structures that empower and constrain social action and that tend to be reproduced by that action (Sewell 1992, p.19). These resources determine how conducive the environment is to using ICT and how enabling the context is of the integration of ICT for teaching and learning, specifically in a higher education institution.

In this section, we set out to identify which resources, forming part of the structure of human institutions, groups and organisations, need to be accessed in order to utilise ICT successfully for teaching and learning. Two key kinds of resources could be identified from the literature, these being firstly social resources (in the form of networks and support) and secondly formal enabling frameworks of various kinds.

The importance of community support and valuing by social networks has been recognised by several researchers (Carvin 2000; Warschauer 2003 a,b,c; Jarboe 2001). Having access to the community and social resources has been described as having the capital to support access to ICT (Warschauer 2003 a,b,c). By being able to draw on these networks, people can receive information and guidance from formal technical advisors, colleagues, friends or family (Kvasky

2002; Garnett & Rudd 2002). Having friends and family also using computers encourages use (Murdoch 2002). Networks of encouraging family and friends provide important emotional reinforcement in form of positive interest (Di Maggio & Hargittai 2001). Social networks therefore provide both practical support and emotional support. Shared social agreement that computers have value also encourages use.

The need for formal external frameworks was also widely observed, *albeit* from slightly differing angles. Thus institutional support and frameworks were identified as important (van Dijk & Hacker 2003; Warschauer 2003c), as were the related matters of governance (Jarboe 2001) and regulations (Government of Japan 2000). At an increasingly macro level, policies (Government of Japan 2000), political will, national regulations and economic frameworks (Bridges 2001) that affected technology use have also been examined in some detail.

We therefore defined social resources as the interest and support received from a community social network. Our research indicators focus specifically on support and networks. We limited our investigation of macro-level resources to the immediate institutional environment, as our pilot study indicated that most students and many staff were unaware of the existence and implications of broader economic and other societal regulatory frameworks. Certainly aspects of institutional context in terms of policy and leadership are more tangible to academic staff than to students. Our second set of contextual resources was therefore institutional resources defined as the integration of technology into the institution. Our research indicators here are extent, policy, support and intentions.

## RESEARCH FINDINGS

We are presently analysing and writing up the results of our survey which was answered by 6 577 students (9% of the target sample) and 515 academic staff (20% of the target sample) in early 2004. While these findings are being reported in detail elsewhere, the way that we have conceptualised the study will allow us to describe the landscape, compare with the results of other studies and explore the various and complex relationships within and across access and use. Firstly, we are able to describe the landscape because to date we have no factual foundation to describe our work in the region. We are answering numerous basic questions and getting a sense of the resources staff and students have access to, and are finding that physical access remains a burning issue.

We can see that access to physical resources is the most differentiated of our resource groupings. Thus the 61% of surveyed students who use a computer daily at their institution, this ranged between 37–84% across the five institutions surveyed. Students were divided about their ease of access to computers, with 63–74% of students at two institutions saying it was difficult or very difficult compared to 67–88% of students at another two institutions saying it was easy or very easy. Perhaps unsurprisingly, it was within the two historically disadvantaged institutions that students found access to be difficult.

Our assumptions are being radically shaken up as we find that most students consider they have adequate access to online resources, with 79–89% stating they find online content relevant to their courses and 80% saying that it is the language they want. We are particularly surprised by this given that just less than half the students surveyed spoke English as a home language.

We now have an idea of how many staff (60%) and students (81%) are using ICT more than occasionally as part of teaching or learning practices, and are interested to note that students are using ICT to support their learning more than staff are asking them to. We are also

able to ascertain whether our findings accord with results of non-South African studies, as we either asked the same questions or tested similar assumptions. For example, while University of Michigan (1999) found that time, support and reliability were the three top factors which enabled or constrained faculty staff in their college, we found that issues relating to physical resources (particularly adequacy and availability) dominated qualitative responses on enabling and constraining factors. This was followed by issues relating to personal ability and the context, particularly support and availability of appropriate facilities (Brown & Czerniewicz 2004).

Finally, we hope we have designed a study which will allow us to rise to the challenge of “getting past the digital divide by designing and testing causal models with multivariate analyses on the road to theory” (van Dijk 2003, p.1). We believe that we will be able to gain an enriched understanding of relationships, patterns, interaction and conditions. An example of this is the relationship between the number of years’ experience students have using computers and their self-rating of ability, and the frequency and range of their use of ICT. Students who seldom use ICT (that is, those who never or rarely use ICT) or have a very narrow range of use of ICT (for example, use them frequently for only one or two specific activities) are more likely to rate their computer ability as average to poor (50%) and have less experience using a computer (38% used a computer for four years or less) than those that use a range of ICT frequently (where only 26% rate their ability as poor to average and 25% have used a computer for four years or less). However we found no relationship between frequency and range of use and reported difficulty in accessing computers on or off campus.

When considering which groupings of staff or student are using ICT to support their teaching and learning, we found no discernable differences in frequency or type of use in terms of gender amongst staff or students. We did find differences in frequency of computer use with regards to age. The older the staff member the less frequent the use and younger students (under 20 years old) report more frequent use of computers overall (63% use more than occasionally) compared to older students (over 40 years old) where only 40% of students use more than occasionally. Of course, often some of the most interesting relationships are the unexpected ones. The data and patterning will also tell us which questions to ask, and which way to go next.

## **CONCLUSION**

In a country where there is a paucity of research about ICT access and use in higher education in South Africa this study is also unusual as existing research has tended to take the form of local case studies rather than meso- or macro-level investigations (Henning & van der Westhuizen 2004; Czerniewicz, Ravjee & Mlitwa 2005). Work done on ICT in education has tended to focus on the technical hardware and software, while it is becoming evident that these are essential but insufficient factors. Furthermore, a binary notion of use – that ICTs have or have not been taken up for educational purposes – provides an uncontextualised perspective on more complex issues in an already multi-faceted teaching and learning terrain.

Those of us working in higher education in South Africa need to move beyond the rhetorics of ICTs as artefacts which simply need to be acquired, to the recognition that integrating ICT in teaching and learning requires access to a much fuller range of resources. If we see personal resources, contextual resources and content resources also as important, we can plan differently and better design educational interventions.

**Endnote:**

- <sup>1</sup> The project is one of five being conducted as part of the HictE (Information and Communication Technologies in Higher Education) Project, a cross-institutional, Western Cape, Carnegie funded project on "Enhancing Quality and Equity in Higher Education through the innovative application of ICT".
- <sup>2</sup> Jones 2002 conducted the PEW study of college student use of ICTs in the US and Allen and Seaman 2003 authored the SLOAN Consortium report on the quality and extent of online education in the United States.

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## **Computer-supported development of critical reasoning skills<sup>1</sup>**

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### **ABSTRACT**

Thinking skills are important and education is expected to develop them. Empirical results suggest that formal education makes a modest and largely indirect difference. This paper will describe the early stages of an ongoing curriculum initiative in the teaching of critical reasoning skills in the philosophy curriculum on the Howard College Campus of the University of KwaZulu-Natal (UKZN). The project is intended to make a significant contribution to the challenge of helping students think more effectively.

The general outlines of the critical reasoning skills 'problem' are described, along with some remarks on the form it takes in South African post-secondary education. This is accompanied with some observations concerning the optimistic claims often made on behalf of philosophy, and the study of philosophy, in the area of reasoning skills, and some indications of the actual success of most attempts to teach reasoning skills. Thereafter some general results from an approach in the study of cognition, most often referred to as 'distributed cognition', are outlined.

These results form part of the explicit motivation for the development and design of a software system for supporting critical reasoning teaching. The ReasonAble system was developed at the University of Melbourne, Australia, and is currently in use at UKZN. The main features of the software system are briefly described. Finally the specific implementation developed so far at UKZN is explained, and the results of initial evaluations by students are reported. Some comments on envisaged future evaluations and forthcoming initiatives extending the use of the system are outlined.

**Keywords:** *Critical reasoning, curriculum, software, philosophy*

### **INTRODUCTION**

This paper describes the early stages of an ongoing curriculum development initiative in the teaching of critical reasoning skills in the philosophy curriculum on the Howard College Campus of the University of KwaZulu-Natal (UKZN). The project, intended to make a significant contribution to the challenge of helping students think more effectively, involves the use of Australian-developed software called *Reason!Able*, usually used in dedicated critical reasoning courses.

The software and related tutorial programme was introduced at UKZN in response to the regularly acknowledged 'problem' of students' critical reasoning skills. While the critical thinking problem is global, it is not evenly distributed, and it takes a particular form in South Africa. Remaining drastic inequalities in the education system mean that many South African students enter the post-secondary system relatively poorly prepared, while some are very well prepared. Levels of skill of various sorts, including critical reasoning skill, vary widely within single post-secondary classes, as do levels of motivation for critical reasoning.

Classes containing such variation in talent, skill and motivation demand creativity and dedication in the teaching process. There is a risk of sectors of any given class being left behind, driven

away, demoralised or sold short. The challenge is, perhaps, especially urgent at the early stages of undergraduate curricula, where rapid gains in skill and motivation at critical reasoning could help lay a foundation for future success in other courses and beyond. The project described here is partly responsive to this particular challenge – the urgent need to build skill and confidence in critical reasoning among students who enter the system often with little of either but a pressing need for both.

My involvement as a philosophy lecturer means that I work in a discipline, the study of which is *correlated* with highly developed reasoning skills. (In the case of philosophy, departments regularly claim that study of philosophy *causes* improvement in reasoning skills, but this has not been demonstrated.) There is also evidence that tertiary education does make a positive, but modest, difference to reasoning skill, and that typical reasoning courses make a comparatively small contribution to the process.

Some key premises about learning underpin the choice and use of the software in this project. For space reasons, the key constructs are summarised very briefly, while the references provided point to a more detailed explanation. In brief, the project is premised on related concepts from distributed cognition, which provide the inter-rated analytical categories of scaffolding, transformations, and the power of good representations.

Distributed cognition (Hutchins 1995; Clark 1997; Spurrett 2003) refers to cognitive processing that relies to a significant extent on resources outside the brain. Evidence from robotics, human computer interaction, developmental psychology, cognitive psychology, cognitive anthropology, as well as various parts of biology and other fields, is sufficiently strong to establish the claim that cognition is at least often distributed. This provides an opportunity to investigate which optimal external resources can be found or constructed with respect to the cognitive problem in order to enhance human performance.

The notion of scaffolding (Vygotsky 1986; Clark 1998) explains that the learning of a variety of tasks could be made possible, or easier, if suitable external structures and supports are available. Cognitive scaffolding can function by helping to direct attention, and to prompt the right sort of action at the right time, and may be permanently necessary and useful.

A key insight of distributed cognition is that some computational problems can be transformed into intrinsically simpler ones, ones that depend for their resolution on a different mixture of sensory modalities, or ones that can (partly) be solved by means of manipulation. Such transformations can permit multi-modal learning of key relationships. It has been found that transformations can reduce error rates, and increase task effectiveness in various other ways (Kirsh & Maglio 1995).

It has also been found that different ways of encoding or representing the very same information can be more or less helpful for cognition. Cognitively helpful representations make the right sorts of information salient, do not clutter the visual field with irrelevant distractions, help make explicit the structure of what they represent, and can allow what would otherwise be demanding problems of judgement to be replaced by simpler acts of visual inspection (Tufte 2001).

In addition to these motivations from the general field of distributed cognition, the design of our programme is partly motivated by reference to the literature on 'deliberate practice' (see Ericsson & Charness 1994; Ericsson, Krampe, & Tesche-Römer 1993; Ericsson & Lehmann 1996; and the papers in Ericsson [ed.] 1996). 'Deliberate practice' is, it seems, a pervasive feature of elite performers in a wide range of domains including the arts, sciences and various sports and games. Key features of deliberate practice include that it relies on improvement through feedback, that it involves activities focused on single components of performance, rather than the

whole, and that it involves exercises of increasing difficulty. For more remarks on deliberate practice see the section on the UKZN initiative below.

### THE REASON!ABLE SOFTWARE

The *Reason!Able* software (see Figure 1) is a structured environment for storing and manipulating the components of *arguments*. It is, in different and complementary ways, a form of scaffolding, a transformer of some reasoning operations into manipulations, and a performance enhancing representational system.

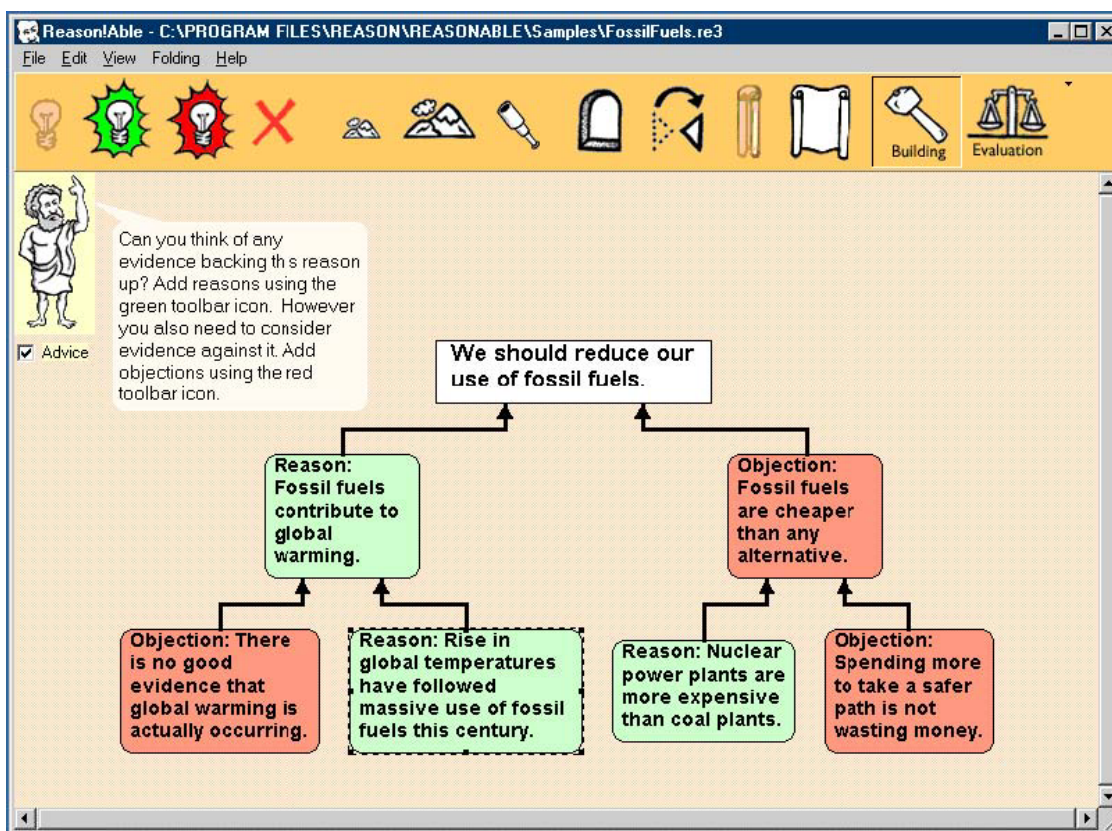


Figure 1: *Reason!Able* screenshot (from <http://www.goreason.com>)

It is important to recognise and remember that the software is not itself 'intelligent'. It does not 'understand' the arguments built with it, and cannot itself judge their quality. Consequently it is just as possible to fill *Reason!Able* with useless nonsense as it is to do so with a word processor. This is not a limitation – it is crucial to the distinctive value of the system, a point returned to in the conclusion below. Along the lines suggested above, when used properly *Reason!Able* enables users to represent arguments in a way that facilitates rather than impedes understanding and evaluation, and it provides scaffolding that enables more effective criticism and evaluation on the part of the user, crucially including evaluation of her own efforts.

Users of the software build and manipulate representations of arguments, and evaluate the

arguments that have been built. The elements of arguments are *statements* – declarative sentences that can be true or false. Some statements are reasons for (or objections to) others. A well-formed argument has reasons that work together to support the conclusion, just as a proper objection consists of a set of statements that work together to *undermine* a conclusion.

The hierarchical structure of the argument maps built in *Reason!Able* makes the relations between the components (claims that support or undermine this or that claim) visible and explicit through their spatial arrangement, and the lines linking the components. This provides a form of scaffolding. It enables diagnostic questions, such as whether a set of reasons does indeed work together, to be appropriately directed, and (with the support of a few simple rules) makes answering the questions themselves simpler. The system of colour-coding and labelling reasons (green) and objections (red) makes the purported function of particular claims more salient. The fact that parts of arguments can be pulled off the current map, moved to different locations, and transformed (for example, from reason to objection) allows decisions about how to improve the argument map to be carried out by direct manipulation (by means such as dragging and dropping).

Learning to use Reason!Able competently and effectively is not a trivial task. While the environment itself is simple and easy to master, and the key rules regarding how to build and work with good arguments are easy to remember, learning to apply the rules systematically and rigorously takes sustained, structured and appropriately supported practice. It is for this reason that our curriculum development took account of the literature on deliberate practice.

Although learning to use the software effectively is difficult, it is also an excellent way of learning not to make, and of getting into the habit of not making, a range of common errors of reasoning, including those listed above in the discussion of ‘the problem’. How is it that correct use of Reason!Able can help with these? The key, in the first instance, is a simple set of rules for correct argument construction. These rules include the following:

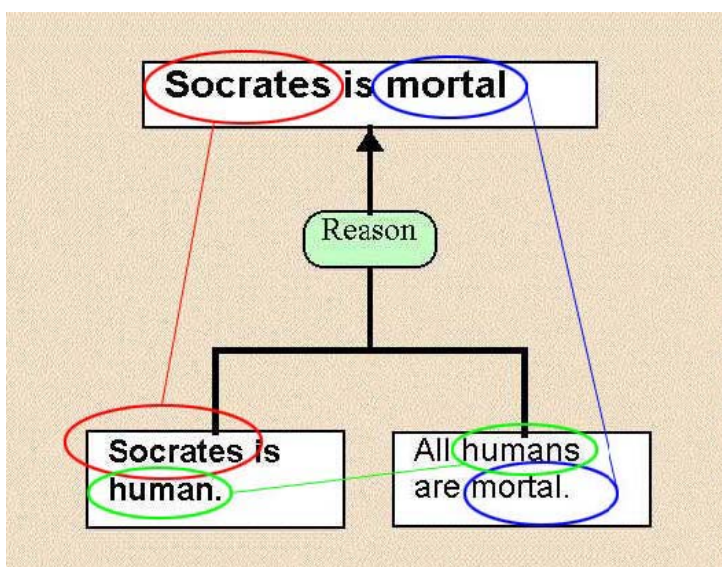
Rule 1: *Only* one simple statement per box;

Rule 2: *At least* two co-premises per (sub)-argument

Rule 3: *Absolutely no* ‘danglers’ (either vertical or horizontal).

Following the first rule ensures that each box in an argument map contains only one statement. Students can fairly easily be taught how to check an argument map to make sure that each box contains a statement (ask “can this sentence be true or false?”) and also whether it contains a simple statement or a complex one (ask “can this sentence be separated into two, without adding anything?”). Complex statements (for example, including ‘because’ claims) are instances of reasoning that has not been made fully explicit, and a sign that work needs to be done in order to make it explicit. Since one of the chief symptoms of insufficiently critical reasoning is failure to make arguments explicit, this simple diagnostic tool has tremendous value.

To understand the second and third rules, an additional illustration will be useful. Figure 2 is an argument map representing a simple and famous syllogism:



**Figure 2: A famous syllogism illustrating the no 'dangler' rule.**

Following the second rule ensures that single claims are not allowed to count as arguments, and to prevent repeating a conclusion to be allowed to count as giving a reason. To understand more clearly why this makes a difference, consider the third rule.

A 'dangler' is a part of a statement that only appears once in a sub-argument. If it only appears in the conclusion, then that part of the conclusion is unsupported by its reasons. (These are 'vertical danglers'.) If it only appears in *one* of the reasons, then it is either irrelevant to the conclusion, or it fails to 'work with' the other reasons to support the conclusion. (These are 'horizontal danglers'.)

In the case of the argument in figure 2, there are no 'vertical' danglers, and the parts of the two co-premises that are not connections with the conclusion are connected to each other, so there are no horizontal danglers either. The visible structure of the argument map helps users work out where to look to determine whether the rules are being violated, which is to say that it functions as a form of scaffolding that helps direct attention appropriately.

Repeated application of the second and third rule makes a significant difference to how easily an accurate and/or effective set of relationships between the parts of an argument can be found, as well as helping to direct the process of working out what the components of the arguments are at all. (If an argument made by someone else and recorded in a text cannot be made fully explicit, or does not allow an effective set of relationships between its parts to be constructed, then the failings of that argument are probably being made explicit.) A good argument map enables objections to be accurately directed as well: since the 'no dangler' rule applies in the case of objections too, it can be invoked to help work out what part of an argument is undermined by an objection, and to help make the objection fully explicit.

It seems as though the system works. In Australia, where systematic assessments have been conducted over several years, students taking a single-semester critical reasoning course there show measured gains in reasoning skills over a single 12-week semester of up to *double* that associated with a three-year undergraduate education (van Gelder 2001).

It is less clear what exactly it is that works. Also, the courses at UKZN have yet to be assessed by means of systematic pre and post testing using a standard independent reasoning skills instrument (as the first such testing is taking place in 2005). Some of our students are certainly of the view that something is working, though. In a reflective essay completed at the end of the course (in 2003), one student wrote as follows:

*As a law student and a future lawyer, it is imperative [for me] to be able to anticipate both sides of an argument. [...] Studying philosophy, [...] particularly the Reason!Able method of argument mapping, has enabled me to do this more effectively.*

The software also allows initially sketchy representations of an argument to be refined through an iterated process. It is possible to enter a conclusion, and follow it with a series of partial reasons, then once they are in the system, use the rules to determine a better arrangement, and to make the sub-arguments properly explicit.

This system does not, and cannot, make it possible to work with or evaluate arguments without having to make *judgements* at various stages. Nor is that its purpose. Rather, it is intended to provide structured support for the process of determining what an argument is in any given case, and how it is supposed to work, so that judgements are made in a more focused and effective manner. It is possible to gain these advantages with respect to both the arguments of others, and with one's own arguments.

One possible concern that the above account could raise would be that users could form a dependency on the software, so that they could only reason fully effectively when actually using it. The empirical results reported above, in which the assessment instrument was a standard reasoning test completed with pen and paper, and in the absence of the software, suggest that this worry is misplaced. As noted above, some cognitive scaffolding is genuinely temporary – it helps those who lean on it learn the right sorts of relationships, so that their ongoing effectiveness without the scaffolding is better than it would have been otherwise.

## THE UKZN INITIATIVE

In our two UKZN courses (both semester-long, one at first-year level and one at second-year level) *Reason!Able* has been integrated into the teaching process of courses that each has its own distinctive content. The first-year course is a general introduction to philosophy, ranging over a wide range of strikingly different topics and historical periods. Several of the outcomes of the course relate to the reasoning skills of students, and include the goals of greater appreciation of the variety of forms of argument, and of the ways in which different forms are appropriate for different problems. The second-year course is on cognitive science, and most of the course is given over to the study of distributed cognition in a variety of domains.

The integration of the course content with *Reason!Able* involves, in the case of both courses, the following components:

- First, all students take a weekly tutorial in a computer room, where a facilitator<sup>2</sup> guides the group through a series of specific exercises and problems, usually involving prepared argument maps and tasks. All of the tasks relate to arguments that are part of the course content, although the first of the 13 tutorials was given over to an orientation to the software itself. Most tutorials involved a mixture of small group and individual work.<sup>3</sup>
- Second, in lectures argument maps built with *Reason!Able* are used as visual aids. This involves talking through the maps, problems faced in constructing them, and commenting on important or interesting features of particular arguments as represented.<sup>4</sup> Over the duration of



the course a library of argument maps is built up on the lecturer's web page, available for students to download and study, attempt to improve, and/or to extend.

- Third, students are encouraged to use printed argument maps as a point of departure during additional consultations with tutors or the course lecturer.

At the outset of each course in 2003 and subsequent years, time was spent in lectures explaining why *Reason!Able* is designed the way it is, how and why it is supposed to work, and why, although difficult, the tutorial exercises are worth taking seriously. It was made clear that what was being demanded was not easy, and an ongoing effort was made to provide motivation and encouragement. (See the remarks on evaluation below: we may have fallen short in this area.) Since the aim of the course was not primarily to produce students who were good at *Reason!Able* as an 'end in itself', but students who were better at reasoning, none of the instruments of student evaluation (assignments, essays and the final examination) depended on constructing and working with argument maps. Instead the clarity and quality of written argumentation was assessed in line with practices from the preceding year, when the same content<sup>5</sup> had been taught without computer-supported tutorials. That said, students were encouraged but not required to make argument maps during the planning stage of written assignments and invited to submit any such maps along with the assignments for comment and feedback.<sup>6</sup>

A key motivation for the design of the tutorial exercises was, as noted above, to facilitate and guide what Ericsson and his co-researchers call 'deliberate practice'. Key features of deliberate practice include:

- It is designed to provide maximum opportunities for improvement through feedback. (This feedback typically requires an independent specialist source of critical feedback.)
- It involves activities focused on single components of performance, rather than the whole.
- It involves exercises of increasing difficulty, ideally with more advanced stages being attempted only when prior stages have been performed at a pre-determined acceptable level of effectiveness.
- It involves repetition and requires conscious endorsement of the goal to improve.

A striking feature of the research on elite performance across the range of domains studied is that top-level performance (including that of child prodigies) seems to be reached after *ten* years of deliberate practice (Hayes 1981; Ericsson & Lehmann 1996). This suggests that the approach being attempted at UKZN should, if found to be successful, be extended further into the curriculum, rather than thought of as a 'one-off' remedy that takes full effect in one semester.

The tutorial exercises in use at UKZN were specially designed to lead students through a sequence of increasingly demanding tasks involving the application of the rules of reasoning described above. At the simplest extreme they involve checking argument maps for violations of the 'one statement per box' rule, and at their most demanding substantial reorganisation and addition is required in order to repair the argument map or otherwise complete the task. Most of the maps used in tutorials were constructed in a three-stage process. First, accurate maps of arguments covered in the course were built up and refined over an extended period. Second, the maps were deliberately modified in various ways, including deleting premises, telescoping separate claims into one, and moving sub-arguments out of their proper places. Finally, a specific set of written instructions (along with clues and suggestions as to how to proceed) were prepared to accompany the task.

We have a growing library of tutorial exercises, many of them developed following a period of intensive workshopping and experimentation. Materials development is an ongoing priority. Each

tutorial is intended to help deal with a specific reasoning problem, or challenge, or a set of them. Other tutorials in the course were intended to facilitate understanding of arguments where students tend to agree with the conclusion, and hence (sometimes) feel less interest in knowing the exact reasons, or to appreciate how arguments can function as explanations, and hence as a tool for coming to understand complex positions. One of the later topics in the course, taught to humanities students who are often wary of mathematically rich topics, is Einstein's special theory of relativity.

In 2003 and 2004 the primary goal of the curriculum initiative with *Reason!Able* was to develop functioning courses, and, given the demands of meeting that objective, we do not yet have rigorous quantitative data regarding measured improvements in reasoning scores along the lines of the studies reported above. (In 2005 we were required by the demands of an institutional merger to implement a revised curriculum, hence impeding quantitative evaluation further.) Some evaluative comments are nonetheless possible. In what follows I will focus specifically on the first-year course that ran in the second semester of 2003, followed by some remarks on an assessment that is presently underway. First an outline of some of the main demographic features of the class is offered. Second an overview of the sorts of evaluation planned for the future is provided. Finally, preliminary evaluative remarks based on the student course evaluations, and the experience of the tutors, are offered.

### **The students**

In the second semester of 2003 the final enrolment for the course 'Philosophy 1B' was 219 students. Of these students 184 (84%) were in their first year of study, while the remainder of the students were in later years. Forty-four (20%) of the students were drawn from the four-year Bachelor of Business Science programme, and 47 (21%) from the four-year undergraduate Bachelor of Laws programme. Of the remaining students, the vast majority were enrolled for general or programme Bachelor of Arts (46 students, 21%) or Bachelor of Social Science (50 students, 22%) degrees.

Forty per cent of the enrolment consisted of white students, while 56% of the class was female. Seventy-one per cent of the class was under the age of 20 years, and 82% of the group reported English as their home language. Fifty per cent of the class entered university with 40 or more matric points. Success at the course overall correlates strongly with 2002 matric scores – the vast majority of those whom passed the course had 30 matric points or more, and almost every student whose final mark was better than 80% had 40 or more matric points. This correlation is not surprising – a total of 30 or more matric points is known to be a reasonable predictor of success at undergraduate courses at UKZN.

Given that the entrance requirement for the Faculty of Human Sciences is 24 matric points, the high average number of matric points per student in the course requires explanation. The Philosophy programme does not impose its own entrance criteria. Nonetheless the 20% of the group drawn from the Business Science programme have passed entrance requirements calling for 38 matric points including at least a 'B' for Higher Grade mathematics. The 21% drawn from the Bachelor of Laws programme were required to have at least 34 matric points to gain admission to that faculty. Any profile of the class by matric points is limited, furthermore, insofar as some students enrolled via access programmes that attempt to assess prospects for success independent of matric results, or in the case of some students, especially older students, in their absence. Finally, the course has a reputation among students for being relatively challenging (see the extracts from course evaluations below) and this probably plays a role in self-selection on the part of students. We are also well aware that matric points should not be regarded as a context invariant indicator: a relatively low score by a student whose secondary education took place in a very poorly resourced school, for example, could be much more impressive than a



'better' score from a student with access to excellent resources.

The enrolment in 2003, as in every year, included students with various forms of under-preparedness, notably including low critical reasoning skill and low critical reasoning motivation (although sometimes with high general motivation), and in some cases low matric scores. Some under-prepared students achieved striking success – including a few cases in which students with close to, or less than, 24 matric points, and who had attended poorly resourced high schools, achieved final marks in the upper second (68–74%) or first class (75%+) range.

From 2004 this same course is to be offered in both semesters, rather than only in the second. Part of the motivation for this is to allow more students to take the course, but at the same time to work with a smaller number at any given time. It is hoped that the better staff:student ratio will allow more extensive support to be provided to all students, especially those who are under-prepared, but motivated.

### Future evaluations

In the first semester of 2005 we began a three-year project to run a series of pre and post tests on classes taking *Reason!Able* tutorials and controls of various sorts. In the first semester of the study we have conducted pre-testing on each of three groups (one at each year of study) in a course using *Reason!Able* tutorials, and will follow these with post-testing and analysis at the end of the semester. This analysis will determine the details of the design of the remainder of the project.

For this study we are using the same instrument used in the Melbourne studies reported above, the California Critical Thinking Skills Test (CCTST). This will enable the results of the UKZN study to be related to those undertaken elsewhere, and will assist in gauging our success. Linking the results of pre- and post-testing with matric points and subjects will contribute in a small way to establishing in more detail in what ways, and to what extent, matric marks overall, and for particular subjects, are predictors of reasoning skill prior to teaching with *Reason!Able*, and also what aspects of matric results, if any, are predictors of capacity to make significant gains over the course of a semester. This study may also be extended to include follow-up work on the varying success of students who completed the course at the variety of programmes of study they go on to follow. Ideally more seriously longitudinal study of a small group of students going through the learning process will be included at some time as well – a noted limitation of pre- and post-testing is that it illuminates so little about what takes place in between.

It would be encouraging to find that the approach adopted at UKZN is producing the same sort of rapid gains as in Melbourne. If it is then follow-up study to determine the extent to which any gains are *retained*, and how they impact on future success, is necessary. Given the research noted above on deliberate practice and expert performance, we also hope to determine the extent to which taking successive courses of this sort (some UKZN second-year courses involve computer-supported tutorials) produces ongoing gains.

### Preliminary evaluations

In the absence, for now, of properly independent measures of success of the sorts envisaged and described above, it is still possible to comment on the success of the project in 2003.<sup>7</sup> First, it is my impression (as the person who marked all of the 700-odd assignments and 450-odd examination essays produced in the course) that the level of detail and clarity in written arguments produced by the students improved steadily through the semester, and that the same was true for the quality of verbal arguments in class discussion.

Second, the tutorial facilitators reported that tasks of types that initially had their groups stumped, became easier and easier over time, and that during the second half of the course especially, students in tutorials would regularly complain that the tutorial period was too short, and that they wanted more time to finish what they were doing to their own satisfaction.

Third, as supervisor of the dissertations of two of the facilitators, I can report that the quality of their own written work increased noticeably.

Fourth, the student evaluations of the course included the positive and striking results presented in the Table 1 below. The reason that the results are given in two columns is that approximately 20% of enrolments on the course were first-year students taking Bachelor of Business Science degrees. Timetabling requirements meant that these students took some classes in different venues, and their assessments were collected and processed separately to facilitate a variety of comparisons. The entrance requirements for the Business Science degree are higher than those for all other degrees from which first-year students in the course were drawn, and include higher-grade mathematics. Tutorial attendance records show that the Business Science students attended their tutorials (also held in different venues for timetabling reasons) with considerably greater regularity than other students (on average).

**Table 1: Student evaluations of the course**

| <b>Evaluation question</b>  | <b>Positive response – Business Science</b> | <b>Positive response – Humanities, Law, Social Science and others</b> |
|---|---|---|
| The course as a whole was “challenging”   | 89%   | 90%   |
| The course was “useful in developing my thinking skills”                        | 93%   | 87%   |
| The course was “useful for (some of) my other subjects”                         | 48% <sup>6</sup>                            | 87%   |
| The computer-based tutorials were “useful in developing my reasoning skills”    | 70%   | 59%   |
| The computer-based tutorials were “useful for understanding the course content” | 85%   | 52%   |

These considerations suggest that the report of those students who attended the greater proportion of the tutorials may be a better guide to their value – and those students who were most dedicated to attending and participating were mostly convinced that the tutorials were useful. Nonetheless it is not clear that this is a sufficient explanation – rather it raises a new explanatory challenge which is to account for the far more patchy attendance in tutorials of Humanities, Law and Social Science students. One pedagogically lazy explanation suggests that ‘good’ students simply work harder, and do better. The more challenging, and I think correct, response is to recognise, as empirical research suggests, and as noted above, that overall reasoning effectiveness depends on a combination of skill and motivation. Both need to be encouraged, developed and supported in the teaching process. It is my hope that careful attention to the task of building and consolidating motivation among students will lead to significant gains for all involved. I suspect that some students found the early stages of the tutorial programme somewhat demoralising, and that more could be done to help them perceive the gains that they are making as they go along, and to help them believe that the ‘pain is worth

the glory’.

On a personal note, the process of teaching with the software was gratifyingly humbling. It was quite a lot more difficult than I expected to make satisfactory maps of arguments that I’d have thought I knew inside out from years of teaching them. I also discovered that working collaboratively on building maps (which I did with graduate students in the course of making tutorial tasks) was highly rewarding – the maps provide a clear focus for discussion, and an anchor reducing or preventing drift away from the topic.

## THE FUTURE

As noted above, 2005 sees a proper quantitative evaluation several of our courses, using the same independent instrument as was used in the Melbourne studies reported above. I hope that it will find that we achieve a comparable gain in measured reasoning skills to that found in Melbourne. In preparation for the 2005 courses a substantial portion of the tutorial tasks have been completely overhauled, including various optional sub-tasks for students who find they are working more quickly than others, and additional extra challenging tasks that can be attempted outside tutorials. (The full set of exercises is to be placed on the web, along with the argument maps that form the basis of each tutorial.)

We are also going to break new ground in the use of *Reason!Able* by integrating it into a number of graduate courses. To replace the common practice of seminars commencing with one person reporting on the content of one of the readings for the seminars, we will require construction of argument maps as preparation for seminars. At the start of each seminar those who have built maps will distribute copies, and then talk everyone through their map, and any difficulties that they ran into along the way. This initial discussion will set up the more free discussion that follows, and hopefully make a significant impact on its quality. The ‘ten-year rule’ in the empirical study of expert performance reported above suggests that integrating argument mapping into graduate teaching might not be a case of overkill, but could instead continue to provide significant gains. It will be a few years before graduate students in our courses are exposed to deliberate practice in argument mapping in their first year, and hence some time yet before follow-up quantitative assessment of longer-term gains is possible. Such assessment should attempt to measure: (a) the extent of skill retention subsequent to first-year evaluation; and (b) the magnitude of any gain following exposure in the context of graduate seminars.

Following one more year of development on courses in philosophy including considerably more development of online materials, we also hope to be in a position to assist and facilitate the development of curricula in other disciplines using the same general approach. There are precedents elsewhere in fields such as law and nursing, and there is already some interest from other departments and faculties at UKZN.

## CONCLUSION

South African universities face their own version of a global problem in the development of critical reasoning skills in their students. While the empirical effectiveness of many standard approaches to teaching critical thinking have modest results, some with proven and remarkable effectiveness are being implemented at UKZN. Preliminary evaluations indicate that the UKZN project is successful, although by no means (yet) as successful as it could be. Future empirical testing will help establish both the degree to which the courses are successful at their intended purpose, and also the extent to which any benefit is retained in the course of further study.

Two points raised above should be returned to in closing. First, it was suggested that a major strength of the approach is that the software used is not itself intelligent. Second, one impediment to the development of critical reasoning was suggested to be a needlessly deferential attitude to perceived authorities. A system based on interaction with a genuinely intelligent computer (were that presently possible, which it is not) would, I suggest, produce just one more authority to which students would defer instead of coming to trust their own capacity to be competent judges. A non-intelligent system that, when properly used, facilitates the clarification, explication and refinement of any argument, including a student's own thinking, is a proper tool for the task of getting more students to take themselves seriously as intellectual actors, competent to challenge any view, rather than mere consumers who attempt to take on the thoughts of others.

#### **Endnotes:**

- <sup>1</sup> I would like to thank Hanlie Griesel of SAUVCA (the South African Universities Vice Chancellors Association) for encouraging me to present a previous version of this work at a curriculum development workshop organised by SAUVCA in 2004, and Tony Carr and Laura Czerniewicz for encouraging me in turn to participate in the e/merge on line conference also in 2004. I acknowledge the Quality Promotion Unit of the former University of Natal for supporting the initial project, and all of the tutors involved in delivering the initiatives described here. Lynn Slonimsky (Wits), Ian Moll (SAIDE) and an anonymous referee provided useful critical comments on earlier versions of this document. Finally, further thanks to Laura Czerniewicz for comments and advice on the present text.
- <sup>2</sup> The tutorial facilitators in 2003 were graduate students, most of whom were trained in cognitive science, and all of whom received specific training in working with *Reason!Able*. Meetings with the tutorial facilitators were held weekly prior to each tutorial.
- <sup>3</sup> One limitation of the current UKZN initiative (up to 2005) should be noted here. For budgetary reasons the pilot project is working with a limited-user software licence rather than a full institutional site licence. Consequently the software was installed only in a few computer rooms, and it was not possible legally to provide students with copies they could install and use on home computers.
- <sup>4</sup> I regularly subjected my own argument maps from previous lectures to criticism and offered improvements of them. This was partly an attempt to lead by example, and hopefully to discourage any of my own maps from being taken as definitive, instead of regarded critically. It was also an opportunity to work through the application of the three basic rules described above, and illustrate the genuine difficulties that can arise.
- <sup>5</sup> The course in 2003 and 2004 was an introduction to philosophy ranging over topics in, *inter alia*, epistemology, ethics, distributive justice, philosophy of science, and political philosophy. As of 2005 the focus has shifted to leave ethics and political philosophy for a companion module.
- <sup>6</sup> A fair proportion did so, and some of the resulting argument maps were used to guide the development of further tutorial exercises.
- <sup>7</sup> Results from the student evaluations in 2004 were not significantly different from those reported here.

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## **Border crossings and multimodal composition in the arts**

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### **ABSTRACT**

Developmental and development-oriented learning with digital media are discussed in relation to the concepts border crossings and multimodal composition. The first concept refers to a transversal of disciplines and recombinations of elements from them. Local-global relations in knowledge building are covered. The second refers to the collaborative construction of multiliteracies across media types and discourse modes. Three case studies relating to Zimbabwe are presented, one in fine arts and two in performing arts. A cultural historical activity theory frame is adopted. Analysis draws on expansive learning. As a whole multimodal discourse and activity theory may be enriched through study of students' production of mediating artifacts.

**Keywords:** *Multimodal composition, border crossing, activity theory, expansive learning, pottery, choreography, digital scenography, multiliteracies, Zimbabwe*

### **INTRODUCTION**

#### **Two senses of development**

This article is about three cases of student composition using a variety of media types and discourse modes. The cases relate to projects involving Zimbabwean students, both in Harare, Zimbabwe, and Oslo, Norway. In these cases, development is seen to have two senses: 1) developmental processes in student learning, and 2) student learning in development-oriented contexts, that is in 'developing' countries. This article attempts to draw together these two senses and to show that they may enrich one another, theoretically and practically. It does this by accessing two core concepts: border crossing and multimodal composition.

With regard to developmental processes in student learning, I refer to border crossing in terms of students' engagement in experimental processes; by shaping digitally mediated art and performance works as mediating artifacts, and by communicating about those works academically. I use the term multimodal composition to encompass students' creative and critical constructions in fine and performing arts as part of their own emerging electronic multiliteracies. In the second sense of development, the article refers to how inquiry into the implementation of ICTs in learning involving Zimbabwean students has moved between two geographically remote countries, Zimbabwe in the 'south' and Norway in the 'north'. The material presented shows that perspectives, pedagogies and innovation may also move from their local genesis in a resource-strapped African higher educational and development setting to experimental works relating to Zimbabwe at a major university in one of the world's most technologically endowed countries.

#### **Three cases relating to Zimbabwe**

Three cases are presented<sup>1</sup> which may be seen as instances of how students' uses of ICTs may generate new knowledge for both themselves and for the research projects connected to them. The cases offer empirical evidence on ways in which experimental multimodal discourses may be built through student collaboration, via access to different media and modes of communicating, and in interdisciplinary partnerships. At a time of considerable political turmoil surrounding access

to land in Zimbabwe, these student projects offer creative, constructive and culturally articulated contrasts to the self-destructive political policies about land redistribution in Zimbabwe. These student works show what it was possible to develop locally via a large project *HyperLand*, from which the first case on fine art is drawn. *HyperLand* had the overall goal of motivating and supporting students' critical investigations of representations and mediations of 'land' as part of their production-based learning about content, culture and ICTs. This approach was extended to the interplay of digital scenography in collaborative processes of choreographing and performing dance works. In all of these cases, students managed to locate and negotiate important cultural inheritances and traditions and to include them as meaningful resources in their own digitally-mediated learning.

### **A socio-cultural approach to learning**

The three cases were each framed in a socio-cultural approach to learning (Vygotsky 1962, 1978; Wertsch 1991, 1995) within cultural historical activity theory (CHAT) in which students' agency and creative voices are important. In each case, students developed digitally-mediated artifacts through collaboration, via the uptake of new tools, as inscriptions of earlier practices and in the form of new expressions.

The article argues that earlier notions and practices of composition from academic communication and rhetoric may be recast in an expanded learning frame (Engeström 1987, 2001). Here, student 'composition' may be seen to be moving from writing into experimental and emergent multimodal discourses. This may extend students' academic literacies (Johns 1998) to include a range of digital media types and discourse modes, that is as electronic multiliteracies. Learning through multimedia production (for example, Buckingham et al. 1995) is in a sense learning to 'write the technology' (for example, Haas & Neuwirth 1994) and thereby also a means of investigate changing meaning-making in expository and expressive discourses (Díaz-Kommonen 2002, 2003).

### **Outline of article**

Research questions related to the cases are covered in sections below on each case. The main research issue has been how to understand and analyse the intersections and differentiations of multiple participant roles and the various ICTs involved in collaborative, experimental student productions.<sup>2</sup> The next section refers to interdisciplinary inquiry by use of the concept border crossing. This is followed by a section on multimodal composition. Cultural historical activity theory is then covered. The three cases follow. A final concluding section discusses directions for multimediational and polyvocal composition.

## **BORDER CROSSINGS**

### **Making multimodal discourse**

The metaphor 'border crossing' is now used by several disciplines in the Human Sciences as part of conceptualising subject-specific concerns over how knowledge is made and communicated (for example, Cohen 1999 on Anthropology). It also appears as part of the repertoire of reflexive methods in post-structuralist inquiry (for example, Chambers & Curti 1996 on Cultural Studies, Atkinson & Breitz 1999 on contemporary art in southern Africa). Earlier disciplinary distinctions and subsequent notions of multi-disciplinarity have been rephrased through the intersections of parts of disciplines resulting in transdisciplinarity. Transdisciplinarity has come to be framed in, through and as negotiations and translations. Here, 'border crossings' refers not only to the inclusion or importation of concepts from a related or distant field but to the ways in which

knowledge may be formed through the linkages, convergence and recombinations of elements from and across different domains (for example, Seaman 2002 on visual poetics). Knowledge making is now acknowledged to be a process and not only directed towards the shaping of an end product. In this view, it is seen to be epistemically in a state of flux; creation and contestation, contradictions and shared resolutions are thus central to the making and analysis of multimodal composition.

Border crossing is included here as part of a conceptual apparatus for investigating how multimodal digital compositions might be understood as multiply scored, arranged and performed – and by students. I refer to the empirical shaping of multimodal discourse in learning in fine and performing arts. This discourse is characterised by students' collaborative involvement in making multimodal texts of their own, that is both expository and expressive discourse. The student works are instances of voicing degrees of fluency with new tools; they are also instances of finding ways of applying digital tools to educational tasks and wider forms of enculturated expression in digital domains.

This said, however, the article presents crossings which are not often mentioned in the numerous studies on ICTs and learning. This refers to both teachers and students moving between and across two geographically remote countries with varying cultural, technical and educational contexts. Border crossing is used to point to ways in which student learning may be realised through local, culturally situated articulation in which students' own compositions are paramount and where local is not seen to be culturally isomorphic with geographical place. The three cases each refer to connections between Zimbabwe and Norway; both Harare (fine art with hypermedia), and Oslo (mediated scenography with choreography), however, may be seen as local contexts for collaborative, multimodal composition.

## **MULTIMODAL 'COMPOSITION'**

### **Multimodal discourse**

Multimodal discourse has become a vogue term in the past few years, often informed by the work of Kress and van Leeuwen (2001). Their approach has been applied largely to school-based and informal learning. Relatively little use has been made of their core concepts in the form of student authoring or composition with ICTs in higher education.

The 'digital discourse' to which this article refers is that generated through student 'composition'. Academic writing may be supplemented in learning through and by communicating in a variety of modes – drawing, video, dance and animation (Bolter 1998). Attention to such modes in shaping multiliteracies (Kress 2003) takes place through collaboration involving working with the known and the familiar, but also the uncharted and risky. Here, multimodal composition refers to learning to make multimodal discourse in which there is a convergence of tools, content and culture (for example, Myers et al. 1998, Wysocki 2004).

### **Electracies**

In order to draw together these lines of argument, I refer to the notion of multiple electronic literacies or, as I have termed them, *electracies* (Morrison 2001, 2003a, 2003b). I developed the term *electracies* to refer to a compendium of literacies in higher education, beyond written communication (for example, Ulmer 1997, 1998), which may be combined to generate new forms and practices (Johnson-Eilola 1997, New London Group 2000).<sup>3</sup> These literacies are multimodal: they demand our ongoing work and competence with a range of software and systems, they may include still and moving images, illustrations and texts written for screen spaces, to mention a



few. Buckingham and Sefton-Green (1997) point to the need to look at expanded notions of media literacy in media studies. Wysocki and Johnson-Eilola (1999) remind us however, that we should be wary of using literacy as a metaphor to account for all that takes place in learning with new technologies.

### **Extending communicative repertoires**

Traditional pedagogy in higher education does not typically encourage process-based experimentation with new genres, forms and expressions through and as multimediated communication. Each of the projects presented below took a specific experimental stance, yet was contextualised within in an explicitly situated approach to learning (Lave & Wenger 1991). This was to adopt an explicitly investigative, experimental approach to learning with technologies that motivates and encompasses curiosity on the part of Humanities students (for example, Green 1995). In terms of collaboration, though, art, design and performance studies offer a medley of modes of communicating which may be usefully added to and combined in our changing, yet often written, electronic discourses. In short, this is to look into ways of building an expanded communicative repertoire.

## **CULTURAL HISTORICAL ACTIVITY THEORY**

### **A theory of change**

Cultural historical activity theory (CHAT) is adopted as an overarching conceptual framework (Engeström 1999a, Engeström & Miettinen 1999) for the analysis of these three cases. It offers some means of critically mapping and understanding how the changing terrain of expository and expressive literacies may be inscribed as part of pedagogies in higher education. Although participation is central to such an approach, activity theory provides a powerful multi-level conceptual apparatus for getting at the role of technology as a mediating tool which helps facilitate expansive cycles of learning. Expansive learning is one approach within CHAT which pays attention to the dynamics of cycles of transformation (Engeström 1999b). It will be presented and then applied to the three cases. In the knowledge creation framework of CHAT, collaboration is that "... process mediated by shared objectives on which the participants are working" (Lipponen et al. 2004, p.41). For these researchers, what defines creative collaboration is its focus on "...certain shared objects, knowledge-laden or conceptual artifacts and the agents' relationships to them" (ibid). CHAT sees the activities of learning as occurring in a context and a community. In this context, the subjects' actions are influenced by rules and roles. Through intersecting with dynamic relationships with divisions of labour and the functioning of mediating artifacts and tools, additional activities or artifacts may result, that is as outcomes (Engeström et al. 1998).

A socio-cultural approach to learning focuses attention on what participants actually do within a communicative process and the ways in which their compositions or mediating artifacts may be understood contextually. In a socio-cultural view, the 'meaning potential' of language and social semiotic approaches to communication, learning and composition (for example, Halliday 1996; Halliday & Hasan 1985; Kress 1998, 2003) may be seen as more than the collaborative construction of an activity. As the cases below illustrate, this is also about how such compositions, and indeed their experimental character, may be viewed in terms of their cultural significance, that is, interpersonally and institutionally. This is to accentuate that learning to compose is a situated, shared activity that also needs to be contextualised and yet remain tentative and open to change as part of ongoing learning with and through ICTs.

### **3rd generation CHAT**

In the formulation of what is called a third generation of CHAT, a number of key features have now been identified: cultural diversity, multivoicedness, dialogue, macro-level networks, networks of activity and boundary crossing.<sup>4</sup> Boundary zones refer to what lies and is constructed between different, intersecting systems of activity. Such 'crossings' may be understood in terms of 'motives'. Interest is also in collective artifacts, that is in their shared making and interchange. Artifacts are seen as multiple and multiply mediated. How such shared and situated knowledge comes to be achieved may be studied less by seeing developmental change on a vertical axis, but rather in terms of its horizontal character and constitution. The features – cultural diversity, multivoicedness, dialogue, macro-level networks, networks of activity and boundary crossing – help us to analyse how different activity systems intersect and what 'travels' or may be exchanged between them (Gregory 2000).

Part of adopting such an approach is also to see CHAT as referring not only to an historically and contextually framed inquiry, but one within which cross-cultural communication is important (for example, Cole 1988). Here what is needed is the integration of activity systems and elements of them in which language and expression, modes and discourse processes and the articulations of situated experience are central 'resources' in cross-cultural communication.

### **Expansive learning**

Engeström has conceptualised this third, synthetic phase of CHAT in an expansive theory of learning (1987, 2001). He argues that we can identify five main principles: 1) The activity system as the unit of analysis; 2) multi-voicedness; 3) historicity; 4) contradictions; and 5) expansive transformations. In his model, Engeström outlines the following stages in cycles of transformation: 1) questioning existing practices; 2) analysing existing practices; 3) collaboratively building new models, concepts and artifacts for new practices; 4) examining and debating the created models, concepts and material and immaterial artifacts; 5) implementing these; 6) reflecting on and evaluating the process; and 7) consolidating the new practices. (Engeström 2001; Lipponen et al. 2004, p.35).

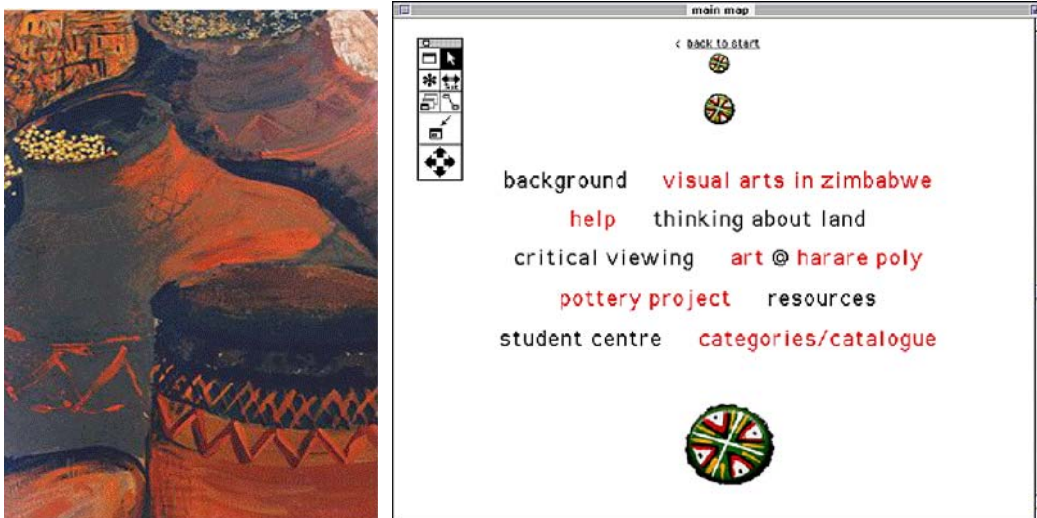
For Engeström, learning is a state of becoming, that is for persons and institutions; it is unstable, ill-defined and often not yet understood. There is a transformative component to this theory in that we need to learn new forms of activity which are not yet crystallised, but are in the process of emergence. For Engeström (2001, p.139), "Expansive learning activity produces culturally new patterns of activity". These patterns need to be seen against the summative dimensions of the entire system just as learning needs to take place in interconnected, dynamic activity systems (see also Wells 1999).

It is also important to study the background and context of these intersecting activity systems. Historicity is one of the main characteristics Engeström argues we need to include in a thorough model. In a southern African educational setting this is part of the daily enactment of understanding inherited structures and constraints as well as developing alternatives to evade, erase and replace them. Engeström also argues that we should add to this approach acknowledgement and analysis of contradictions which arise in overlapping relations and outcomes. Here disturbances, conflicts and challenges posed by intersecting systems need not be seen as negative; they are part of processes of negotiation and transformation. This he takes up in the final component of expansive transformations. When cycles of change are lengthy, individuals may begin to deviate from conventions and their individual secure practices and concepts. For Engeström (2001, p. 137), "An expansive transformation is accomplished when the object and motive of the activity are reconceptualised to embrace a radically wider horizon of possibilities than the previous mode of activity."

In summary, in expansive cycles of learning, the activity system is transformed and along with it new motives and objects are generated (Lipponen et al. 2004, p.35). In this change process, actors in the activity system reflect on their own reconceptualisations of the system. They assess shared objects and relations. The actors "... negotiate a shared understanding of the new activities and artifacts, and in this process something new is created and emerges".

Engeström (2001) positions his five principles of activity systems (unit of analysis, multi-voicedness, historicity, contradictions, cycles of expansion) against four questions in the shape of a matrix. The questions focus on the learners. The questions are: Who is learning? Why are they learning? What are they learning? And how are they learning? I now apply this framework to the three experimental, innovative projects in which Zimbabwean students were primary collaborative actors.

### CASE 1: HYPERPOTTERY PROJECT



**Figure 1: HyperPottery project**

*Left: painting developed by ceramics students for Zimbabwe International Book Fair 1996;  
Right: start screen of HyperVision Web*

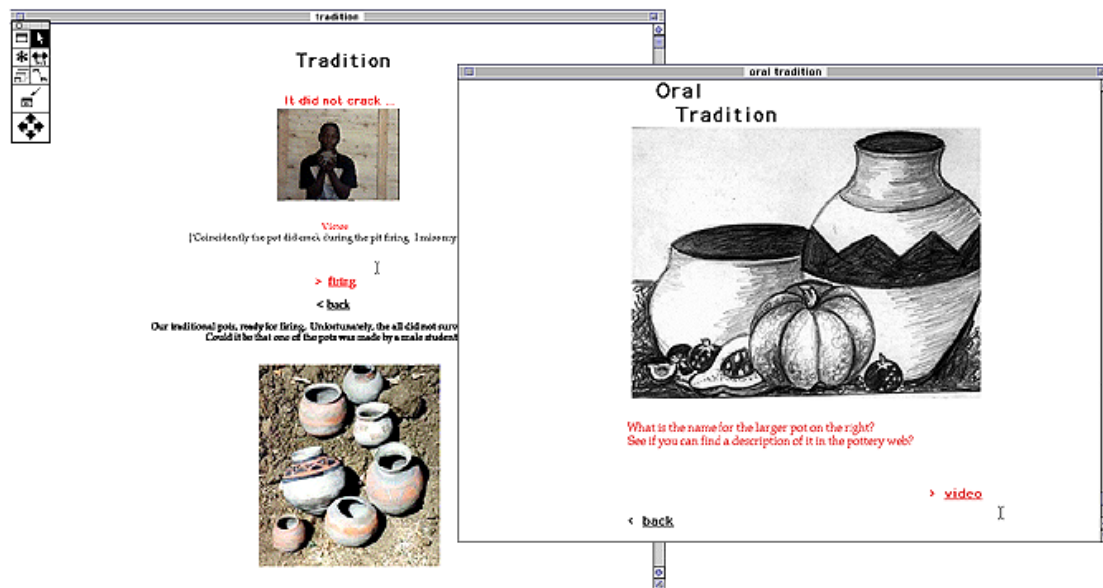
This first case and unit of analysis centred on an existing ceramics course and learning about traditional pottery involving student collaborative and multi-voiced production of a hypermedia web with support from peer tutors. The case was developed in Zimbabwe, The software *Storyspace* was used as the main authoring tool. The resulting web was a hybrid of media types and discourse modes: print text, photographs and video; face-to-face and electronic interviews, on screen categorisations, a short narrative with drawings, and hyperlinking. The students developed work in the form of an hypermediated portfolio to which they each contributed and commented on shared inputs and one another's work (Morrison 1997). The overall research question behind this was: How might fine art higher education students in an African setting themselves collaboratively compose content-rich hypermediated learning resources where few formal documents and limited research are publicly available?

On the *why of learning*, as one part of the overall *HyperLand* project, a web was developed to support learning about visual arts in Zimbabwe at the Department of Graphics and Fine Art at the Harare Polytechnic. Called *HyperVision*, this web contained a variety of art resources (writings, still images, video annotations of exhibitions) which were compiled with input from artists, critics and students. The contents of the *HyperVision* web are shown in Figure 1. Given the fact that since Independence in 1980 much art interpretative discourse has been written by white English-speaking Zimbabweans and European scholars (albeit sensitive to local context), the project also aimed to encourage students to see art criticism and visual literacy in cross-cultural perspectives (for example, Phillipson 1995; Messaris 1997).<sup>5</sup> Local texts, images, gallery visits and video material were hyperlinked to produce a novel structure and a resource for expansive learning. The students' own expansive learning would contribute to this discourse, content-wise and rhetorically.

Final-year ceramics students were asked to develop a hyperweb of their own to investigate the cultural context, design, uses and production processes of traditional pottery (Morrison 1997). They were asked to use a diversity of modes and media in shaping such a web as part of learning how to articulate their own learning multimodally. This is indicated in the painting to the left in Figure 1 which was created by the students and used in the opening screen on the final version of the pottery project rather than a photograph of a pot. This shows that multi-voicedness may be seen not only as a written or spoken polyvocality but also as a mix of media types and modes of artistic expression. The motive of this web was also to build contextual resources around a specific domain of material culture and as material for a hypermediated interpretation.

In terms of historicity, the pottery project aimed to develop situated, local knowledge resources alongside the students' own practice in pot-making and related interpretation. The web was intended to be a record of students' creation of a multimodal artifact rich in content, modes of communication and media types. Yet, it was also designed to provide them with experience in learning processes through cycles of transformation, in questioning their own practice in relation to existing ones, and reflecting on their own art making and analysis and the contradictions and new horizons arising from these.

In terms of the *who of learning*, the group consisted of six students, five women and one man. They were all taking a course in ceramics and made use of the *HyperVision* web (used more generally in other classes), with guidance from specially trained peer tutors from the *HyperLand* project. Support importantly came from the head of department, Jane Shepherd, and her staff. At a macro-level network, the ceramics lecturer, Alison Brayshaw, saw a possible connection of the *HyperVision* web to her course in ceramics. Of British origin, she admitted she had little knowledge of the forms and functions of traditional Zimbabwean pottery. We discussed how a student-based hypermedia production might involve ceramics students in moulding more than just clay but in building an experimental web of material and reflection on traditional pottery. This would involve them in networks of activity with their aunts, grandmothers, a gallery director, an art lecturer, another ceramic lecturer and the four peer tutors involved in the *HyperLand* project. That pot-making along traditional lines is a female gendered activity also meant that gender was an ever present element. The one male student in the group found he was not only working with five motivated female colleagues, but that he had restricted access to the gendered transmission of knowledge on pot-making. He discussed this in a video file in which he mentioned his own understanding of the contradiction of being asked to learn about embellishment and diverse styles and uses of pots while not having an inherited role from which to access such historical knowledge.



**Figure 2: HyperPottery.**

*Top left: video on value of tradition,*

*Below: photograph of pots having been fired in the earth.*

*Right: student drawing for section with their writing on Oral Traditions in conveying knowledge*

On the *what of learning*, the students developed a novel and information-rich web in which they demonstrated their own work processes and results. Their web included written texts, summarised from the few print publications they were able to locate in libraries and the National Archives, but also written by them. There were tables categorising, naming and describing a range of pots and their functions. A hypermedia story was developed with illustrations by the students so as to show contexts of cultural use of pots. Special attention was given to the role of women in making pots and in their handing down of knowledge to novices. The project was patterned around the categories of Background, Usage, Process and Interpretation. The group learned that knowledge about traditional pots lay not only in books and their classroom. They visited their families in rural parts of the country and through interviews learned about the value of oral culture as a repository of knowledge. This was echoed in their own spoken contributions to the web. The project clearly introduced a range of voices and perspectives and the possible contradiction between oral culture and techno-determinism of a hypermedia system was avoided through the production of a synthetic text: the students all commented that the possibility of continually changing their inputs and links in the hypertext system meant that they were able to work through cycles of reflection and improvement of their contributions.

The group also learned to work together collaboratively in contributing material to the dynamic structure they presented as work in progress and which was redesigned with help from the lecturer and researcher and educational designer. In terms of hypermedia, the students developed a multimodal text of their own, drawn to different modes of presentation and cross linking by virtue of the material they gathered. However, they were also able to use the functions in *Storyspace* and quickly alter how content was linked. They clearly demonstrated skill in how to think and link across factual content, narrative, photographic and hand drawn representations.

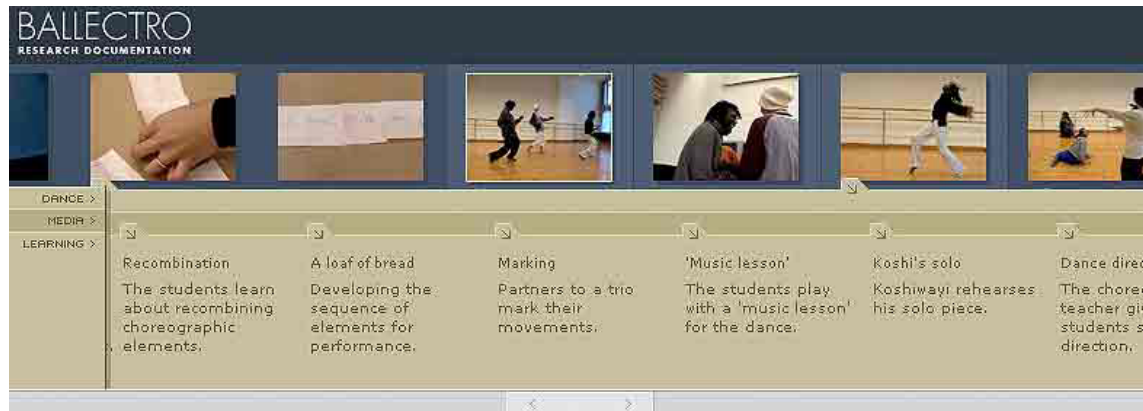
Concerning the *how of learning* and historicity, these students were actively involved in meeting and translating their own cultural heritage and representing it as a digital, cultural one in a form of collage-like writing and imaging (Landow 1998). They were involved in conducting primary research, the documentation of field interviews, and the generation of new textual representations. They did this with support from their lecturer with her background in education as well as from the researcher-designer and the three peer tutors in the *HyperLand* project. The students also consulted other lecturers in the department and, most challengingly, in terms of Engeström's conflictual questioning and 'multi-voicedness' and 'dialogue', gave a diskette with interview questions to one lecturer who had designed a series of postage stamps on Zimbabwean pottery. The students asked her to give an account of her own knowledge making on Zimbabwean pottery. The lecturer's replies were included in the web. The students also included the earlier photographic documentation by one of their lecturers of traditional methods and contexts of production (from shaping to firing). The students made their own voices heard through short videos. They used these to annotate their contributions to the web and also to reflect on it. For example, the male student reflected on how he had learned more about the value of women as bearers of cultural and artistic knowledge through researching gender in pot-making; this video could be seen alongside those by the women students. As part of composing their web, the students had several sessions in the networked computer lab at the University of Zimbabwe. Here they were able to work collaboratively in structuring, linking and annotating their material. In terms of multiple activity systems, this student project was also incorporated in the many sessions on the broader *HyperLand* project for students in the Humanities at the university.

This student work was an example of "rearticulating hypertext writing" (Johnson-Eilola 1997) that would break out of known modes of formal project presentation in the art institution as well as by extending notions of hypertext writing to multimodal 'composition'. Further, as a 'translation', this student project took a multimedia tool and used it to articulate new views on gaps in the small body of print sources. It augmented these through short accounts of field visits, via individual entries, through the narrative piece which was linked to a formal typology of pottery artifacts and in video meta-reflections on the process included as guides to other users. Gender perspectives on the gendered activity of pot-making were also linked in the model of expansive learning to another web developed by law students on women's rights to land, inheritance questions and connections to a women and law research project. This too reached into a different activity system in which women law students were co-designers of a learning task for their large class of peers on learning how to generate a genre of written legal discourse.

In reading the pottery project in terms of metamedia literacy (Lemke 1998), the students all commented favourably that the experience had given them insight into their own cultural heritage, into how to use digital media as a research and recording tool for reflection, into new ways of understanding visual arts as multiply constructed discourses and especially into the role of women as bearers of traditional culture. This was clearly to move beyond the "hype over hypertext" (Snyder 1998). As an educator and researcher interested in the transformative aspects of an activity theoretical approach to socio-cultural learning, the project most clearly was a case, in Engeström's words, of developing "a wider horizon of possibilities". One of the students, Victor Mavidzenge, expressed this as follows: "I don't think I'd be seeing as far as I do now. It was really inspirational. It's hard to express how much it did for me because you know words are very limiting, but the innermost feelings are what counts as I see it. So it was more like a new door opening to me you know, so I don't think I'd be thinking like I do now (laughs)." In terms of 'boundary crossing', the pottery web included a variety of successful use of modes and media (video, drawing, interviews). These were positioned in an integrated articulation of making and interpretation which broke out of the predominantly art-making pedagogical frame for the institution. Students' own prototypical and hypermediated discourse illustrated how collaborative, peer-based authorship might be achieved through creative processes and in building content along with situated interpretation.

As expansive learning, the pottery project may be seen as an instance of the collaborative design of a new activity. The case offers empirical evidence of how the conceptual frames of CHAT may be anchored in actual production and reflection on learning. Students' own experimental production generated a newly textured body of work. The means and content of this work was embodied in a new mediating artifact.

## CASE 2: BALLECTRO



### Marking a trio

Willson (left), Malin (centre) and Koshi (right) are marking the movements of a trio which is to be used in the final performance.

Erlend is playing music in preparation for the 'music lesson' sequence.

'Marking', or going through the movements - to learn them, to practice them, and to save time and effort - is used as an aid by dancers. Such marking was helpful for the media developers. As the dancers later re-rehearsed with the music, they used the rhythm to readjust the pace of this piece slightly.

To see how the trio was in one of the performances at the National College of Ballet and Dance, see [clip 68](#).

**Figure 3: The integrated interface in *BallectroWeb*.**

*Top: an item on rehearsing a trio is selected from one of 80 videos in a horizontal scrollable video menu. The video plays in the large window (bottom left.) One of three tracks (dance, media, learning) has been selected from the bar below the video menu; a corresponding text appears to the right. The large video window has controls built in (pause, frame-by-frame moves etc).*

The second case involved six choreography students in the collaborative design of a dance work with digital media scenography produced by three media researcher-designers in Oslo, Norway. Here there was a blend of face-to-face communication, live workshopping and improvisation with video feedback, with choreography and performance involving live and stored digital media. This mixed-reality approach took the media off the desktop computer screens and into a shared collaborative devising and development space with the overall goal of live performance. The project is conveyed in the form of a multimodal website, the *BallectroWeb* (see Figure 3).<sup>6</sup>



The main research question was: In what ways might the inclusion of digital technologies impact on the compositional processes and outcomes of collaboratively developed choreography for dance performance? The changing horizon of possibilities in the model of expansive learning was enacted through collaboration on dance making in which digital media was to be a partner. In expressive digital arts and culture in which performance and performativity are themselves being reconstituted (for example, Birringer 1998; Schieffelin 1998), new modes of public expression and screen based mediations are beginning to be documented (for example, deLahunta 2002).

This project involved participants in collaborative design processes based on methods from the performing arts but also from experimental digital media production (for example, Halskov Madsen 2003) and iterative design. The merger of real-time and recorded mediations of both dance and digital media may result in a different, hybrid digital poetics (Qvortrup 2003). As Seaman (2002) argues, it is the potential and practice of the recombination of elements in such a poetics which challenges us to see performativity differently. This is a performativity in which the relationships between human performer and media-as-actor alter earlier notions and expectations of stage and staging (Sparacino et al. 2000). These are environments which are labelled mixed or augmented reality and extended to media as responsive participants through sensors and location aware technologies (for example, Sha & Kuzmanovic 2000). In our setting, and given that this was our first foray into such a project, we would concentrate on computer-based and live projection and multiple screens as the main means of creating an extended stage and staging.

Concerning the *why of learning*, we wanted to involve choreography students in critical, recombinatorial practices in dance design in which mediated scenography would be a part of their designing along with attention to other para-performative aspects such as lighting and music. For the choreography teacher, the project was a means of providing a collaborative, experimental space for dance making in which students could develop their own contributions in a horizontal and sideways move rather than the characteristic vertical one of expert-to-novice learning processes (Engeström 2002, p.153). This was to see how to relate their own solo and duet components to those of other participants and to produce an integrated, varied whole. As educators, therefore, we were concerned to introduce choreography students to digital media in dance as an asset and as a complement to their own competences and dancers and as learner choreographers. For the Zimbabwean students in particular, this was an introduction to digital media in performance as well as to a shared, iterative design process in dance making. It also involved them in direct collaboration with designer-researchers who were themselves learning about digital media as dynamic scenography in live dance performance

On the *who of learning*, the *Ballectro* project was a collaboration between six final-year choreography students at the National College of Dance in Oslo and InterMedia. Two of these students were financed on a collaborative study programme between Norway and Zimbabwe. There were three male dancer-choreographers in this group, two of whom were from Harare. The group was taught by a freelance choreographer and dancer as well as by three media researcher-designers from InterMedia at the University of Oslo. The aim of this partnering with the College was originally to provide some video-based documentation of dance performance. However, in practice, this collaboration was quickly extended to a shared process of designing, learning and performing a dance work over one semester.

On the *what of learning*, the student and development group learned about the complex and recursive possibilities in developing a dance performance work in which digital media elements could be included and at different levels of centrality in a final performance. They saw how improvisation with video feedback could generate ideas for designing movement. Such aspects were included in the final performances. Further examples of the *what* of learning as process and as product, can be seen in the project website. The students learned about the cycles of transformation in the varied intersections between digital music, animations in the software Flash,



and their dancing with live projected images of themselves (for example, see Figure 4). The videos in the website show, for example, links between rehearsals and final performance material by Koshiwayi Sabuneti from Zimbabwe.



**Figure 4: *Ballectro*. Live video projection of Willson Phiri from an ensemble with two dancers.**

About the *how of learning*, the project explicitly faced a number of potential contradictions on learning and performance design as process. These centred on the negotiation of real-time, recorded dance and media and their intersections as mixed or augmented reality performance. Here students were working with new modes of interconnecting composition. We used workshoping sessions, with improvisation of both dance and media. One of the contradictions we quickly encountered was that dance students were able to turn on their heels and rework movements while it took more than a few hours to change some of the digital media elements. Initially, the dance students were impatient; however, they came to understand that other than the immediate and playful character of video feedback, digital scenography takes time both to generate and to re-design.

The 'composition' went through many cycles and reordering of elements. At first, some of the students commented that this was confusing; towards the end of the experience, Willson Phiri from Zimbabwe commented that this was a completely different way of learning to dance and to choreograph: improvisation and expressivity were not necessarily centred around a musical score as has been the approach in most of the choreographers' education. The website demonstrates the variety and cycles of process driven creativity. In addition, and especially for the Zimbabwean students, the choreography teacher herself was open to exploring alternative solutions and

framings of parts of the dance piece. They were able to see a choreographer at work with experimental media and see how a recombinatorial design process could bear fruit. Further, these students could extend their experience from that of their traditional classes at their own dance school to include collaborating with researcher-designers at an educational research and experimental media lab. This was similar to Engeström's concept of change laboratory. The multi-level composition *Balletro* functioned as a mirroring device for the participants: where different elements were known to different participants, it was the combination of these and the interplay between them that resulted in a new activity or unseen horizon of possible expression. Through this activity it was also possible to refract the main concepts back to the whole group, not always in a strict activity theory vocabulary, but through discussions on problems and potential of mediated dance and its shared design or composition. In terms of border crossing and multimodal composition, the integrated performance work included 'traditional' Zimbabwean dance blended with 'contemporary' western dance movement, accompanied by animations in Flash. Traditional Zimbabwean mbira music was played live, but also remixed electronically in collaboration with material by a young Norwegian electronic musician. In summary, these multimodal compositional elements were also combined, with the overall result that the students developing a new, integrated activity in and through which their own blends of knowledge and cultural expression were realised.

### CASE 3: EXTENDED



**Figure 5: Startscreen of student initiated and designed website developed in Flash for *Extended*, with term papers containing video of projects and of *Ngirozi*.**

In the third case, *Extended*, the interplay between media and dance shifted to one between choreography and media students in Oslo (see Figure 5). In this partnering, four works were developed, each an experiment in collaborative learning and hybrid performativity. Media and dancers were active contributors to an overall creative co-construction. One work, *Ngirozi*, by the

Zimbabwean participant Jimu Makurumbandi, is presented in detail here (Figure 6). This was a narrative piece with a mix of southern African dance styles (Morrison 2003b). The overall research question was: What issues of cross-cultural communication emerge in the development of digital scenography for narrative-led dance performance work?



**Figure 6: Stills from *Ngirozi*.** On the left, digital scenography fills the right hand side of the image; to the right, the dancer in full motion is pictured in a still from a digital camera

Concerning the *who of learning*, this was a second choreography project between the National College of Dance and InterMedia. This time, however, the four dance students involved were choreographers and they did not themselves necessarily need to dance their works. In contrast with the *Balletro* project, the media elements of these works were designed, developed and performed by two masters students in Media and Communication at the University of Oslo. In the case of *Ngirozi*, the choreographer Makurumbandi chose also to dance his work. This involved the participants in unique relationships not present elsewhere in the project.

On the *why of learning*, the concept 'extended' was introduced to challenge both choreography and media students to rethink their notions of performativity and to find ways of reaching beyond their given experience and competencies by way of collaboration. For the choreography students this was to think creatively about how the body and movement might be extended performatively. For the media students, who were taking a course in new media production and critique, the aim was to investigate how digital media as scenography could be integrated as part of the overall composition. In the student developed website, shown in Figure 5, the students listed the following questions as part of their process of defining their joint creative experimentation: What is integration? Where does the physical room end? Can it be extended into a virtual one? Is there an overlap between the rooms? If so, what happens to the dancer? Is the extended body within reach? What is digital scenography? How can we use it? The students were explicitly asked to

face one of the main contradictions experienced in the *Ballectro* project, namely that the choreographers' design took primacy over the media. In this new project, the aim was to find out how movement, space, body and media could complement and play off one another.

This was to give the students a difficult challenge in developing not only their own blended and collaborative learning experience; it was to ask that they achieve this artistically and for live performance.<sup>7</sup> Here, with little work published on digital scenography (for example, Morrison et al. 2004), the students needed to draw on their own ingenuity in devising, workshopping and reformulating dance and digital media as composition and simulation (see for example, Penny 2004). As researchers, we have attempted to analyse their works and to develop further the concept of performativity.

On the *what of learning*, Jimu Makurumbandi chose to design and dance his work as a solo (see Figure 8). He was the only student who was not Norwegian and also a male choreographer. He wanted to develop a work which would be an invocation of ancestral spirits in the setting of a cave. This led to discussion about how to create a cave-like scenography in which animated figures would dance on the rockface as backdrop as the dancer himself moved through the space and into such projections. This raised many questions about the ethics and aesthetics of such mediations. The Norwegian media students were requested not to produce hackneyed images of San rock paintings which would be at odds with the views and cultural understanding of their co-developer. However, the students were asked to not merely reproduce images from key print texts on San rock painting in the region. In time, they developed a short dance work together in which a small screen was placed at the front of the stage to demarcate two different narrative zones in the choreographed movement. Pixellated animations were projected of shadowy figures moving on the rock face. The choreographer reflected positively on his own learning through such co-ordinated activity in designing and in performing. In particular, as the dancer in the piece, he also felt connected to the animated figures dancing on his body (Morrison 2003b).



**Figure 7: Reworked scenography for *Ngirozi* with altered colour palette and increased scale of animated figures as presented in the project *Extended+***

On the *how of learning*, in addition to the same modes of improvisation, sketching, and workshoping collaboratively, the media students also came with pre-prepared scenography for discussion and adaptation. There were compromises on the depiction of the cave and the character of the animated figures. Despite the openness to experiment on the part of this Zimbabwean choreographer who had not worked with digital projection and blended movement with digital scenography, we encountered a substantial contradiction in terms of activity theory. In CHAT, analysing contradictions is important so as to identify changes which might be needed and the processes involved in effecting them. The contradiction was that, despite being visible on the computer screen, the main animated figures were not easy for audiences to see when the stage was lit and when the projection was itself a major source of light. Although the dancer commented that he saw new relations and dimensions to his performance because he almost felt the figures dancing on his skin, audiences did not have this experience in the way this was intended. In developing this scenography, the media students had had to pay attention to four dance works in all; perhaps they had also been too careful about avoiding the clichéd literalism of uses of San rock paintings in advertising. As a consequence the figures which were developed were not distinct enough, nor was there adequate contrast in their projection onto the dancer. This led us to all to reconsider the entire scenography as a tension, in Engeström's terms, in need of resolution.

The *Extended* project produced four new digitally mediated dance works. For undergraduate choreography students it provided an opportunity to work with fellow media studies Master's level students and learn about ways of seeing performance as more than driven by dancers. In this new activity, the media students also came to see how to design moving media as part of dynamic performance. For the Zimbabwean student, this was his first engagement with digital scenography as part of artistic and cultural expression. However, as this scenography was at times difficult to see, we discussed ways to adapt it in a new cycle. This was taken up in a project on multimodal discourse and augmented space. We called this redesign of the digital scenography and the performance work *Extended+*. As can be seen in Figure 7, the earlier sepia and ochre tones have been replaced by figures much more visible and all-the-more-so on the dancer's moving body (Morrison et al. 2004).<sup>8</sup> For us, this reworking was a clear example of an expansive learning cycle and a shift from a student to a professional production, one in which similar collaborative workshoping methods were used. Makurumbandi has also been able to include this work in his emerging portfolio and as part of his experimental repertoire in new choreographies with Zimbabwean dancers.

Ultimately the projects into extended dance and mediated performance showed that in terms of intersecting activity systems, choreographic and scenographic design cannot be effectively developed as separate entities. They need to be understood as embedded in a complex of negotiations between the kinetics of dance design and the dynamics of shaping digital scenography.

## CONCLUSION

### Border crossings and multimodal composition

Information communication technologies are now apparent at different levels of complexity and use in many higher education institutions. In the arts, working out ways in which ICTs can be applied to articulate educational needs and give shape to cultural expression is as much a part of finding apposite means of articulation as it is learning how to compose through multiple media types, software applications and underlying information systems. Each of the three cases presented above indicates how ICTs have been taken up in processes of meaning-in-the-making. It is this making that transverses the cases.

Through exploratory and student-generated production, new knowledge, fresh mediating artifacts and intersecting activity systems were generated. This generative aspect of learning through production included important open-ended tasks where student collaboration was built as and through 'dialogue' with existing knowledge and via the emergence and related synthesis of new knowledge for the participants. This transformation was facilitated through processes of improvising, devising, and trialling the intersections of artistic expressions, digital technologies and multiple participants.

The initial open-ended nature of these activities placed high demands on students' engagement with negotiating digital technologies in shaping their creative expression. The resulting works indicate the importance of interdisciplinary collaboration in shared creative processes where technologies have an role as compositional and performative 'actors' as is argued by actor network theory. However, in these three cases relating to Zimbabwe, the participants working with new software and media types (hypertext and video) and in cross-border collaboration (between media studies and choreography) generated new cultural resources, knowledge-through-use and art and performance works. In terms of border crossings and multimodal composition, these matter at the level of cultural significance, that is as cultural articulations, digitally composed and mediated.

### **Reconsidering expansive learning**

Through a socio-cultural approach to learning it is possible to situate students' experimental engagements with digital media and information systems, such as these, in terms of expansive learning. In the cycles which characterise this approach, an activity system is transformed and along with it new motives and objects are generated (Lipponen et al. 2004 p.35). In this change process, actors in the activity system reflect on their own reconceptualisations of the system. They assess shared objects and relations. The actors '... negotiate a shared understanding of the new activities and artifacts, and in this process something new is created and emerges.'

These three projects demonstrate that the theory and model of expansive learning provides a useful frame for understanding the emergence of digitally mediated communication in higher education relating to the southern African region. Students' roles in acquiring individual literacy knowledge and practices may be seen in their productions and reflections on them in a cd-rom web, in a project-based website, via a student website and through live performance with mediated scenography. Art and choreography students' participation in co-constructing new knowledge about content and fine arts and modes of performing is crucial in the building of a fuller understanding about multimodal composition.

Inquiry into understanding and analysing the multiple constructions of hybrid, mediating artifacts and embodied interaction may benefit from closer study of creative and expressive processes and modes of performativity in fine and performing arts. In further investigating creativity, expressivity and performativity, an integrated approach to communication design is needed. Projections are light sources; dynamic media need to be rehearsed with dance moves; choreographers and media designers need time to familiarise each other with their practices and adaptive workarounds; media leaves computer desktops and needs to be integrated with electronic mixing desks in real-time performance. Designing digital media as part of choreography demands rethinking interaction design, scenography and dance. Together these design elements may be recast as the choreography of dynamic, emergent and expressive multimodal discourse. Taken together, these components and intersecting activity systems may be seen in terms of co-configuration (Engeström 2004). Where earlier research has focused on work environments, such as medicine, this article points to the applicability of CHAT and expansive learning in the expressive and performing arts. CHAT provides a robust theoretical frame for analysing the

complex, intersecting processes and systems involved in learning about multimodal authorship in ceramics and digital dance. In this sense, the article aimed to draw together a developmental learning and design process and resulting mediated artifacts as change experiments with a situated and artful integration of multimodal composition relating to a cultural and historical contexts. This was to venture into what was not known or co-configured as building a radical localism (Engeström 2004). Macro-level analysis of the type presented here might in time also be supported by micro-level interaction analysis. To adopt this delicate approach is to move closer to participant discourses in and as multimodal composition processes and as part of our understandings of them as situated multimodal interactions

### On reciprocity

The three projects relating to Zimbabwe presented here may each be seen as part of learning how to negotiate the interplay of digital tools and the articulation of culturally situated artifacts within a wider post-colonial frame.<sup>9</sup> The cases show how collaborative engagements with ICTs and with one another are part of developmentally and ecologically emergent experiences in knowledge making. These experiences are situated culturally and historically, yet are also translocal (place, discipline, skill, and person) as has been discussed in several domains within Post-Colonial Studies. Hall (1996b, p.255), sees “the status of the ‘post-colonial’ as an episteme-in-formation”. It is possible then to view a multimodal multiliteracy not only as the production of a product, a policy or a result, but also as a process in which learning may be conceptualised as potentially ongoing transformation. In such a process, student compositions may be seen as mediating artifacts which allow us to see the ‘translation’ of local knowledge domains into newly shaped digital environments and modes of articulation.<sup>10</sup>

Hall (1996b, p.247) also argues that we need to engage in a reading of a double inscription of difference. He foresees that the value of post-colonial studies “lies precisely in its refusal of this ‘here’ and ‘there’, ‘then’ and ‘now’, ‘home’ and ‘abroad’ perspective”. For Hall, the global should be seen neither as universal nor as nation/society specific. What is important is how “the global/local reciprocally re-organise and re-shape one another”. This may be connected to the concerns of third generation CHAT and the approach of expansive learning. Key concepts of cultural diversity, multivoicedness, dialogue, macro-level networks, networks of activity and boundary crossing have been shown to be present in intersecting activity systems concerning a dynamics of learning how to apply ICTs in fine and performing arts.

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**Endnotes:**

- <sup>1</sup> The first case is from 1996, the second from 2001 and the third from 2004.
- <sup>2</sup> The article does not present a detailed interaction analysis of processes of negotiation and breakdown. It is concerned with accounting for how transformation in learning may be understood as a multi-level, shared activity.
- <sup>3</sup> I draw this term from the work of Gregory Ulmer (e.g. 1998). I refer you to his website for further details and to Morrison (2001).
- <sup>4</sup> Engeström (2001) has described activity theory as passing through three phases, culminating in multiple activity systems. In the first phase, centred on Vygotsky, relationships were posed around subject-object-mediation relations. In the second phase, influenced by Leont'ev, differentiation between individual and collective action was made. The third phase now ushers in concern with multiple, interrelated activity systems. In this third phase, Engeström (2001, p.135) suggests we need to develop concepts and tools to account for dialogue, multiple perspectives and networks of these intersecting systems. Boundary crossings occur when the outcomes of these systems overlap. For Engeström (2001, p.139) the learning challenge therefore "is to acquire new ways of working collaboratively".
- <sup>5</sup> Later in the decade in the region there appeared vibrant, challenging publications on interpretation, visual arts and identity (for example, Deepwell 1997; Enwezor 1997).
- <sup>6</sup> As media and education researchers involved in this co-design, we have published several print pieces on this project (for example, Skjulstad et al. 2002). We have also attempted to communicate the project online in the form of a seminar presentation (Morrison et al. 2001) linked with an actual performance and a website, the [BallecroWeb](#). This website is a resource for contextualising the project especially via video (see Figure 5). It links research publications to contexts of production and performance-based learning. I encourage readers to refer to the site themselves. Its interface allows users to trace comments on the videos from three perspectives, while at the same time scrolling across the menu of videos. This website has been invaluable in explaining such inquiry as exhibition, as performance and as creative co-construction. This has referred to not only dance design and performance but as the role of dynamic software and media in generating movement in the interface (Skjulstad & Morrison 2005).
- <sup>7</sup> In doing this we were also concerned as researchers to see how production-based learning and collaborating in a production and a performance could raise new issues and perspectives for critical theory and new media (Bolter 2003).
- <sup>8</sup> This scenography was developed by one of the original media researchers in the *Ballecro* and *Extended* projects, Synne Skjulstad, and one of the media students from *Extended*, Idunn Sem. Jimu Makurumbandi was again central to this process, and in his own words this was part of a reshaping of possibilities and expression, or in expansive learning frame, a clear cycle of expansion which came about through designing, via iterative changes and in performance. The resulting redesigned scenography was performed three times in a choreography festival in Spain.
- <sup>9</sup> See e.g. Sylvester (1999) for discussion of linkages between development studies and postcolonial studies, with reference to Zimbabwe.
- <sup>10</sup> If we take the second sense of development to refer to ICTs in development-oriented institutions and societies, we find that development discourses are framed by terms such as the digital divide, technology transfer and the transformative power of ICTs to overcome fundamental and embedded development needs. In such settings, ICTs have often been directed towards the material sciences. In such targeted investment, technologies have been perceived drivers of wider economic change. In contrast, one seldom comes across research papers about creating, teaching or researching electronic arts relating to African contexts and cultures. It is perhaps even less often that these perspectives on electronic arts travel 'north' and have a presence there in negotiations of learning with and through digital tools and modes of composition and reflection.



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## **Online debating to encourage student participation in online learning environments: A qualitative case study at a South African university**

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### **ABSTRACT**

The use of computer-mediated communication in higher education presents opportunities for students to be part of an online learning community irrespective of their geographical location. However, students do not always avail themselves of this opportunity and pedagogic strategies for encouraging participation are therefore constantly being explored. One potential strategy to encourage participation is the use of the structured format of online debating. This paper proposes an underlying epistemological perspective on and an informing learning theory of online debating and its potential as a pedagogic strategy to encourage participation in online learning environments. The paper reports on student and staff perceptions of an online debate used during a BEd (Hons) course at a South African university. The findings underline the importance of providing explicit procedures to pave the way for student participation and highlight the potential value of an online debate as a pedagogic strategy to support the development of argumentation and to encourage reflexivity.

**Keywords:** *Computer-mediated communication, online learning environment, online learning community, online participation, online debating*

### **INTRODUCTION**

Internationally there is a growing trend for universities to use computer-mediated communication to facilitate discussion between geographically dispersed students. Computer-mediated communication (CMC) is a "generic term now commonly used for a variety of systems that enable people to communicate with other people by means of computers and networks" (Romiszowski & Mason 1996, p. 438). It includes the use of e-mail, computer conferencing, discussion lists, bulletin boards, videoconferencing, internet relay chat as well as more specific educational applications such as computer-mediated seminars and case study discussions (Romiszowski, Jost & Chang 1990; Romiszowski & De Haas 1989); virtual classrooms (Hiltz 1994); virtual learning teams (Johnson, Suriya, Won Yoon, Berrett & La Fleur 2002) and learning circles (Riel 2002). While each of these strategies has the intention of encouraging participation, they differ in the way online discussion is managed and to what extent participation is specifically required.

Despite that fact that these online communication strategies are intended to replicate or augment face-to-face group communication, students do not always avail themselves of the opportunity. In attempting to account for the reasons why students are reluctant to participate as frequently or substantively as they could, some researchers have focussed on student-related issues, while others have focussed their attention on the role of the lecturer or on course-related concerns. Bures, Abrami and Amundsen (2000) found that students who are concerned about their performance relative to that of others send fewer messages when online activities are not assessed. Masters and Oberprieler (2004) note that students need incentives to participate in online discussion, while Pilkington and Walker (2003) recommend that students take on different dialogue roles in order to encourage participation. A study that focussed on the role that the online lecturer plays found that "frequent posting by instructors did not lead to more student postings, and the more the instructors posted, the shorter were the lengths of the discussions overall" (Mazzolini & Maddison 2003, p. 237). From a course-related perspective, Mason and

Bacsich (1998) emphasise the influence of integrating online collaborative learning within the structure of the course and Macdonald (2003, p. 377) underlines the importance of assessment in “ensuring online participation”. While these factors possibly all play a role in encouraging online participation, an additional challenge is how to encourage students to provide thoughtful and considered responses rather than posting ill-considered, poorly articulated or hasty responses. This paper will argue that online debating is a possible pedagogic strategy to encourage student participation through encouraging students to provide well-argued and reflective responses in online discussions. In addition, we maintain that online debating may be particularly appropriate for facilitating the acquisition of academic discourse in an asynchronous environment among English additional-language speakers.

The epistemological perspective that informed our use of online debating to encourage student participation is based on the assumption that knowledge is constructed by learners in a socio-cultural context (Vygotsky 1978). The logical extension of this perspective is that knowledge is constructed, negotiated and perpetuated “via a process of argumentation within a community” (Cobb, Perlwitz & Underwood-Gregg 1998, p. 72). Online debating can be seen as one way of allowing geographically dispersed students to participate in the process of constructing and negotiating knowledge via a process of argumentation within a virtual community.

The interactive and collaborative nature of online debating is underpinned by social constructivist learning theory (Palincsar 1998). This view holds that learning does not happen in a void, but occurs within a social environment which not only brings with it the history, traditions and “wisdom” of the social environment or particular society, but also provides the learner with a resource of other learners, each with their own knowledge, experience and expertise, with whom to share ideas, negotiate meaning and work towards shared understandings. One of the key assumptions of social constructivist pedagogy is that the most valuable activity in a classroom is one that provides opportunities for learners to work and interact together to become part of a community of scholars and practitioners (Jonassen, Davidson, Collins, Campbell & Haag 1995). Whether the students meet face-to-face or online, the assumption is that by making their covert ideas overt, students support each other in the construction of their understanding of the topic and concepts under discussion.

Traditionally face-to-face class debates have been used to encourage students to engage interactively with each other to refine their understanding of particular issues. The formal structure of the debate provides a clearly defined framework for discussion by assigning particular roles and procedures to be followed. While these formal procedures may be interpreted by some as inhibiting, for students who are apprehensive about participating in discussions, they may provide a “scaffold” specifying when the students are required to participate and to what particular issue. For example, if assigned the role as the first speaker, the student would have the clearly defined task of introducing his or her team’s stance on the particular motion being debated. As such, a class debate is a particular form of co-operative learning (Slavin 1995) which requires learners, each with an assigned role, to work in smaller groups towards a shared goal.

An online debate appropriates the structure of the face-to-face debate with its formal organisation and set procedures, but differs in one very important aspect – time. While face-to-face debates are usually conducted synchronously, online debates may be conducted asynchronously allowing students time to consider and plan before making a response, hopefully encouraging reflexivity (Archer 2003). Reflexivity is understood to be the practice of the internal dialogue through and in which we go about formulating a thought, “questioning ourselves, clarifying our beliefs and inclinations, diagnosing our situations, deliberating about our concerns and defining our own projects” (Archer 2003:103). Researchers in the field of CMC maintain that asynchronous online discussion offers participants the opportunity to think through, research and construct their responses that is not possible in a traditional face-to-face discussion (Harasim, Hiltz, Teles, &

Turoff 1995). Furthermore, Boughey (1997) claims that the act of writing (or typing) responses *per se*, as opposed to responding verbally, also enhances learning since the writer has to consider, clarify and revise thoughts more carefully than if they had not been written down.

A further possibility is that online debating could be used to develop the argumentation skills required by university students. As Marttunen and Laurinen (2001, p. 127) note: "Argumentation and debating skills are needed when engaging in academic discussion, where it is essential to be able to assess the strengths and weaknesses of other peoples' standpoints, and to formulate one's own positions supported with relevant and adequate grounds". Their study suggests that argumentation skills can be promoted by short-term e-mail and face-to-face teaching.

Lea and Street (cited in Macdonald 2003) maintain that familiarity with the language of a discipline and the academic genre is essential for students to communicate within an academic discipline. They claim that this familiarity with the discourse grows as students practice writing online messages. Likewise, Sullivan & Pratt (cited in Pilkington and Walker 2003, p. 41) report that "the quality and quantity of writing for second-language students improves in the computer-assisted classroom employing electronic discussion". As online debating specifically requires students to write online messages asynchronously, allowing time for drafting and redrafting of messages, we suggest that online debating could particularly helpful for English additional-language speakers.

## **ONLINE DEBATE CASE STUDY**

### **Context of the study**

The Education Department of Rhodes University offers a two-year part-time BEd (Hons) degree for in-service teachers. During their first year students enrol for Foundations of Education, a course integrating Educational Psychology, Philosophy and Sociology. In their second year students can select three from a total of approximately five elective courses one of which is "Educational Computing" (as it was in 2000, but renamed in 2001 as "Information Communication Technology for Education"). This module aims to support teachers in using information communication technology (ICT) to enhance teaching and learning in the classroom. Since basic computer literacy skills are not explicitly taught in this course, students selecting this elective are required to display a prerequisite level of computer literacy. As a means of establishing their computer literacy skills, prospective students were required to complete an electronic questionnaire and submit it as an e-mail attachment. Before the course, they were however not expected to have set up a personal distribution list of subscribed to a mailing list; both activities which were used extensively during the debate. In addition, students were required to have easy access to a computer and the Internet.

The online debate was the second of four activities in the first of five modules entitled: "An introduction to the use of ICT for Education". A study guide which was made available both in hard copy and on the Web, contained the intended course outcomes, the assessment criteria and deadlines, as well as references to both library and Web resources.

### **Research design**

This study reports on a qualitative case study undertaken during May to June 2000. As only four in-service teachers completing the B. Ed. (Hons) degree met the selection criteria, four guests were invited to participate to increase the range of experience and expertise within the group, to enrich the interaction in the debate and to offer alternative perspectives on the debate topic. Seven of the eight participants were English additional-language speakers. Before the start of the



debate, students were requested to compile a “Personal Profile” which assisted the lecturer in dividing the group into two fairly evenly matched teams according to the following criteria: prior computer experience, occupation, geographic location, and status (student or guest), as depicted in Table 1.

**Table 1: Participants in the study**

| Participant | Prior computer experience | Occupation                         | Geographic location          | Status             | Mother tongue & nationality      | Debating group |
|-------------|---------------------------|------------------------------------|------------------------------|--------------------|----------------------------------|----------------|
| 1           | Some                      | College lecturer                   | Swakopmund, Namibia          | BEd (Hons) student | Ovambo Namibian                  | 1              |
| 2           | Some                      | College manager                    | Keetmanshoop Namibia         | BEd (Hons) student | Afrikaans Namibian               | 2              |
| 3           | Adequate                  | Primary school teacher             | Port Elizabeth, South Africa | BEd (Hons) student | Afrikaans South African          | 1              |
| 4           | Some                      | Primary school teacher             | Grahamstown, South Africa    | BEd (Hons) student | English South African            | 2              |
| 5           | Excellent                 | Computer Science lecturer          | Grahamstown, South Africa    | Guest              | isiXhosa South African           | 1              |
| 6           | Excellent                 | Information Systems (Hons) student | Grahamstown, South Africa    | Guest              | Shona Zimbabwean                 | 1              |
| 7           | Some                      | Prospective MEd ICT student        | Grahamstown, South Africa    | Guest              | Kikuyu Kenyan                    | 2              |
| 8           | Adequate                  | Secondary school teacher           | Grahamstown South Africa     | Guest              | Afrikaans/ English South African | 2              |

Data were collected in several ways: through participant observation by the lecturer; a questionnaire distributed to the participants; archived messages on the mailing list; and an evaluation report compiled by the course evaluator. The lecturer who took on the role of chairperson of the debate made field notes before, during and after the debate noting the issues that were of interest or concern. The open-ended questionnaire was e-mailed to the participants after the course and returned to the lecturer. The students’ perceptions of the online debate were elicited with four open-ended questions:

- 1) Describe the two to three most valuable learning points about debating online.
- 2) What hindered the process of online debating for you?
- 3) What could be done differently in a future online debate?
- 4) Provide details of anything else that you would like to share with the lecturer and the evaluator.

While the archived messages provide a rich source of data, a detailed analysis of the postings is beyond the scope of this paper. For this paper, the archived messages were used to report on particular e-mails only from the lecturer. The course evaluator, who followed the debate on the mailing list as a non-participant (or “lurker”) compiled an evaluation report by grouping all the comments of the students, anonymously, according to common themes and adding his own perceptions. This report was sent to the participants at the end of the debate.

### **Online debating process**

Before the debate commenced, the lecturer sent an e-mail message to all the BEd (Hons) students and the guests inviting them to introduce themselves by compiling and posting a "Personal Profile" to the group. As only two of the four BEd (Hons) students had previously met, this was an ideal exercise to establish a shared understanding of each others' work environment, family and support structure, access to and experience of using ICTs and what they were able to contribute to the group. In addition, participants were asked to send a photograph of themselves as an attachment. The e-mail message also provided specific instructions to set up a distribution list and a link to the course URL which provided the course study guide, procedures to be followed in the debate and references to online resources that they could use in preparing for the debate.

The three modes of communication used during the online debate were electronic mail, distribution lists created within students' email clients and a mailing list (listserv). As we did not have access to an integrated learning management system at the time, we had to be creative with what software was available. The thinking behind this structure was to provide a one-to-one communication medium for personal comments between individual students or between individual students and the lecturer; a one-to-many communication medium for each of the teams to communicate, strategise and build their arguments in a "private forum" and a many-to-many communication medium to conduct the public online debate. To support the pedagogic process, the lecturer (acting as chairperson of the debate) was an obligatory member of each student's distribution list. The course evaluator, however, was excluded from the distribution lists and could therefore only follow the actual online debate on the public mailing list. Postings to the mailing list were automatically archived providing a useful feature for the participants to catch-up on the debate and for the lecturer to re-evaluate the process and content of the online debate at a later stage. None of the products used required high bandwidth provision, as Web-based technologies would have done. This was especially useful since some of the participants were connected to their Internet Service Providers (ISPs) through dial-up connections.

A second e-mail message from the lecturer introduced the motion of the debate: "Computers should be implemented in schools". This e-mail message also included a contentious extract from Naisbitt's (2000) book aimed at promoting the use of the Internet in the town of Celebration (<http://www.abfla.com/1tocf/disney/celeb.html>). The purpose of this extract was to encourage the participants to reflect critically on the implementation of computers in schools. The procedures to be followed in the debate and the specific rules to be observed were also provided. Each team was given between two and three days to discuss and negotiate their arguments and then to post the combined response by a specified target date. From time to time these target dates had to be adjusted due to unforeseen procedural, technical or personal problems.

### **REFLECTION ON THE ONLINE DEBATE**

Despite the fact that there were only eight participants a great deal of data was generated by the debate itself, the students' evaluation questionnaire responses, the field notes by the lecturer and the evaluator's report. For the purposes of this paper we will report on four themes only, namely the students' perceptions of the value of the online debate in general, the value of online debating to encourage student participation (including students' perceptions on potential obstacles and suggestions for improvement), the potential of online debating in developing argumentation skills and the extent to which online debating can be a useful pedagogic strategy to support English additional-language speakers acquire academic discourse.

### Value of online debating: Students' perceptions

With reference to the value of online debating in encouraging student participation, two students commented on the *value of the immediacy of responses*: (1) "The responses are up to date of how people feel about the topic." (2) "Online debating has the wonderful quality of enjoying written argument (sic) that has been posted to the reader recently – it is therefore "fresh" and it is possible to make an immediate response." One long reflective comment refers to the *value of understanding different perspectives*: "I think one of the most valuable learning experiences is to gain insights into what other people have to say. It is very interesting to see the different responses from the different areas as well as the different learning conditions. Let me expand on this. The response from a person teaching at a very affluent school is different from the person teaching at a township school. The response of one teaching in a metropolitan area is very different from one teaching out in the 'sticks'. It was interesting to see that often one 'side' did not really appreciate where the other side was coming from. This taught me really to take stock of myself and try to gain insight in to what the other party was saying." Another comment focussed specifically on the importance of *engaging with students who hold different opinions*: "You also learn about netiquette and how to respond without flaming the others, even if you don't agree with their opinions." One comment in particular reinforced the *collaborative nature of online debating*: "You have to work together in a group", while another made a closely associated comment about the value of online debating as a *mechanism to overcome geographical distance*: "The barriers are broken down and because we are not in a class situation, the virtual community classroom is a great alternative." One student even expresses his missionary-like zeal for online debating: "Online debating celebrates the genius of human thinking – one once again realises the difference in human beings – that the same point of debate is open to all and each person reacts on it through the electronic medium. This point supports the importance of computers in education."

### Value of online debating to encourage student participation

Both the lecturer and the evaluator mention their perceived value using the extract from Naisbitt's book to stimulate ideas prior to the debate. The evaluator notes: "This book addresses a rather contentious issue which somehow managed to get the learners involved emotionally (at least some of us, if you look at the many personal examples that were put forward as arguments) ... In my view, such use of a controversial piece of writing is an extremely useful technique for engaging learners and increasing the level of participation."

When the debate actually commenced on 22 May 2000, the lecturer was delighted that the "Proposing Team" presented a fairly well thought through piece on why computers should be implemented in schools, despite it being over the word limit. When a second e-mail was sent from the same team the next day with a separate argument, the lecturer realised that her original instructions may not have been clear enough or that the students had not read them adequately. To accommodate this glitch, she posted the following e-mail:

*From c.hodgkinson at ru.ac.za Wed May 24 11:47:35 2000*

*Thanks to the proposers of the motion, "Computers should be implemented in schools", for their opening arguments. I trust that the team opposing the motion will have some time today to put forward their opposing arguments (at least before 8:00 tomorrow). Fortunately e-mail with its option to include and annotate the previous message makes it a very powerful medium for debate – you can argue sentence by sentence!*

*Remember that this is a team effort. Consult with your team mates before posting a reply. In this way you can gather a great deal of evidence and/or questions to oppose the*

*motion. I suggest that you appoint one person to be responsible for the final posting, but that you consult along the way.*

*Usually the proposers are allowed to make their opening arguments and cannot add to their formal presentation until the team opposing the motion has a chance to air their views. This would mean that the additional e-mail "Debate-more food for thought" would be excluded for comment by the opposition team. But as this is our first debate I suggest that we accept the additional arguments, but respond to them in one consolidated e-mail (i.e. cut and paste). We'll get the hang of this way of communicating soon.*

*The chairperson.*

This fortunately had the desired impact and the opposing team posted their contribution after consulting with each other. However, it did point to the need for *procedural clarity*. This point was picked up too by the evaluator who states in his report: "While the debate format intrinsically encourages participation, the online medium, in my view, requires more structure which should be provided by an even stricter adherence to the debating procedure." This procedural issue plagued the rest debate and resulted in an *unavoidable extension of the deadlines* originally imposed. Despite the initial difficulties, both lecturer and evaluator felt that the online debate did increase student participation. The lecturer noted: "What really made this valuable was the authenticity of debating with people who were not part of a usual class. What made this even more interesting was that most participants did not know each other, so the formal debate was quite an appropriate way to structure the online interaction."

### **Potential obstacles of online debating in encouraging student participation**

Students provided some very insightful comments about what hindered the process of participating in the online debate. Two comments refer specifically to the need for the *goals of the debate to be clear*: (1) "That the topic under discussion should be clear to all"; (2) "There should be no ambiguity." Another one refers to the need for *procedural clarity* in the online debate: "That all participants should know where to send his/her arguments." Another three specifically refer to the need for *clearly specified deadlines*: (1) "Dates given should be adhered to, if possible." (2) "Everyone didn't respond before the deadlines we have set." (3) "Time should be clear in the sense of different times, eg. Namibian and South African." Technical issues were raised about the *importance of reliable internet service provision* three times: (1) "That the service providers of the sender and the receiver must be able to communication with one another." (2) "The big problem that I had, was the fact that whenever I sent my messages, the messages have been returned in my box. The fault was with the service provider on my side which was rejected by terrapin.ru.ac.za. It forced me to cancel my service with them and subscribe to another one." (3) "In addition, the server only provides a node with a capacity of 33 lines in Keetmanshoop, resulting in a congestion of calls during business hours." A related problem of a *lack of convenient access* was raised twice: (1) "My biggest problem was the lack of a reliable link. The only reliable link I have is at school. Time is limited there as I teach full time and have little time at school to do anything else. The other big problem that I have is when (on the rare occasion) I connect at home all the emails I want to refer to are on my school computer! I do believe that there is a way of re-reading the mail. I want to investigate this possibility. The other way to do it is of course to forward the mail, but here the problem is that when one gets home and tried to connect and fails the messages remain unread. The next day at school all the mail is sent back to you!" (2) "This might sound like self-pitying, but I envy those who could use their work time and computer facility to post their messages. I can, unfortunately only check mail between 1–2 pm and work online after 5 o'clock or over weekends." One participant complained about *inadequate*

*typing skills*: “My typing skills are not so good either but have improved remarkably over the last few weeks!”

### **Suggestions to improve student participation in online debating**

The question on how student participation could be improved for a future online debate yielded some interesting responses. Two comments indicated the need for *revolving leadership*: (1) “Give someone else a chance to be the group leader so that everyone have [sic] an opportunity to have that responsibility and keep the others on their toes.” (2) “It might also be useful if either Prof. Hodgkinson or Markus could allocate specific areas/aspects for each team member. Similarly, a team leader (on a rotating basis) could be appointed from Rhodes. Each team member will have to respond to his/her team-leader within a given time span. In this way, the leader may contact each of his/her team-members individually before presenting the collective team effort.” Another comment called for more specific task allocation: “Each person could be assigned a task.” One participant made a plea for *additional time for the online debate*: “At least two to three weeks for debating.” Two participants made a *call for a synchronous debate*: (1) “I know this will be very difficult to co-ordinate but it would be really super if all the debaters could be at their computers at a given time – much like attending a lecture. This would have to be arranged well in advance so that we all could make sure we are sitting at a reliable link. This would give the debate a really ‘live’ feel. I appreciate that this will be very difficult to do but there is no harm in dreaming of the ‘ideal’ situation.” (2) “It might perhaps be useful if a daily time slot (differentiating between week days and weekends) could be suggested. I don’t know how practical this will be for others.” A request made by one participant that the lecturer should receive a copy of each student’s contribution indicates that the person concerned *did not understand the role of the distribution list or the mailing list* as the lecturer received copies of every posting other than personal one-to-one e-mails: “A copy of each participant’s contribution could be send (sic) to the lecturer so that the lecturer can keep up with those who are contributing and those who has problems. The lecturer do not need(sic) to read the content in detail.” One participant asked “to keep the maximum length of [a] given essay”. The advice given here indicates the need for the lecturer to encourage those who were not participating adequately. This is consonant with one student’s comment on the obstacles facing students in an online debate: “The lack of full participation of all team members”.

### **The potential of online debating in developing argumentation skills**

On this issue the lecturer and the evaluator disagree. The lecturer maintained that: “The students certainly improve their argumentation skills between what they negotiate ‘behind the scenes’ on the distribution list and what they present on the mailing list.” The evaluator had harsh words on this issue in his report: “In fact, my strongest critique of this debate is the lack of conciseness and economy of words by both sides. Yes, there are certainly many reasons why computers should or should not be implemented in all schools. However, what are the three to five most convincing arguments? The critics, in their initial posting, worked towards this aim by providing four very distinct (albeit lengthy) arguments and kind of grouped another four (obviously weaker) reasons into one point. Cheryl very explicitly said ‘decide on the major points of discussion’ (2000-05-17). In my view, the purpose of the behind-the-scenes distribution lists was to develop comprehensive lists of all the issues, then to negotiate the most compelling reasons and then develop these strongest ideas into arguments. Obviously, I did not have access to these discussions, but you might want to agree that the postings I received provided little evidence of such negotiations.”

Three comments from question 1 of the participants’ questionnaire refer directly to the role of online debating in the development of an argument: The first comment refers to the benefit of being required to *argue a point of view contrary to one’s own view* on the motion: “Another valuable learning point was that I actually had [to] argue against something that I have felt a need

to introduce at my school. Obviously I would not have introduced computers at my school if I did not feel this was the way to go. I really had to play the devil's advocate here! Many of the things I was arguing against I actually believed in. This was very difficult because one still has to build credible 'anti-arguments'. It has probably taught me to look at the 'other' side more critically that I would have done before." The second comment notes the *importance of reflection* in developing an argument: "A second important aspect in this sort of debating requires careful reflection. Unlike in the real-life situation, one is afforded the opportunity to think out well-reflected arguments. It creates a learning situation in which one can avoid impulsive (and subjective) counter arguments and interjections which derail the line of thinking. This objectivity is an invaluable life-long academic learning tool that helps one to sort out thoughts and translate them into structured arguments." The third comment indicates that while asynchronous debating has a place, it is not the same as face-to-face debating: "In this way one can follow the gist of debating and the development of a statement [argument?] on a daily basis. As such it is second best to the real-life debate."

### **The potential of online debating for facilitating the acquisition of academic discourse among English additional-language speakers**

This issue was raised in discussions between the lecturer and the evaluator after the debate when they were analysing the archived messages. They perceived that there was a noticeable difference between the "private" messages the students sent to each other or the lecturer and the formal messages sent to the mailing list, possibly due to the requirements of the formal debate or the time to reflect more carefully on their responses. A detailed exposition of this position is beyond the scope of this paper, but it does raise possible questions for further research.

The students' comments refer mainly to the issue of reflexivity raised above and can probably be best summarised by the one comment: "This objectivity is an invaluable life-long academic learning tool that helps one to sort out thoughts and translate them into structured arguments."

### **CONCLUSION**

These findings underline the importance of procedural clarity in online debating to prepare the way for student participation. Students in this study valued online debating for its potential to provide immediate responses, as a medium for gaining insight into the perspectives of people whom they were unlikely to meet in person and for learning how to engage with those holding different opinions to their own. Suggestions made by students for revolving leadership and additional time were taken up towards the end of the debate and embedded within the structure of the subsequent use of an online debate in the following year.

While the constraints of this paper preclude a detailed analysis of the actual debate, both students and staff members perceive that online debating is a potentially useful pedagogical strategy to encourage participation through the development of argumentation skills and to promote reflexivity.

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## **Towards appropriate methodologies to research interactive learning: Using a design experiment to assess a learning programme for complex thinking**

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### **ABSTRACT**

In this paper, we advance that there are several issues pertaining to the design of research in instructional technology. It is our view that much of the current research taking place may suffer from poor quality, inappropriate design, and lack of social responsibility. We contend that the most appropriate way to research the effectiveness of online learning is the use of design experiments. We present an exemplar of a recent design experiment that was completed at a university in Johannesburg, South Africa. During this study, the researchers explored the extent to which complex thinking skills can be facilitated in online learning environments. A design experiment was engineered in which a learning programme was designed and developed for Masters students. Specific instructional methodologies were employed in the learning programme, and activities were designed that facilitate the use of complex thinking skills. The extent to which these skills were evident in student online activities was easily detected by using the comprehensive checklists and rubrics that were generated. A rigorous framework for analysis was developed. The findings were integrated with theoretical perspectives on instructional strategies for complex thinking development and new, unique criteria for online learning design were yielded. We are of the view that the findings of our study are 'true', as the appropriate methodology was used to conduct it.

**Keywords:** *Design experiments, complex thinking, instructional methodologies, online learning, unique criteria.*

### **INTRODUCTION: QUESTIONING INSTRUCTIONAL TECHNOLOGY RESEARCH**

The decision whether to use some form of instructional technology in education should be based on the question: Is the use of instructional technology likely to improve education? (Mitchell 1997; Reeves 1995). The way in which scholars, lecturers or teachers attempt to establish whether such interventions are indeed beneficial is through a process of scientific research in the form of case studies, course evaluations or experimental studies. In fact, the literature abounds with reports in which the benefits of instructional technology interventions are espoused. Lockard and Abrams (2001) list many research studies in which it has been found that the use of instructional technology shows gains in subject-matter achievement, learning retention and speed, attitudes towards learning, problem solving and for students who are at risk. We assert in this paper that the research results pertaining to instructional technology research may be flawed due to poor quality research and inappropriate research designs. We further assert that an academic system that rewards research that is not socially responsible will not produce relevant and high quality research. We will argue that design experiments (development research) that are executed rigorously will address the concerns that we have about instructional technology research.

There is significant evidence that the research results pertaining to the benefits of using interactive technologies to support teaching and learning is questionable, often because of a lack of rigour during the execution of the research. According to Reeves (2000), the "quality of published research in Instructional Technology is generally poor". Reeves (1995) launches a scathing attack on research done in instructional technology, and claims that most published

research articles are “pseudoscience” (also see Mitchell 1997) He claims, after an analysis of five articles published in refereed journals, that these articles have specification errors, have few links to robust theory, have inadequate literature reviews and treatment implementation, have measurement flaws and inconsequential outcome measures, inadequate sample sizes, inappropriate statistical analyses and meaningless discussion of results. Dillon and Gabbard (1998), who reviewed 500 papers for an article they prepared for the journal, *Review of Educational Research*, found that only 30 of these met the minimal criteria for good scientific studies for inclusion in their review. Reeves, Mitchell and Stokes are not the only dissenting voices in the research community who have expressed concern about the state of instructional technology research. In fact, Reeves (1995) refer to authors like Mielke (1968), Lumsdaine (1963), Schramm (1977), Clark (1983) and Salomon (1991), who were the forerunners in the questioning of research practice in instructional technology. In his seminal work, Clark (1983, 1994) asserts that media (and therefore instructional technology) has no influence on learning and he criticises the research in this field. He explains that meta-analytic reviews report an approximate 20% increase in evaluation scores following the use of instructional technology in comparison to conventional forms of teaching. However, he contends that it is the instructional methodology that underpins these interventions that account for the gains in learning of those research reports. The research studies that have examined the use and effectiveness of the media used therefore failed to isolate the real reasons for the learning gains that were demonstrated. The publication of Clark’s initial work sparked the well-reported Clark-Kozma debate, wherein the two opposing sides drew the proverbial line in the sand about the value of media (instructional technology) for learning. A primary thrust in this debate was the selection of appropriate methodologies for researching instructional technology.

The root of the problem may possibly be found in the ‘quantitative–qualitative’ paradigm debate. Hoepfl (1997) explains that the relative value of qualitative or quantitative inquiries has been raging for a long time. Quantitative research is based on an experimental design in which a hypothesis is tested and from which generalisations can be drawn. Reeves and Hedberg (2003) describe this type of research as “analytic-empirical-positivist-quantitative”. Many researchers claim that positivist, experimental designs are the only appropriate ones for doing valid and reliable research. In fact, Reeves (2000) found that most published research in leading journals for education was situated within the quantitative, positivist paradigm. Qualitative research on the other hand does not rely on numerical or statistical data and attempts to understand phenomena in “natural settings” (Hoepfl 1997). Strauss and Corbin (1990, p.17) define qualitative research as producing results that are not “arrived at by means of statistical procedures or other means of quantification”. Many scholars are of the opinion that research in education should be based on qualitative data. In addition to these two paradigms, Soltis (1992) explains that research can be situated within a ‘critical theory’ paradigm. Critical research aims to critique the social order to bring about change and examines restrictive and alienating conditions. It questions the maintenance of the status quo and wants to bring about cultural, political and social change.

The question is which of these paradigms (or combination of paradigms) is suitable for researching instructional technology. Roblyer and Knezek (2003) claim that research findings that confirm the benefits of modern technologies for learning may “simply not hold true” as much of such research was done using behaviourist-cognitivist approaches to assessing learning benefits. Alternatively, in these research projects, comparisons between technology-mediated learning environments and traditional face-to-face course deliveries using experimental or quasi-experimental methodologies were made. Some researchers like Tellez (1993), Hoepfl (1997) and Reeves (1995, 2000) claim that it is not possible to conduct true experimental designs in social science inquiries. Because of the fact that researchers are often faced with intact groups (specific classes or groups) that cannot be divided up for random assignment and the creation of experimental and control groups, true experimental designs are often simply not viable. In this regard, the question further needs to be asked what the aim of a research project is. Reeves and

Hedberg (2003) point out that the reliance of experimental methodologies stem from the need to “prove” the effectiveness of a particular educational intervention, in other words, the research has a summative evaluation dimension. Many of these research projects are case studies. Case studies appear to exemplify the “Tylerian Objectives-Based Evaluation Model”, which would judge a programme to be good if the set objectives were achieved (Reeves & Hedberg 2003). Case studies appear to be underpinned by ‘after-the-fact’ methodologies, and may seem wasteful if some contribution to theory is not made. Suitably engineered educational online interventions that are meticulously designed and that are situated within specific educational theory, may therefore be of more value to learners. Additionally, when the impact or effectiveness of such interventions is scrutinised and researched, appropriate methodologies need to be utilised that go beyond the mere exploration of cases. Cunningham (Willis 1994) claims that it is impossible to produce ‘findings’ that are generalisable across all possible circumstances, and specifically so within social science contexts. Constructed knowledge is not ‘truth’ that remains stable and dependable forever, rather, it exists within specific contexts and perspectives – knowledge that may profess to be truth for one context may very well not be ‘truth’ for other contexts. Therefore, we advance that empiricist designs that depend on pre-testing and post-testing using quantitative data may not be the most appropriate way of researching online learning. Subsequently, we hold the view that research design in social science can at best be quasi-experimental designs.

The third dimension that impacts on the quality of instructional technology research is the way by which scholars are rewarded for their research outputs. Reeves (2000) describes in a paper delivered at the prestigious America Educational Research Association (AERA) his experiences when appointed at a university as a junior professor. He explains how he was told to collect “lots of data” in order to publish and therefore advance in the university system. He points out that the state in which his appointment was made had a documented poor educational system, but he was not told to find solutions, through research, for those problems. This exemplifies the ‘publish or perish’ notion, which is a significant challenge that faces higher education. It is our experience in the higher education system that academics are under pressure to publish (do research). Publishing is incentivised by the higher education institutions, which receive financial rewards in the form of subsidy, and which in turn reward academics with promotion. Whereas we do not question the reward system for research, we would plead for a system wherein ‘socially responsible’ research is advanced. In this regard, Reeves (1995) refers to ‘socially responsible’ research as research that aims to make education better, therefore finding practical solutions to real problems. It highlights the fact that much educational research may have little value for solving the practical problems that plague education in general (also see Reeves 1995, 2000). Similarly, Stokes, (1997) in his *Pasteur’s Quadrant: Basic Science and Technological Innovation* work explains that much of the research done in the educational field contributes little to the understanding of the theories that underpin education (and in our view also that of instructional technology) and that these studies do not advance fundamental knowledge in the relevant knowledge domains. He uses as exemplar the work done by Louis Pasteur, who found practical solutions for real-world problems and at the same time advanced fundamental (theoretical) knowledge, in this case about the preservation of fresh food. We acknowledge that our view may be contentious. Reeves (1995) points out that others in the research community will argue that the search for the sake of knowledge’s sake is paramount, and that researchers should not be prescribed to as to what they should research. Although we concur that a purist agenda is important for the maintenance of independent scholarship, we would like to have – in the context of the problems that were highlighted with regard to instructional technology research, and to the further context of the educational problems that beseech South Africa in general – a research agenda developed that advances both theory and practical application. In this paper we argue that design experiments will address these dual needs.

The South African situation is unclear. The most typical application of qualitative research in instructional technology seems to be that of case studies. Van der Westhuizen (2002) conducted

a meta-analysis of research topics and methodologies in South Africa that related to instructional technology research. He found that the vast majority of published research is case studies. Although the value of case studies in a developing field of knowledge is not to be underestimated, we doubt that this approach will lead to fundamental understanding of the theories that are associated with online learning. Although they may highlight practical problems, and even suggest solutions to those problems, the findings need to be incorporated into existing theory. Whether case studies yield sufficient in-depth data to advance fundamental knowledge remains to be seen. No other meta-studies that have examined the research designs of instructional technology inquiries have been found in South African literature.

## **DESIGN EXPERIMENTS**

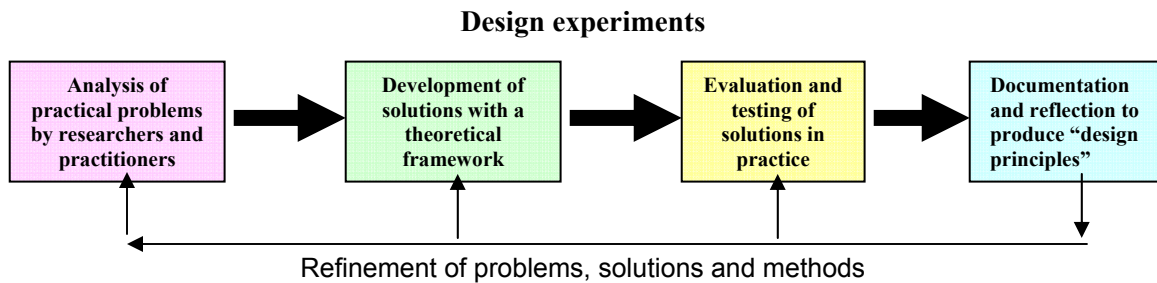
In this paper, we contend that the most appropriate way to research the effectiveness of online learning is the use of design experiments. We assert that design experiments address the concerns that we have raised in the previous section. In the first place, we argue that design experiments require rigorous designs that yield rich, in-depth data over a prolonged period of time, and therefore by virtue of the design addresses issues of quality, depth and validity. Secondly, design experiments may use any of the paradigms that underpin educational research, and in fact, will utilise both approaches in a complementary manner. Thirdly, as design experiments address real-life problems and attempt to engineer solutions to those, we believe that design experiment methodologies are socially responsible. The following section provides a definition of the concept, and outlines the goals of design experiments.

### **Conceptualisation**

The term “design experiments” – also referred to as “formative experiments” (Barab & Kirshner 2001), “applied research” (van den Akker 1999; Reeves 2000), “use-inspired basic research” (Stokes 1997) or “development research” (Reeves 2000) – was introduced in 1992 by Brown and Collins. More recently the term “design research” has been applied to this kind of research (Barab & Kirshner 2001 and Collins 1999). The terms “design experiments” and “design research” will be used interchangeably in this paper. Design experiments are types of research that place educational experiments in real-world settings to find out what works in practice (RooseveltHaas 2001). According to Cobb et al. (2003), design experiments entail both “engineering” particular forms of learning, and systematically studying those forms of learning within the context defined by means of supporting them. This designed context is subject to test and revision, and the successive iterations are similar to systematic variation in experience. Design experiments incorporate the notion of formative and summative evaluation of learner skills and knowledge demonstrated over time, penetrating into the learning processes on a weekly schedule, as instructors and researchers negotiate instructional decisions (Brown 1992). Design experiments are pragmatic as well as theoretical in orientation in that the study of function – both of the design and of the resulting ecology of learning – is at the heart of the methodology (Cobb et al. 2003). A design science in education therefore aims at determining how the design of learning environments contributes to learning (Brown 1997).

### **The goals of design research**

Design experiments were developed as a way of conducting formative research for testing and refining educational problems, solutions and methods (Reeves 2000; Stigler & Hiebert 1999). They are mainly used by researchers with development goals in mind (Reeves 2000). The goals of design experiments (development research) as described by Reeves are summarised in Figure 1.



**Figure 1: Development approach to research** (Reeves 2000)

However, design research is not aimed simply at refining practice. It should always have the dual goal of refining both theory and practice (Edelson 2001; Joseph 2000). Design experiments are conducted for the *generation* and *testing* of theories that target domain-specific learning processes (Cobb et al. 2003). It ideally results in greater understanding of a learning ecology – a complex, interacting system involving multiple elements of different types and levels – by designing its elements and by anticipating how these elements function together to support learning (van den Akker 1999; Brown 1997; Cobb et al. 2003; Reeves 2000). Design experiments, therefore, constitute a means of addressing the complexity that is the hallmark of educational settings (Barab & Kirchner 2001). Elements of a learning ecology typically include the tasks or problems that learners are asked to solve, the kinds of discourse that are encouraged, the norms of participation that are established, the tools and related material means provided, and the practical means by which instructors can orchestrate relations among these elements (Cobb et al. 2003).

The researcher firstly develops the broader theoretical goals of the study (a design focus), frames selected aspects of the envisioned learning (provides a theoretical framework for the study), specifies the settings in which the learning will take place as well as the means of supporting it, and develops a model of the learning tasks and instructional strategies that can support that learning (Brown & Campione 1996). The process of engineering or specifying the forms of learning being studied provides the researcher with a measure of control not obtainable in purely naturalistic investigations.

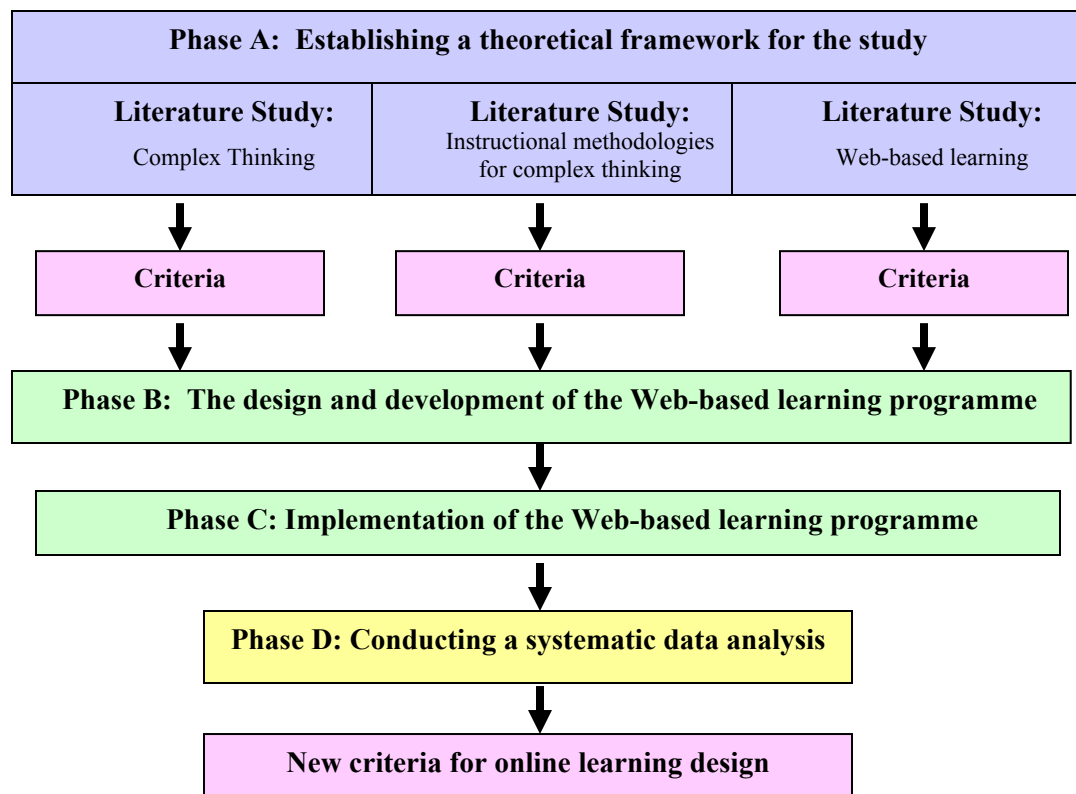
Design experiments, according to Cobb et al. (2003), have two faces: prospective and reflective. On the prospective side, designs are implemented with a hypothesised learning process and the means of supporting it in mind, in order to expose the details of that process to scrutiny. An equally important objective is to foster the emergence of other potential pathways for learning and development by capitalising on contingencies that arise as the design unfolds. The theory therefore informs the design focus and prospective design (DiSessa 1991). On the reflective side design experiments are conjecture-driven tests, assessing the critical design elements, often at several levels of analysis (Shepard 2000). Together the prospective and reflective aspects of design experiments result in an iterative design process featuring cycles of invention and revision (Cobb et al. 2003). The evaluation of the design, therefore, is an ongoing process that changes as the design changes (Brown & Campione 1996).

### RESEARCH EXAMPLE: COMPLEX THINKING ONLINE

We provide as exemplar a recent design experiment which was completed at a university in Johannesburg, South Africa. During this study, the researchers explored the extent to which complex thinking skills could be facilitated in online learning environments. In this study, a one-

on-one design experiment with a small number of learners was engineered. A learning programme was designed and developed for Masters students who were enrolled for a course in Instructional Technology. The aim was to create a small-scale version of a learning ecology for in-depth and detailed study (Barab & Kirshner 2001; Cobb et al. 2003) and to refine the design parameters for a new type of curriculum. The research suggested in this study looked at a complex system of interrelated factors and events, where each component, event or action has the potential of affecting the unit as a whole (Collins 1999). There is compatibility in this research between the systemic nature of the subject matter and the use of qualitative research methods. The research methodology for this study was guided by principles of interpretive inquiry outlined by researchers such as Lecompton, Preissle and Renate (1993) and Miles and Huberman (1994). The research was conducted in four phases as summarised in Figure 2.

### Design Experiment



**Figure 2: Using a design experiment for assessing a learning programme for complex thinking development**

#### Phase A: Establishing a theoretical framework for the study

The development of the qualitative/interpretive design experiment began with the establishment of a theoretical framework, the set of questions to be answered by the research. The framework address the problem to be investigated by the study, reviewing what is known about the topic, what is not known, why it is important to know it, and the specific purpose of the study

(Winegardner 2000). Merriam (1992) stresses the importance of identifying the theoretical framework that forms the 'scaffolding' or underlying structure of the study. Theory should be present in all qualitative studies because no study could be designed without some question being asked explicitly or implicitly. The phrasing of that question and the development of a problem statement reflect a theoretical orientation (Merriam 1992). The literature study, therefore, formed a theoretical and analytical framework of criteria, serving as a foundation for the analysis and interpretation of the data collected during the research project, and, this, according to Vockell and Asher (1995), directs the questions asked by the researcher. It also helps the researcher identify methodological techniques used to research similar phenomena as well as contradictory findings. The aim of the literature review in this study was to identify the following: criteria for the development of complex thinking, instructional strategies that could enhance complex thinking development, and methods of using online learning for the advancement of complex thinking development in a Web-based learning environment. Course content was then designed according to these findings and presented in the Web-based learning environment.

The following objectives were realised in Phase A:

#### **Objective 1**

Researched the essential characteristics of complex thinking through a literature study and derived criteria for identifying complex thinking.

#### **Objective 2**

Through a literature study, possible instructional strategies and techniques to enhance complex thinking were thoroughly researched and a set of criteria derived.

#### **Objective 3**

Through a literature study the contribution of Web-based learning to the learning process was researched and a set of criteria derived.

The elements (criteria) identified in this phase of the study provided a framework for the design of the Web-based learning programme developed in Phases B and C of the study.

#### **Phase B: The design and development of the Web-based learning programme**

In Phase B of the study, a learning environment was designed to incorporate the criteria established in Phase A of the research. During this stage the critical elements of the design and their relevance to each other were identified. The design included a contact session, serving as an introduction to the theme. The second part of the design experiment comprised a series of Web-based learning activities, which incorporated various instructional methodologies to facilitate/enhance complex thinking. Different discussion forums were created in the Web-based learning environment to facilitate these activities. The programme was implemented in Phase C of the study.

#### **Phase C: The implementation of the Web-based learning programme**

During Phase C of the inquiry, the Web-based programme was implemented using a series of instructional strategies focussing specifically on complex thinking. Specifically, Phase C sought to answer the following questions:

- What types of complex thinking skills did learners employ while interacting in the Web-based learning environment?
- How did the instructional strategies and techniques employed in the Web-based learning environment impact on the facilitation of complex thinking?
- How did the Web-based learning activities contribute to the success of the course?
- The extent to which these complex thinking skills were evident in the student online activities could therefore easily be detected by using the comprehensive checklist and the criteria that were generated.

#### **Phase D: Data analysis**

Phase D provided an explicit account or report of the outcomes of the research, according to the criteria specified in Phase A, and types of evidence used. Data were collected from submissions and discussions in the Web-based learning environment and these were interpreted against theoretical criteria derived from the literature study. The data that were collected were reduced to several themes (complex thinking, instructional strategies and Web-based learning) with several categories and sub-categories of criteria, and provided a framework for the analysis and interpretation of the data by using a classification scheme. One of the most important tasks of analysis is the identification of “patterns, commonalities, differences and processes” (Miles & Huberman 1994). Categories (criteria) were developed in terms of their properties and some categories were eventually promoted to major categories while others were demoted to sub-categories.

A practical format for the analysis of the written discussions (talk) and assignment activities (described as ‘messages’ by the Web-based software WebCT used to facilitate the learning) displayed in the Web-based learning environment had to be found. In this study *content analysis* was regarded as the most useful model for analysing the content of these recorded messages in accordance with Merriam’s (1992) emphasis on the importance of observing and analysing the content of learners’ conversations. The learners’ discussions were divided into units of meaning as the most practical method for this study. This method counts each type of talk as it occurs (Henri 1992).

#### **SUMMARY OF FINDINGS**

The findings were integrated with theoretical perspectives on instructional strategies for complex thinking development and, new, unique criteria for online learning design were yielded. This research is not generalisable, and instructional practitioners, designers and learners will have to judge the applicability of the findings and recommendations made.

There are many implications for practice in the findings of this research. Most relate directly to the use of Web-based learning in higher education environments, although many will apply to other classroom settings. The implications pertain to both the design of online learning and the application of instructional strategies used in instructional designs. The contribution of this research is three-fold. It is significant in the South African context, it has practical value and design criteria for Web-based learning were generated and documented to produce design principles that may be useful to any practitioner of Web-based learning.

#### **Significance in the South African context**

The major contribution of this study is that, for the first time in the South African context, research was undertaken based on a typology that clustered the dimensions of complex thinking,



instructional strategies/techniques and Web-based learning within the context of a design experiment. This research is significant for higher education in South Africa where Web-based learning is emerging as a tool to facilitate instruction. Prime reasons for using Web-based learning in South Africa are to improve the quality of learning, to provide learners with everyday information technology skills they will need in their career and personal lives, and to widen access to education and training. As Web-based learning is being implemented, an important emergent issue is to ensure that learning is adequately supported and facilitated. This study aimed at generating criteria to support meaningful learning in a Web-based learning environment and criteria were generated for providing clear learning outcomes, engaging learners, and structuring learner interactions to facilitate thinking development. In South Africa there is a need for the development of thinking skills as a general thrust in education and this research is particularly relevant as the development of critical and creative thinking skills (complex thinking skills) has been identified as a national critical outcome.

### **Practical value**

Furthermore, this study has practical value because criteria were applied to a practical Web-based learning environment. This study focused on enhancing the practice of Web-based learning by linking the practical to the theoretical foundations and adequate literature reviews. This research therefore aimed at making both a practical and scientific contribution to ensure a more productive inquiry. Furthermore, there were sufficient theoretical principles to guide the practice (Reeves 2000). The researcher aimed at explaining the phenomenon of complex thinking development through the logical analysis of learning theories and Web-based learning principles. However, because there are no sacred steps to effective instruction, this research – focusing on how Web-based instruction works – tested conclusions related to the theories of teaching, learning, thinking, assessment, social interaction, instructional design, and so forth. In addition, the primary goal of this design experiment was the development of a profile rather than testing hypotheses (Collins 1999). The overall goal of this research was therefore to solve real world problems while at the same time constructing design principles that can inform future designs (Reeves 2000). With this research goal in mind, it was considered necessary to employ a design experiment as research method.

#### *The implications for the selection of instructional strategies*

This design experiment aimed to determine the effects of Web-based instructional strategies on complex thinking development under certain controlled conditions. The principal implication for instructional designers is that the quality of the learning that takes place (whether in the Web-based learning environment or normal classroom settings) is directly influenced by the instructional strategies used. There are many advantages to be gained from implementing instructional strategies in a manner that supports the construction of knowledge and enhances complex thinking development.

A major implication for instructors and learners is that, contrary to constructivist beliefs, direct instruction plays a vital part in ensuring the quality of learning and thinking. If basic skills are not taught, learners will not be able to understand and apply these on higher levels of thinking. Learners should, for example, be taught how to apply the action words that describe the outcomes; they need to be taught the skills of co-operative learning and need knowledge on a topic to be assessed, in order to complete such complex tasks as peer assessment and group work, particularly in a complex learning environment such as the Web. Second-language users often find it difficult to understand the outcomes and assessment questions posed to them and the instructor should ensure that these are explained properly.

An important finding of the research is that the action words that describe the learning outcomes should be derived from the different complex thinking skills sets, because the outcomes

employed directly affect the degree of complex thinking that takes place. It also found that time frames should not place restrictions on learning activities as it takes time to learn and think. Time frames should therefore be flexible and realistic to allow learners reasonable time to complete learning activities and work at their own pace. Furthermore, the research finds that co-operative learning strategies can be advantageous, but there are also some disadvantages. In particular, it suggested that inexperienced members should first be taught the basic skills of co-operative learning, and the instructor should ensure that these activities are clearly defined and procedures specified. Working in groups was found to take up much more time than working alone, therefore time should be given to complete group activities, especially in Web-based asynchronous environments where interaction is delayed.

An additional finding is that the instructor should apply questions that focus on the higher levels of cognitive activity (ill-structured questions) throughout the learning process to direct the discussions and to stimulate the learners' thinking. Web-based learning activities should be monitored and assessed regularly to ensure that learners are provided with the necessary feedback, motivation and guidance. This will also help the instructor to intervene and alter the learning, if and where necessary.

#### *The implications for the design of online learning programmes*

The principal implication for instructors is that instructional design models for Web-based learning can be an effective substitute for the traditional classroom design model. Contrary to concerns that Web-based learning models may place the focus on instruction and not on learning, an environment was created where learners actively used complex thinking skills in collaborative group settings. The research indicated that, generally, Web-based learning strategies could be successfully used for the facilitation of complex thinking. The seven Web-based learning criteria that were generated, may guide designers of Web-based instructional designs to a model based on outcomes-based education principles and learning theory.

A major implication for current research is that some learners may find it very difficult to adapt to new didactic methods, such as problem-solving activities and group work (peer assessment and debate). If, in this situation, they are also required to apply additional skills such as using the Web-based discussion forums effectively, the instructor must ensure that these skills are taught in advance and that the learners are familiarised with the specific Web-based learning settings, before an attempt is made to let them participate in such a complex activity. The new instructional strategies and techniques employed in the Web-based learning environment are geared to self-direction and active participation and some learners take time to adapt to these new approaches. An important implication for learners and instructors is that the Web as medium for instruction should be carefully weighed to ensure that flexible learning is provided. Time settings should be flexible, and adequate time should be given to complete group activities, especially in asynchronous Web-based learning environments where the interaction is delayed. Without some time constraints however, assignments are not completed and marked in time, and proper feedback is not provided.

#### **Design principles for Web-based learning**

This study provides a framework incorporating design principles for instructors and designers of Web-based learning environments to encourage/facilitate complex thinking. This framework includes:

- Criteria for identifying complex thinking and providing learning opportunities where the learner is encouraged to demonstrate and develop specific abilities and skills in complex thinking;
- Instructional criteria/requirements for the effective facilitation of complex thinking, as derived from the social and cognitive constructivist learning theories;

- Instructional design criteria applicable to asynchronous Web-based learning environments for the facilitation of complex thinking and effective learning.

The thorough exploration of the three theoretical thrusts of this study (complex thinking, instructional strategies/techniques and Web-based learning) makes a significant contribution and the list of criteria developed is potentially of great value to other researchers, instructors and practitioners of Web-based learning.

## CONCLUSION

In this paper our aims were three-fold. In the first place, we wanted to highlight some of the issues pertaining to instructional technology research. We concluded that a number of factors impacted on past instructional technology research, being poor quality research, problems associated with research designs and research that is not socially relevant. We then proposed that design experiment methodologies may address many of the concerns that we have identified. The design experiment is a particularly suitable strategy to research implementations in educational hypermedia, but this methodology is under-utilised in the South African context. Finally, we constructed, as exemplar, our own design experiment. The paper described a framework for the design of such an experiment in which the development of complex thinking skills in Web-based learning environments were envisaged. The meticulous application of design experiment methodology illustrated the appropriateness of this strategy for the research of instructional technology.

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## **A pedagogical and economic critique of student charges for Internet access**

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### **ABSTRACT**

In this article I argue that charging students for Internet access is both destructive of fundamental objectives of the educational process and is unnecessary as a mechanism for solving the public goods problems that are typical of Internet provisioning.

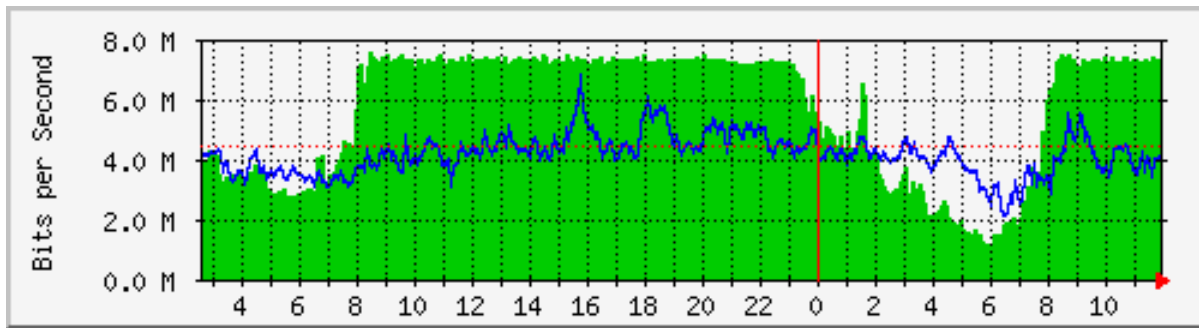
**Keywords:** *Internet, students, universities, teaching, learning, public goods.*

### **INTRODUCTION**

Consider:

- 1) "When I hear the word culture I want to reach for my revolver." This rather awful comment was made by Hermann Goering. Or was it? A quick Google search will show Goering as the originator. A more careful search will suggest Goebbels. But only a fairly exhaustive search will reveal that the source is in fact Hanns Johst, a leading playwright in the Nazi era.
- 2) In late 2000 a macabre web hoax suggested that kittens were being subjected to horrific mistreatment to shape their bodies, much as trees are shaped into bonsai. The "bonsai kitten" hoax was widely believed and provoked a storm of outrage, and the hoax is still occasionally seen circulating in email. The site ([www.bonsaikitten.com](http://www.bonsaikitten.com)) still exists, and a Google search for "bonsai kitten" still returns that site at the top of the list.
- 3) The word 'research' comes to us from the Old French *cercher* (to search), with the "re" denoting intensive force.

This article is about bandwidth, and in particular about why some ways of controlling its use militate catastrophically against objectives that universities regard as central to their mission. I do not dispute that control is necessary. The reader in an economically advanced context might find this last proposition surprising: why should there be control in the first place? The answer is that my primary interest is in addressing myself to low-bandwidth environments such as are typical throughout Africa and much of the developing world. It should be added that even in bandwidth-rich environments there is often the need to manage access: a recent *Chronicle of Higher Education* link (<http://chronicle.com/temp/rd.php?id=20050329d>) highlights this vividly. But the problem in the developing world is not just quantitatively but qualitatively different. The sheer scale of the difference in the cost of bandwidth between these two contexts is breathtaking. Probably the simplest way to illustrate it is by reference to a traffic graph (Figure 1), taken from a South African university:



**Figure 1: Internet traffic graph (Figure 1), taken from a South African university**  
*Inbound traffic - green; Outbound - blue*

This graph shows the volume of both inbound traffic (green) and outbound (blue). The capacity of the circuit is a little under 8 megabits per second, which is large by African standards. It services more than 5 000 client computers. The distinctive table-top effect on the inbound traffic denotes circuit saturation: far more packets are trying to enter this circuit than can be serviced. Some are discarded, causing broken TCP sessions, which typically means broken web browsing. The end-user experience in this environment is dreadful: pages present extremely slowly or not at all. Circuits of comparable size are often used to carry Internet access to the home in Europe and North America. They can be had for 40 pounds a month in the UK. A circuit of this size in many parts of Africa costs \$100 000 a month.

The appallingly high cost of bandwidth in many developing countries creates management imperatives that are quite foreign to bandwidth-rich environments. This article is about the range of possible responses to those imperatives and about the educational consequences of choices.

## ARGUMENT

The microchip revolution has fundamentally and permanently altered the way in which information is produced and consumed. The consequences of this revolution are so pervasive that they amount to a societal revolution – a basic shift in the class composition of society and the manner in which surplus value is extracted and distributed. Universities have historically played a central role in sustaining class formations and in the maintenance and elaboration of the systems of knowledge that underpin economic activity. The information revolution has rendered this historical role much more ambiguous than in the past. Some have argued that universities are now basically irrelevant; others, that they have a continuing role to play, not in disseminating information but in navigating it. Everyone is agreed that universities are no longer the custodians of specialist knowledge in the way that they were a generation ago. I have argued elsewhere (Greaves 2002) in favour of the continued role of universities in the information age, and I will not replicate that argument here; suffice it to say that the information feast requires workers – who may even be ‘knowledge workers’ – who are skilled in locating, sifting, sorting, analysing and judging information, and that universities are better at imparting these skills than other institutions. If this is true, then it is not *obviously* true; and universities have had to work hard to defend their place in the new economy. They face numerous challenges: competition from non-traditional providers, declining state funding, demands for greater accountability, and public indifference to their plight, to name only a few. In short, money is short. Financial crisis has led higher education administrators into systematic reflection on the cost structure of their institutions, and it has commended to them the merits of shifting funding burdens, wherever possible, to the locus of consumption. The merits are (said to be) manifold: they reveal potential inefficiencies in the

system, expose those who consume disproportionate shares, compel greater self-funding, and dampen discretionary demand. They also distract researchers and educators from their mission and destabilise the delicate economies of cross-subsidisation on which universities are built, but those are separate issues. Suffice it to note that chargeback systems are, increasingly, a part of the administrative landscape of higher education.

What of the Web? Universities are under pressure to provide their students with Internet access. Students and parents expect it, academics demand it; it takes very little mental effort to see that a university which does not prepare its students to function in a web-centric world is failing badly in its duty to prepare the young for the world of work. But the Web is expensive. In the northern hemisphere the real cost is not bandwidth but personal computers and the associated staffing costs. In contexts where bandwidth is either scarce or delivered through an effective monopoly, the real cost is both machines and circuits. And the circuits can be very costly indeed: anything up to a hundred times more expensive than in bandwidth-rich environments. A university in such a context could easily spend 5% of its revenue on provisioning the campus with 5% of the bandwidth that a northern hemisphere counterpart enjoys. The bandwidth budget is thus highly visible, made more visible still by seemingly limitless demand. The consumption of bandwidth, moreover, is quite different from the way that other large expensive resources are consumed. How does one attribute per capita consumption of an item such as a building? Large, 'lumpy' or entirely indivisible goods are not easily brought into chargeback regimes. But bandwidth consumption can be attributed in a completely granular fashion – in principle, down to the level of quantities of both inbound and outbound datagrams per individual user. Is this not an ideal candidate for a chargeback regime?

If university administrators have an interest in charging for bandwidth, so does the Information Technology (IT) department – though not always for the same reasons. Cost recovery will indeed be an important objective for many IT directors, but an even more important objective is that of dampening discretionary demand. Bandwidth is, generally speaking, a public good in the strict technical sense, in that the individual can consume an arbitrarily large quantity of it, irrespective of how much they contribute to funding it. Public goods are notoriously overconsumed, for reasons that are well documented in the standard literature on the subject. In this context, the result tends to be circuit saturation. And throughput on a saturated circuit tends to be poor, because individual processes (whether they be Transmission Control Protocol (TCP) segment retransmissions, mail delivery retries, or repeatedly frustrated requests to servers for file downloads), are flooding an already overburdened circuit with spurious traffic. Worse still, this kind of problem is not corrected by the ordinary feedback loops that one might expect to cut in, because for some users even a saturated circuit presents useful possibilities – if they have the time on their hands and the right tools, neither precondition being entirely unknown in a university environment. For most members of the university community, this set of conditions is summed up as "the network is slow" or "the network is down" – and of course this message is transmitted constantly to the IT department, who see charging as an obvious means of reducing circuit load, and sometimes also of balancing their budgets. IT departments have another reason to be enthusiastic about charging: it deflects demands for the analysis of web usage. Vice-Chancellors, under pressure from frustrated academics, are given to asking difficult questions like "What are people actually doing on the Web?" That question is almost impossible to answer. Log files typically run to millions of lines a day, and at that level they defy analysis, except in the crudest possible terms. But this is not an easy fact to explain. Charging makes it all go away.

Administrators and IT departments, in short, tend to like charging. What of the academic community? There are really two separate constituencies here: academics themselves, and librarians and affiliated information professionals. I want to begin the next part of this argument with the latter group, by posing the question: Is the Web a library? Many IT practitioners would answer yes, on the grounds that it is a searchable collection of documents. Many library



professionals would answer no, on the grounds that it is not managed, defies cataloguing, is subject to acute volatility, and above all lacks the coherence that attends the notion of a 'collection' – a critical notion which carries the idea of human intention. A collection is selected and conserved and reflects an overarching intellectual purpose that is entirely absent in the Web as a collective entity. This last point is vital, because there is a tremendous difference in sending students to the library and sending them to the Web. In the library they can call upon trained experts whose sphere of specialisation spans the domains of traditional academic disciplines and information theory. They have an ordered and managed catalogue at their disposal; above all, they have access to collection of documents that was shaped and crafted over time and reflects the intellectual cast of mind of those who created it. Nothing like this is true of the Web at large, and those parts of it where there is organisation, management, and selection are invariably in the 'deep Web' – in databases that are less readily accessible and the volume of which massively exceeds the 'common Web'. Most of this 'deep Web' will not be transparently visible to the student embarking upon a Web search, and to the extent that it is, the skills required to manipulate it are closer to ordinary library skills than to a Google search. (For a fascinating conversation on whether the Web is a library see Lynch, Battin, Lucier, Mandel, Marcum and Webster 2000).

Many academic libraries charge their patrons. Membership fees, inter-library loan costs, specialist database charges and the like are all common. If libraries can charge, why not IT departments? The analogy seems straightforward to some. But it fails almost immediately it is examined, because the public goods problem faced by the library is quite unlike that faced by the IT department. The difference resides in the physical facticity of the library – one or more buildings with physical tables, chairs, terminals and documents. While the library's public goods can in principle be overconsumed, overconsumption is limited in practice by this physical facticity. By contrast, once there is sufficient hardware in place, the IT department's public goods are readily overconsumed. The library, moreover, distributes its goods in relatively lumpy form: typically, books or journals. If the Web-charging model were to be successfully applied to the library, then the patron would pay not only for each book borrowed or consulted, but each time a page is turned.

Sending students to the Web, in addition to the library, is something that academics increasingly do. Students will of course go there anyway: the wired generation, accustomed to fast digital access to all kinds of services, will take the Web as a point of departure. In the minds of some, the real victory would be to get them to go to the library as well. But there are more than negative reasons for wanting to direct students to the Web. The key issue here is the significance of information in the process of knowledge formation. The volume of available information is growing at a geometric rate – doubling somewhere between every nine months to every seven years, depending on what estimate you want to use. And what counts as 'information' is of course subject to contestation. If we distinguish variously between high-grade information, low-grade information, misinformation and disinformation (which can themselves be delivered in different grades), then the result is an information landscape that is simply bewildering. The skills and capacities requisite to navigate it successfully are not insignificant. They are the skills of analysis and judgement and the capacities of insight and argument. They matter in any context, but in this one more than any other, for without them the traveller in this landscape is hopelessly lost. As Newman puts it:

*That only is true enlargement of mind which is the power of viewing many things at once as one whole, of referring them severally to their true place in the universal system, of understanding their respective values, and determining their mutual dependence. But the intellect, which has been disciplined to the perfection of its powers, which knows, and thinks while it knows, which has learned to leaven the dense mass of facts and events with the elastic force of reason, such an intellect cannot be partial, cannot be*

*exclusive, cannot be impetuous, cannot be at a loss, cannot but be patient, collected, and majestically calm, because it discerns the end in every beginning, the origin in every end, the law in every interruption, the limit in each delay; because it ever knows where it stands, and how its path lies from one point to another. (Cited in Greaves 2002, p. 2)*

In other words, the foundations of understanding lie in the powers of abstraction, generalisation and analysis. Now, these are the things (among others) that universities set out to teach. In sending students to the Web, one hopes that they will come back with useful information, but also – and more importantly – with augmented powers of analysis. This is true of the library as well; but there is a key difference. The Web is a truly amazing source of information, and also misinformation, rumour, sloppy thinking and lies. The last four are certainly to be found in libraries as well, but in significantly smaller quantities – that, after all, is the whole point of engaging professional librarians in roles of custodianship.

We are now at the point where the argument knits together. Charging students for Internet access does several damaging things. First, it introduces artificial search costs into the process of information review. The student must evaluate, at every step, the value of information before having access to it. To be sure, this is a genuine skill – given that one cannot go down every road, the ability to judge which are likely to be valuable and which are not is very important. But that skill is built up from the experience of going down many roads, good and bad. Having to travel the bad roads is unpleasant enough; paying for the privilege means that less travel takes place, less experience is laid down, and less insight emerges. The student fails to acquire fully the habit of testing and retesting the value of information and the quality of argument; instead, he or she is more likely to be contented with a ‘first pass’ search. If there is a cost in clicking the ‘next’ button, it is more likely to go unclicked.

Two kinds of students will be undeterred by charging: first, those who have already acquired the habits of full and thorough searching and review, who understand the likely value of information that can be evolved from the Web; and second, those who are financially better off and who can readily afford to pay for Internet access. An immediate and deeply disturbing consequence of charging, therefore, is that it amplifies digital divides within the student body and augments the advantages of wealthy students while underscoring the disadvantages of the poor.

It will be readily objected that these remarks amount to a licence for abuse, and that a student body given unfettered access to a circuit of any size at all will readily fill it with music and video content. This is perfectly true. It does not follow from this, however, that the choice is between charging and unbridled abuse; there are alternatives, which I discuss below. What I want to draw attention to here is the intrinsically ludic nature of the Web. More than any other medium, it collapses the distinctions between ‘work’ and ‘play’. Its playful side is not an undesirable side-effect, but an intrinsic part of its very nature. Expecting students – or anybody else – not to use it for play, or to segregate their ‘playful’ activity from their ‘serious’ activity, is to miss the character of the medium. Play is in fact a very serious business, and educational psychologists have long drawn attention to the significance of play in learning. Viewed from this angle, the information landscape is an inviting rather than a forbidding space. There is a case to be made for inviting students to play within this space rather than forbidding them from doing so. And of course they will abuse it; breaking the rules is a part of the rules themselves. The philosophy that underlies charging assumes, at some level, that students are rational self-interested utility maximisers with transitively structured preferences and that they make choices all the time on this basis. But students are in fact not like that. (Probably nobody is actually like that, and the rational self-interested utility maximiser as a chimerical creature that exists nowhere outside classical economic theory – but that is a different story.) This is not to argue that students are *in statu pupillari* and universities *in loco parentis*; it is simply to suggest that the rich, complex and mad tapestry of the Web has to be engaged in all its forms, because it is only through an active and practical engagement that one learns its nature, understands its opportunities, becomes sensible of its threats, and acquires the ability to use it for one’s own purposes, whatever they might be.

Many will object that this vision is still too permissive, too tolerant of abuse, and that there is an urgent problem that needs to be solved: circuit congestion that makes the Internet unusable during the day and much of the night. This is indeed an urgent problem for many. But charging is too blunt an instrument, too destructive of academic purposes, to be a first resort. Long before it appears on the campus agenda, the following things need to be considered:

- 1) Does the institution have a clear vision of the importance of the Internet to its educational and research objectives? If the answer is no, it's probably spending too little on bandwidth in relation to the size of the user base.
- 2) Are there structures and channels to align what the IT department does with institutional vision, to ensure that they are active partners and enablers in realising the institutional mission rather than passive service providers?
- 3) Does the institution have a clear and appropriate policy framework governing the way that bandwidth can be used? If the answer is no then there are few mechanisms of control available apart from charging.
- 4) Does the institution have a budgetary framework that makes it possible to fund technology costs, including Internet access, as an ongoing operational cost? If the answer is no then there are too many incentives to use charging to solve a financial problem rather than a public goods problem.

Charging certainly solves the public goods problem, but at the cost of damage to educational objectives. Can the problem be solved in other, less damaging ways? I think it can, by the following means:

- 1) *Right-sizing the bandwidth:* Given a basic workstation count there has to be a commensurate level of supply. An easy thing to do is to benchmark against comparable institutions.
- 2) *Having appropriate policy frameworks:* As a general rule, 5% of the user community will account for 50% of the traffic. There have to be mechanisms to inform students that it is not acceptable to generate disproportionate demands for bandwidth by transferring music and video content.
- 3) *Capitalising on community mores and sensibility:* It's much easier to persuade people to refrain from abuse if they have a sense of being part of a community, an understanding of how their behaviour affects the rest of the community, and confidence that that understanding is shared (and acted upon) sufficiently widely for the community to manage its public goods problem. (Of course, in large institutions the notion of the 'community' is often weak or entirely absent.)
- 4) *Using technology smartly:* Traffic shaping, for example, can minimise the impact of file-sharing while also permitting it during off-peak hours. Delay pools can prevent individual users from consuming disproportionate amounts of bandwidth. (For a useful commentary on these and other options see Venter 2003).

## CONCLUSION

The defenders of charging regimes commonly justify their standpoint by insisting that universities are businesses and need to apply business logic in order to survive. I readily agree that universities are indeed businesses, in the sense that they are enterprises with purpose. Those purposes remain what they have always been: to expand the store of human knowledge, to place their skills at the disposal of the wider community, and to train the minds of aspirants to knowledge. The information revolution does not fundamentally diminish the relevance of

universities and indeed enhances it, because the information landscape is effectively un-navigable without the skills in analysis and judgement that universities impart particularly well. Preparing students to survive in that landscape, and equipping them with skills in searching, sorting, ordering and analysing, means exposing them extensively to the Web in all its forms. Charging them for access to it impairs the learning process, and the public goods problem that gives rise to charging imperatives can be solved in ways that are not destructive of educational purposes.

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## **A response to “A pedagogical and economic critique of student charges for Internet access”**

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### **ABSTRACT**

This paper is a practitioner response by an IT manager to a paper by Duncan Greaves entitled "A pedagogical and economic critique of student charges for Internet access", which appears in the same issue of IJEDICT. Greaves' article proposes four mechanisms to solve this "public goods problem". The author explores the challenges of Internet service provision in a no-charging low bandwidth environment and specifically considers the implications of Greaves' recommendations to solve this problem: right-sizing the bandwidth; having appropriate policy frameworks; capitalising on community mores and sensibility; and using technology smartly.

**Keywords:** *Bandwidth management, South Africa, university, public goods, Internet*

### **INTRODUCTION**

At a philosophical and pedagogical level I agree wholeheartedly with Duncan Greaves' thesis in his paper "A pedagogical and economic critique of student charges for Internet access". Indeed, Greaves makes a well-argued and thoughtful case for not charging students for Internet access. In particular, his comment about "the intrinsically ludic nature of the web" rings true with my own experiences of learning to use the web and of teaching 'newbies'.

However, my interest in this topic is not academic. I am responsible for service provision in the kind of non-charging, low-bandwidth environment described in Greaves's article. It is up to me and my colleagues to make sure that users at my institution have a reasonable level of Internet access. And when the Internet is 'slow' or 'down' we have a barrage of complaints from enraged and frustrated customers. Thus I face a dilemma. From a theoretical perspective, I concur that charging students for internet access may be well harmful and "amplify the digital divide". On the other hand, as a "rational, self-interested" person, I know that in practice charging would make my life as a service provider much easier. This paper is therefore about the nuts-and-bolts of implementation.

Greaves argues that Internet bandwidth is a public good. According to *The Economist* (2005), public goods have three characteristics. "They are:

- Non-rival – one person consuming them does not stop another person consuming them;
- Non-excludable – if one person can consume them, it is impossible to stop another person consuming them;
- Non-rejectable – people cannot choose not to consume them even if they want to.<sup>1</sup>

Greaves' article proposes four mechanisms to solve this "public goods problem". These are:

- 1) Right-sizing the bandwidth;
- 2) Having appropriate policy frameworks;

- 3) Capitalising on community mores and sensibility;
- 4) Using technology smartly.

I will discuss each of these in turn, and list some challenges involved in putting these mechanisms into place.

### **RIGHT-SIZING THE BANDWIDTH**

Greaves writes that “given a basic workstation count there has to be a commensurate level of supply. An easy thing to do is to benchmark against comparable institutions.” Right-sizing the bandwidth inevitably has to be the starting point, but there are a number of difficulties with implementation.

Firstly, how does one choose a “comparable” institution? This needs to be an institution that also operates in a low-bandwidth environment, does not charge and has similar usage requirements. It also needs to have acceptable Internet access speeds and largely satisfied users, otherwise there is no point in benchmarking against it.

Secondly, Internet applications are growing more and more bandwidth-intensive. In the early days, the Web was a text-only medium, but this was soon followed by images, then audio, then streaming video, all of which are extremely demanding of bandwidth. This poses a budgetary difficulty: the institution will have to commit to an annual benchmarking exercise, on the understanding that the demand will grow each year, possibly in exponential leaps. Although bandwidth costs are dropping on the whole, they are not dropping fast enough to balance the growing demand. Increasing costs will be a bitter pill to swallow, given the funding problems that bedevil institutions in developing countries.

Thirdly, right-sizing the institution’s bandwidth provision will only provide temporary relief. Where usage was previously inhibited by poor response times, newly satisfied users will find new applications for Internet use. This will lead to increased demand. Benchmarking thus will not establish a stable level of service provision – institutions will almost always be playing a catch-up game.

Finally, it is not enough to right-size the bandwidth. In order to properly manage this scarce resource, IT departments need a complementary budget for supporting infrastructure and staff. Simply put, there is no point in spending millions each year on bandwidth, only to skimp and scrape to save thousands on cache servers, which allow for more efficient usage of bandwidth. In particular, adequate budget will be needed to enforce policies and to use technology smartly.

### **APPROPRIATE POLICY FRAMEWORKS**

As Greaves says, policy is a key tool in the effort to keep the Internet free and fast. However, even the best policy has no value unless it is communicated and enforced. It also needs to be able to handle exceptions.

A policy must be continually communicated to stakeholders in a meaningful way, especially as many students will not be familiar with the technical jargon that such a policy will inevitably contain. Communication will also require ongoing attention, since each year brings a new cohort of students.

The policy must be enforced, and violations must have real consequences. This should be done via existing channels for staff and student discipline, so that it is given the same weight as other infringements of rules. The IT department will need technical systems and staff to monitor usage and report on infractions.

It is also important to handle the inevitable exceptions properly. The policy needs to be flexible enough to accommodate special or unusual needs in a fair and transparent manner. But there is a danger here. In a university environment, many individuals and groupings will argue that they are exceptions and should be given special treatment. Eventually, once enough exceptions have been made, the policy loses impact. In addition, managing the exceptions is costly and time-consuming, and they should therefore be kept to a minimum.

### **CAPITALISING ON COMMUNITY MORES AND SENSIBILITY**

The third mechanism that Greaves describes is "capitalising on community mores and sensibility". While this is an appealing concept, I think this is unlikely to have much impact. Most students do not differentiate between personal and academic Internet usage. In fact, the Internet is valued highly as social and recreational tool, and I am not convinced that the community of students places a higher value on academic usage than on other types of use.

Even if the student population did feel strongly that this shared resource should be used wisely, community norms and values tend to be most effective when an individual infringement is visible. However, web browsing and downloading usually takes place in private. Technically, we could make the activity public, for example, by publishing student usage stats to a website that is available to all, in the hope that peer pressure would cause 'bandwidth hogs' to reform their antisocial behaviour. Aside from the concern that this would be a serious violation of privacy, this could well lead to unpleasant incidents of bandwidth vigilantism.

A related problem is that of copyright infringement since the use of the Internet to download copyrighted material is a common problem in institutions of higher learning across the world. From a bandwidth perspective, this is a waste of the institution's scarce resources, because such downloads tend to be very large files with little academic value. Over and above that, one would hope that the community's sensibilities would be outraged by this clear breach of intellectual property law. Given the prevalence of the problem, my view is that a significant number of people do not view such copyright infringements as immoral. If illegal actions are viewed with tolerance, then what hope is there that students' behaviour will be changed by appeals to social responsibility.

Despite these expressed reservations about its effectiveness, I believe that the appeal to community values can be a sound approach when communicating and marketing bandwidth policies. A creative example is the "Be Nice to the Net" site of the University of California (UC) Berkeley (<http://www.rescomp.berkeley.edu/benice/>). This site is aimed at student users who have connection points in their residence rooms. As part of the enforcement procedures, first-time offenders (students who use more than their bandwidth quota) have their connection disabled until they have completed "an educational quiz about bandwidth".

It is of note that these UC Berkeley residence halls have 60 megabits per second of Internet bandwidth available. The Tertiary Education Network (TENET), which serves all South African higher education institutions, has about 100 megabits per second of international bandwidth. Even although the UC Berkeley residences have 60% of the bandwidth of all South African institutions put together, they still need to have bandwidth management strategies in place.

## **USING TECHNOLOGY SMARTLY**

Using technology smartly is clearly important, but has two key, related difficulties: financial and technical. As I said earlier, it is not enough to right-size the bandwidth. Institutions must also provide adequate budget for supporting infrastructure, and for the technical staff to manage it. Greaves mentions some relatively inexpensive ways in which an institution can manage bandwidth, but even these require a level of investment in hardware and skills.

Such investment must be ongoing, since there will always be some diehards who are not won over by appeals to their community spirit, and who have the time and the tools to search for a way around whatever enforcement mechanisms are used. In any event, the Internet is continually evolving, and new technologies require constant changes in bandwidth management techniques.

## **CONCLUSION**

Internet bandwidth is a scarce and expensive resource that requires wise management. In his article, Duncan Greaves argues that although charging students is in many ways an attractive solution, it impairs the learning process.

I have explored some of the practical problems that face those who choose to manage bandwidth without directly recovering costs from users. Institutions that decide to take this route need sophisticated information technology policy and governance structures, strong management, excellent technical skills and sufficient technology resources. For universities struggling to afford adequate connectivity, this is a challenge.

Moreover, there is no out-the-box one-size-fits-all solution. Each institution will have to develop policy, enforcement, communication and technical strategies that fit its unique circumstances. These must be aligned to educational goals, and so we should take cognisance of Paulo Freire's observation that "Experiments cannot be transplanted; they must be reinvented" (Freire 1978, p.9).

Not charging students may philosophically be the high road, but practically it is a rocky, arduous and challenging path.

### **Disclaimer:**

Pippa Moll writes in her personal capacity and not as a representative of the University of Cape Town.

### **Endnote:**

<sup>1</sup> One of the problems with public goods is that they are often over-consumed.



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## **Blended online and face-to-face learning: A pilot project in the Faculty of Education, Eduardo Mondlane University**

**Xavier Muianga**  
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### **ABSTRACT**

This paper is about the introduction of blended online and face-to-face learning to the Faculty of Education at Eduardo Mondlane University (EMU) in Mozambique. The main objective of the intervention was to explore the use of a course management system (CMS) within a flexible, student-centred teaching and learning strategy. The author selected two courses, developed an implementation plan, and designed blended versions of the courses, which replaced much of the face-to-face contact teaching with online contact via a course management system.

This study is a part of a larger project to develop new teaching and learning methods for the new Education faculty and for EMU as a whole. The study includes a cost and benefit assessment and an assessment of the strengths and weaknesses of learning technologies. Project results include quantitative and qualitative information on the use of the CMS such as the access conditions of students and educators; student preferences across a range of activities; barriers to the use of computers; teaching and learning methods; the useability of the CMS as perceived by students; and barriers to the use of a CMS. The conclusion identifies institutional challenges, and offers recommended solutions to provide the human and technological infrastructure needed for effective implementation of a CMS across the university.

**Keywords:** *Course management system, online learning environment, acquisition and participation models, Mozambique, developing country, flexible learning*

### **INTRODUCTION**

Mozambique's National Information and Communication Technology (ICT) Policy (2002) provides principles and objectives that will permit ICTs to be a driving force for national development and for better governance. Other goals are to contribute toward the country's increased participation in the global economy, to widen access to the information society and to convert the country from a mere consumer to a producer of ICTs. In this way it is the intention that ICTs contribute to the eradication of poverty and to the improvement of living conditions of Mozambicans.

Mozambique's national university, Eduardo Mondlane University (EMU), has a Strategic Plan (EMU 1998) which supports the application of ICT in education specifically order to support research and to improve teaching and learning. The plan specifies that

- The use of ICT can offer access to a wider student body across the country through the provision of distance education programmes;
- The use of ICT can offer opportunities to extend teaching and learning methods;
- ICTs can provide the basis for developing focused, profitable lifelong learning programme;
- ICTs can support the promotion of postgraduate programmes.

## **CONTEXT**

Growing student numbers, increased student diversity and rapidly transforming technological and work practices have changed the relationship between universities and the wider community. The EMU, like many other educational institutions worldwide, has responded by identifying specific required graduate competencies. As part of this response, the Faculty of Education (FacEd) has adopted curriculum-based competencies that integrate ICT into teaching and learning.

Despite changes in the curriculum many faculties continue to use a traditional teaching and learning pedagogy that is characterised by an emphasis on face-to-face lectures. For self-study, the students use the library. The instructors lecture via the use of the chalkboard and textbooks, while the learners listen; sometimes the instructors use handouts or overhead projectors.

Most faculties are only in the very early phase of using computers to promote student learning. In some faculties both students and instructors have access to computers but from observation these are mostly used for administration, e-mail and to consult websites that not always have a clear relationship with the actual teaching and learning. Most instructors at EMU do not have experience in the use of computers for teaching and learning. They also lack the skills to teach in a student-centered way and have little experience of using methods/strategies that incorporate the use of ICT. Furthermore instructors have limited access to examples that illustrate the use of ICT in teaching their disciplines. Students are in a similar position; when the computer competencies of students were evaluated through a questionnaire more than 80% of the students answered that they had poor computer skills. These results demonstrate the need to integrate a basic computer skills module into the FacEd curriculum.

## **RESEARCH QUESTIONS**

This paper sets out to demonstrate that new strategies of teaching and learning with ICT in the Faculty of Education at EMU can contribute to quality improvements in courses offered at EMU. This study is a pilot that can be used to provide recommendations for processes to roll out the use of ICTs in teaching on a larger scale across the university.

The central research questions for the study are:

1. Can the introduction of a course management system improve flexibility and reduce face-to-face teaching time at the Faculty of Education of EMU?
2. How does the adoption of a course management system affect courses in the Faculty of Education?
3. What kind of pedagogical model is best suited to the context of teaching and learning in the Faculty of Education?
4. Which framework is applicable to describe the costs and benefits of adopting a course management system in the Faculty of Education?
5. How can EMU prepare for an effective roll out of a course management system across the institution?

The effective use of ICTs in teaching and learning is facilitated by the use of an Internet or Intranet-based course management system. A WWW-based course-management system is an environment created on the World Wide Web in which students and educators can perform learning-related tasks (Jones & McCormack 1997). It is not simply a mechanism for distributing information to students; it also supports tasks related to communication, student assessment, and

course management. A WWW-based course-management system is a comprehensive software package that supports some or all aspects of course preparation, delivery and interaction and allows these aspects to be accessible via a network (Collis & Moonen 2001).

According to de Boer (2004) the overall aim of the intervention was to increase flexibility of course delivery and reduce the amount of face-to-face teaching by using the course management system to facilitate blended learning. "Blended learning is a way to design courses that blends different kinds of delivery and learning methods that can be enabled and/or supported by technology with traditional teaching methods (de Boer, p.17)". The intervention itself had two elements: the implementation of a WWW-based course management system as a pilot project and the redesign of two Masters-level courses with the application of acquisition and contribution pedagogy (Collis & Moonen, 2001).

### **SELECTION OF A COURSE MANAGEMENT SYSTEM**

The WWW- based course-management system used in the Faculty of Education in EMU is TeleTOP, which was developed by the Faculty of Behavioral Sciences at University of Twente in 1997. TeleTOP is a useable system that requires limited training of students and instructors. It includes multiple functions in an integrated system including News, Course Information, the Roster, Discussion, Questions & Answers, and Assignment Submissions. The University of Twente made TeleTOP available for the pilot project at EMU.

### **LITERATURE REVIEW**

The combination of innovative, increasingly learner-centered pedagogy and new learning technologies inevitably has implications for the teaching and learning methods used at universities. According to Collis and Moonen (2001, p.9), flexible learning is related to a variety of forms to study used in higher education. They say that "students in higher education have for a long time chosen from a variety of courses, studied their textbooks in a variety of locations and times, and selected from a variety of resources in the library. Learning also takes place outside of explicit course settings, as students' interaction with other or takes part in events such as guest instructors or debates and use built-in tutorials to help them how to use a software package."

Flexible learning has a variety of characteristics that collectively differentiate it from other models of education. It can be mapped according to several dimensions such as time; content; entry requirements; instructional approach and resources; and delivery and logistics, as described in Table 1 below.

**Table 1: Dimensions of learning flexibility: options available to learner**

|  |          |
|--|----------|
| <p><b>Flexibility related to time:</b><br/> Fixed time<br/> &lt;=====&gt;<br/> Times (for starting and finishing a course<br/> Times (for submitting assignments and interacting within the course)<br/> Tempo/pace of studying<br/> Moments of assessment</p>   | Flexible |
| <p><b>Flexibility related to content:</b><br/> Fixed content<br/> &lt;=====&gt;<br/> Topics of the course<br/> Sequence of different parts of a course<br/> Orientation of the course (theoretical, practical)<br/> Key learning materials of the course<br/> Assessment standards and completion requirements</p>   |          |
| <p><b>Flexibility related to entry requirements</b><br/> Fixed requirements<br/> &lt;=====&gt;<br/> Topics of the course</p>   |          |
| <b>Flexibility related to instructional approach and resources</b>   |          |
| <p>Fixed pedagogy and resources<br/> &lt;=====&gt;<br/> Social organization of learning (face-to-face; group, individual)<br/> Language to be used during the course<br/> Learning resources: modality, origin, (instructor, learner, library, www)<br/> Instructional organization of learning (assessments, monitoring)</p>  | Flexible |
| <p><b>Flexibility related to delivery and logistics</b><br/> Fixed place and procedures<br/> &lt;=====&gt;<br/> Time and place where contact with instructor and other students occur<br/> Methods, technology for obtaining support and making contact<br/> Types of help, communication available technology required<br/> Location, technology for participating in various aspects of a course<br/> Delivery channels for course information, content, communication</p> | Flexible |

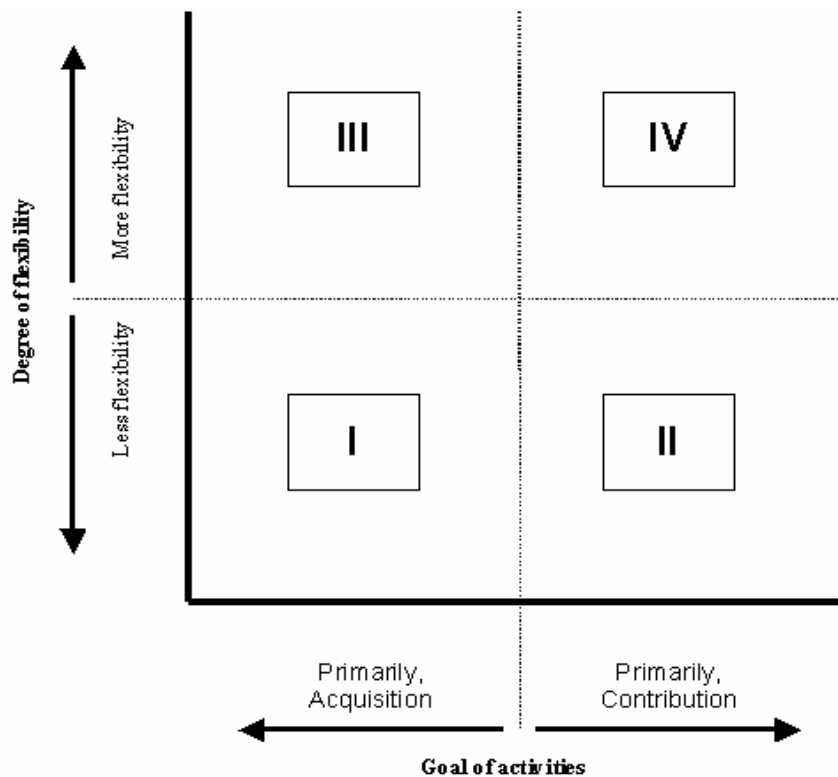
Source: Collis & Moonen 2001, p.10

## EDUCATIONAL MODELS

Collis and Moonen (2001) differentiate between the acquisition model and the participation model of learning. The acquisition model is focused on learning activities that are pre-determined and are based on the acquisition of pre-specified knowledge by individuals, whereas the participation or contribution model is focused on learning activities where the student interacts and communicates with other participants and in a learning community. Because participation alone is not enough, contribution-oriented activities also play an important for learning in such an environment. Collis and Moonen (2001) suggest that both models should be reflected in pedagogy with more emphasis on contribution-oriented activities.

Collis and Moonen (2001) show the relation between flexibility and pedagogy by using the flexibility-activity framework that is similar to the ideas argued by Rich, Gosper, Love and Wivell (2001). By combining an educational model dimension with activity goals focused on acquisition or contribution with a flexibility dimension with categories relating to less and more flexibility, we can define a *flexibility-activity framework* (Collis & Moonen 2001), as shown in Figure 1. Rich et al. (2001, p.12) assert that “The student-centered approach underpinning flexible learning requires a different relationship between instructors and students than other models of education. There is less reliance on face-to-face teaching, often reserving such an approach for those circumstances where it is particularly valuable. There is more emphasis on guided independent learning; instructors become facilitators of the learning process directing students to appropriate resources, tasks and learning outcomes.” This framework is used to describe the changes associated with the intervention in the Faculty of Education at EMU.

**Figure 1: Flexibility-activity framework**

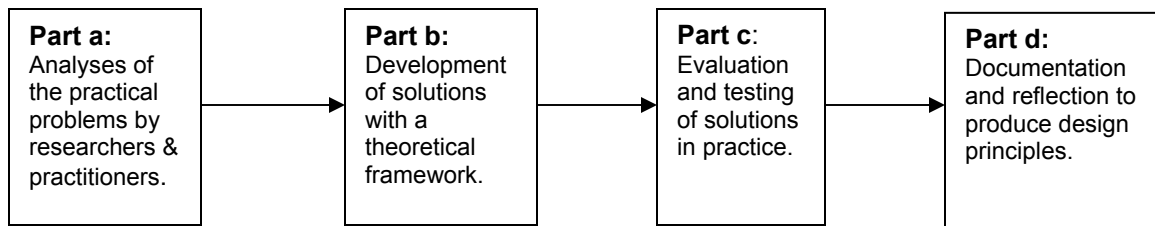


Source: Collis & Moonen 2001, p.24

## METHODOLOGY

Reeves (2000) argues that research concerning the use of information technology in education is characterised by researchers with action goals that are focused on a particular programme, product or method, usually in an applied setting, for the purpose of describing it, improving it or stimulating its effectiveness and worth. The analysis of this case study draws on an adaptation of Reeves' development research model, as shown below in figure 2.

**Figure 2: Adapted development research approach**



*Source: Reeves 2000, p.9*

In the adapted model the feedback and redesign of the courses are not included since the study allowed only two months for the design of courses, implementation in TeleTOP, and data gathering.. Both qualitative and quantitative data were collected in this case study. Different methods of data collection were used. The research instruments used to obtain the relevant information for the study were: questionnaires for instructors and students; observations; discussions with instructors; analysis of TeleTOP sites, and some interviews.

A total of 22 questionnaires were returned from instructors and 52 were returned from students. The interviews were conducted only for some students and all instructors who were using TeleTOP in their courses. Notes from most of the interviews were written in an exercise book. The final evaluation questionnaire was distributed only for post-graduate students,  $n = 14$ , and all 14 were returned.

## DESIGNS AND PLAN

Two Masters-level courses were selected for the intervention. The instructors and researcher decided to use the TeleTOP functions of News, Course Information, the Roster, Discussion, and Questions & Answers. The Roster was seen as desirable because it would allow students and instructors to submit assignments and because it takes account of the three cycles of learning – before, during and after an activity.

Figure 3: TeleTOP roster options\*

|    |   | Data e local   | Durante a Secção   | Trabalhos         |
|----|---|--|--|-------------------|
| 00 |   |  |  |                   |
| 10 | Planos temáticos: Handbook of Research on Science Teaching, pp 377 ? 380. The STS Theme Currículos do EBásico e ESG M. Rollnick. Relevance in Science and Technology Education. | Dia 01/09/2003<br>Na Faculdade<br>das 14:30 as 19:00 | Introdução ao CT&S* Organização do curso* O tema CT&S* CT&S em currículos Moçambicanos; ligação com os cursos ECNM 201 e 202* Trabalho de Grupo Levantamento de tópicos e temas no domínio CT&S que são relevantes em Moçambique.  |                   |
| 20 | *Artigos da imprensa: Selecionar de Notícias, Domingo, Mail & Guardian (RAS), etc. *S. Spencer. SAARMSTE proceedings 1997, pp 539-545   | Dia 02/09/2003<br>Na Faculdade<br>das 14:30 as 19:00 | CT&S no contexto Moçambicano* Análise e categorização do inventário.* CT&S na imprensa Moçambicana: análise de alguns artigos. Termos usados das CNEM e do CT&S.* Trabalho de Grupo para a próxima sessão Estudar e apresentar o caso de Sierra Leone - tecnologia tradicional no ESG 1. | Trabalho em grupo |
| 30 | Apontamentos  | Dia 09/09/2003<br>Na Faculdade<br>das 14:30 as 19:00 | * Apresentação e debate sobre o CT&S de Sierra Leone. * Sistematização dos casos apresentados: tecnologia e técnica.   | trabalho em grupo |
| 40 | * Currículos do EBásico e ESG* Material escolar do EP e ESG* Apontamentos   | dia 10/09/2003<br>Na Faculdade<br>das 14:30 as 19:00 | CT&S e Meio Ambiente* Educação ambiental ? contexto* Analisar a educação ambiental em currículos e livros escolares de Moçambique  | Trabalho em grupo |
| 50 | Innovations in STS, vol. VII (2000). Case Study de Mozambique. pp 246-252   | dia 15/09/2003<br>Na Faculdade<br>das 14:30 as 19:00 | * Levantamento e análise dos tópicos seleccionados para a Avaliação Final.   | trabalho em grupo |
| 60 | * J Parkinson, The Effective Teaching of Secondary Science, pp 191-195 (Longman, 1994)* Estatísticas do PNUD (2000)* Apontamentos   | Dia 22/09/2003<br>Na Faculdade<br>das 14:30 as 19:00 | CT&S e Género* Apresentar Trabalhos de Grupo.* Género na sociedade e no sistema escolar: acesso e metodologia.   |                   |
| 70 |   | Dia 29/09/2003<br>Na Faculdade<br>das 14:30 as       | Apresentar o Case Study Moçambique ? UNESCO 2000? (sessão 5). Trabalho individual para a Avaliação Final   |                   |

\* The English language interface of TeleTOP is not a problem for Mozambican higher education students who study English in secondary and higher education

### Training for instructors and students

The instructors and the students received training sessions of two hours in the use of TeleTOP. These sessions were longer than would have been the case in a typical developed country because of poor Internet bandwidth at EMU (typically 120 b/ sec), which especially affects the use of sites with banners and Flash animation, both of which are used in TeleTOP.

The training for students was organised in three groups: 15 masters' students constituted the first group, while 57 graduate students constituted a further two groups. The group of graduate students was split because there are only 30 machines in the computer room.

### Course design

The intervention was planned to introduce the use of a course environment in tandem with a shift towards a participation/contribution model of teaching and learning which would still include some aspects of the acquisition model. The implementation of TeleTOP required that the instructors redesigned their courses in order to reduce the number of face-to-face lectures and to introduce



more individual or group activities that required students' contributions within the course environment.

Table 2 below shows how the courses were designed to include a balance of acquisition and contribution activities in both TeleTOP and face-to-face interactions.

**Table 2: Application of acquisition and contribution aspects in relation to flexibility**

| Component                                      | To increase flexibility and support an acquisition model   | To increase flexibility and support a contribution model  |
|--|--|---|
| General course organization                    | <ul style="list-style-type: none"> <li>- All announcements about the course procedures are posted in the TeleTOP News section.</li> <li>- A calendar is provided in the TeleTOP Roster with all relevant dates and times highlighted</li> </ul>  |   |
| Lectures/contact sessions                      | <ul style="list-style-type: none"> <li>- The traditional lectures and the contacts and unscheduled meetings.</li> <li>- Summary lecture notes are available in TeleTOP.</li> <li>- Students who were not at the session can review the instructor's notes, listen to the instructor explaining particular points (via contact asked by the students or e-mail), and can review the materials created and posted by the students who were present at the sessions.</li> </ul> | <ul style="list-style-type: none"> <li>- Interaction of the students with each other in a way that engages them in discussing the lecture material and articulating their ideas in a summary by using group work.</li> <li>- Extend the lecture after the contact and change to online-learning by having all students reflect on some aspect and communicate via some form of structured comment from the instructor via TeleTOP.</li> <li>- The instructor uses the students' input as the basis for the next session or activity.</li> <li>- Capture student debates and discussions and use as basis for asynchronous reflection and further discussion.</li> </ul> |
| Self-study and exercises; practical sessions   | <ul style="list-style-type: none"> <li>- Exercises and guided self-study are now integrated with the contact sessions; all can be engaged in from wherever the instructor and student have network connections.</li> </ul>   | <ul style="list-style-type: none"> <li>- Students can use each other's submissions as learning resources once these are available within TeleTOP.</li> <li>- Communication and interaction via the TeleTOP site provides students with guidance as to how to respond productively to each other's work and questions.</li> <li>- Personal questions will be addressed via e-mail and other methods of capturing communication.</li> </ul>   |
| Feedback/testing/assessment of the assignments | <ul style="list-style-type: none"> <li>- Feedback in a quick and targeted manner, without the student needing to wait to see the instructor face-to-face.</li> <li>- Feedback is posted in TeleTOP</li> </ul>  | <ul style="list-style-type: none"> <li>- Peer – feedback</li> </ul>   |
| General communication                          | <ul style="list-style-type: none"> <li>- TeleTOP has a group/ participant page listing all students and instructors profiles including their e-mail addresses.</li> </ul>  | <ul style="list-style-type: none"> <li>- Discussions and question and answer activities about course topics within TeleTOP.</li> </ul>  |

Source: adapted from Collis & Moonen 2001, p.21

## RESULTS

This part of the paper shows results concerning student and instructor access to computers and the Internet; student evaluations of the two courses and the use of different TeleTOP features.

### 1) Student access to computers:

**Table 3: Places where students have access to computers**

|                         | <b>Masters</b> | <b>Graduate</b> | <b>Frequency</b> | <b>Percentage</b> |
|-------------------------|----------------|-----------------|------------------|-------------------|
| Faculty                 | 1              | 22              | 23               | 44.2              |
| Faculty and outside EMU | 13             | 16              | 29               | 55.8              |
| Total                   | 14             | 38              | 52               | 100.0             |

We note that:

- More than half of students have access to computers in faculty and in other places (for example, at home, at work, and in Internet cafés, 55.8%).
- In total of 14 master students, 13 have access in the faculty and outside EMU.
- Most of the graduate students only access computers in the faculty.

### 2) Student access to the Internet:

**Table 4: Where students have access to the Internet**

|                         | <b>Master</b> | <b>Graduate</b> | <b>Frequency</b> | <b>Percentage</b> |
|-------------------------|---------------|-----------------|------------------|-------------------|
| Faculty                 | 1             | 30              | 31               | 59.6              |
| Faculty and outside EMU | 13            | 8               | 21               | 40.4              |
| Total                   | 14            | 38              | 52               | 100.0             |

We note that:

- More than half of students access the Internet only in the faculty (59.6%).
- Of the total of 14 master students, 13 have access in the faculty and other places.

### 3) Instructor access to the Internet:

**Table 5: Places where instructors have access to the Internet.**

|                         | <b>Frequency</b> | <b>Percentage</b> |
|-------------------------|------------------|-------------------|
| Faculty                 | 15               | 68.2              |
| Faculty and outside EMU | 7                | 31.8              |
| Total                   | 22               | 100.0             |

Most of the instructors depend on faculty computers (68.2%) and less than a third of instructors have access to the Internet outside EMU.

**4) Feedback from Masters students concerning the use of TeleTOP:****Table 6: Feedback by Master students about the effects of using TeleTOP**

|   | <b>Disagree</b>   | <b>Neutral</b>    | <b>Agree</b>       |
|---|-------------------|-------------------|--------------------|
| Improves the quality of the courses                   | p = 7.1<br>n = 1  | p = 28.6<br>n = 4 | p = 64.3<br>n = 9  |
| More communication between students                   | p = 14.3<br>n = 2 | p = 50<br>n = 7   | p = 35.7<br>n = 5  |
| More communication with instructors                   | p = 7.1<br>n = 1  | p = 7.1<br>n = 1  | p = 85.7<br>n = 12 |
| Helps to be prepared for lessons                      | p = 14.3<br>n = 2 | p = 14.3<br>n = 2 | p = 71.4<br>n = 10 |
| Gives more opportunities for feedback                 | p = 7.1<br>n = 1  | p = 7.1<br>n = 1  | p = 85.7<br>n = 12 |
| Gives access to course information                    | p = 7.1<br>n = 1  | p = 7.1<br>n = 1  | p = 85.7<br>n = 12 |
| More assignments before and after the classes         | p = 7.1<br>n = 1  | p = 35.7<br>n = 5 | p = 57.1<br>n = 8  |
| Leads to more activities during class hours           | p = 7.1<br>n = 1  | p = 7.1<br>n = 1  | p = 85.7<br>n = 12 |
| Students like to have TeleTOP support in more courses | p = 7.1<br>n = 1  | p = 7.1<br>n = 1  | p = 85.7<br>n = 12 |

Most Masters students agreed that working with TeleTOP improved their courses. Twelve of the 14 Masters students who completed the final evaluation questionnaire stated that the use of TeleTOP resulted in: improved communication with instructors; more opportunities for feedback from the instructors; improved access to course information; more learning activities during class hours; and improved course quality. The same 12 Masters students also demonstrated a preference for TeleTOP support in more courses and more regular use of TeleTOP for assignments before and after classes.

**5) Impact on teaching and learning models:**

With the basic infrastructure to support flexibility in time and place, students had the opportunity to work on assignments or tasks at times of their own choosing. Interactions within the period of the courses were completely flexible, except for the scheduled face-to-face contact with the instructor or other course participants and assignment deadlines. Thus the tempo or pace of studying was partly fixed.

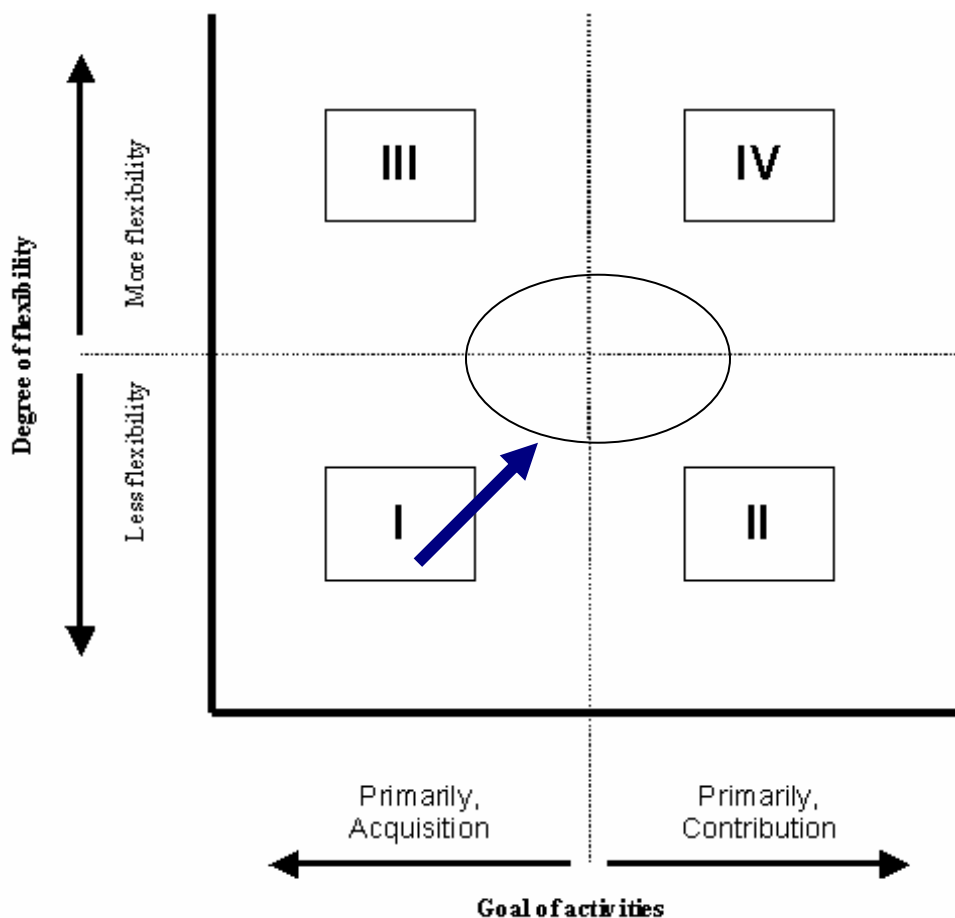
The social organization of the courses was quite flexible. There were face-to-face meetings of the whole class at the beginning and the end of the course as well as group work for some assignments and individual work for others. The learning resources were open, so that the students had to find their own resources for doing the tasks and assignments. This supported self-controlled learning. There was also an opportunity for using contributions by students but there were some difficulties in students uploading attachments.

One instructor made extensive use of classroom discussions and individual meetings at the expense of interaction in TeleTOP. The instructor of the second course made far more use of TeleTOP including more online discussion and feedback, and making online resources available to students. From a student perspective there were improvements in communication, feedback to

students and perceived course quality in both courses. The instructors were however cautious about changing their courses and preferred slow incremental changes to radical shifts in pedagogy and learning activities.

The acquisition and contribution models are well known in the Faculty of Education and fit well in a context in which one wants to build a competencies based curriculum (Kouwenhoven, 2003). The teaching and learning model chosen for the two course interventions involved students in the acquisition of skills and concepts and also in contributions to the growth of a learning community. This project has shown that many of the ideas for more flexibility and student contributions were realized despite the limited use of flexible communication within TeleTOP.

**Figure 4: Flexibility-activity framework with position of the actual situation of two courses applied in TeleTOP**



The findings of the investigation shows that the two courses in the Faculty of Education moved to a position from the first to the third and partially to the fourth quadrant of the flexibility figure as shown in Figure 4. The shift to quadrant four relates to an increase in both flexibility and the use of the contribution model. We agree that flexibility and contribution are important aspects to generate an effective implementation but also suggest that acquisition elements are still needed.

## COST AND BENEFITS

Table 7 applies the Simplified Return on Investment (ROI)-model (Moonen, 2002) from an efficiency perspective. In this table some relevant items regarding to quality perspective are mentioned in the first column. The last three columns indicate ROI scores from the institutional, instructor, and student perspectives. A weighting factor is mentioned in order to represent the importance of each item per actor as reliably as possible. The data in the cells (on a scale from – 10 to +10, indicating 100% loss to 100% gain) represents the relative amount of loss or gain that was perceived by the respective actors in the new situation when using the course management system in comparison with the original traditional situation. Some of the remarks made are used in the table to clarify the score given by the researcher.

The results as shown in Table 7 suggest that the introduction of the learning management system has improved efficiency from institutional, student and instructor perspectives.

From an economic perspective, there are some investments and yearly costs. In the case of this pilot intervention the costs were quite high in relation to the efficiency gains. For future projects including a faculty or university wide roll-out far higher gains of quality and efficiency are expected. EMU has an Informatics Center (CIUEM), which offers ICT services. One of the main recommendations of this study is that EMU should buy or to licence a WWW-based course management system and host it in this centre. The infrastructure for introducing new e-learning is already there, hence a big amount of investment for it could be saved. Another point to consider is that EMU's part-time students urgently need flexibility because of their full-time work commitments.

**Table 7: Simplified ROI with respect to efficiency**

| Actors:                                | Institution |   | Instructor |   | Students |   |
|--|-------------|---|------------|---|----------|---|
|  | Weight      | Score   | Weight     | Score   | Weight   | Score   |
| Flexibility                            | 1.0         | +5<br>Can serve students at a distance*                     | 1.0        | +5<br>Can work on the course outside of the faculty or when traveling, don't have to be in the faculty all time* ** | .8       | +3<br>Time can be used more efficiently, don't have to come to lectures all afternoon, but it is necessary to work at a computer*** |
| Studying course content via TeleTOP    |             |   |            |   | 0.6      | +2<br>Since the course itself is teaching users to use e-learning system, so the TeleTOP system will be more efficient* ** ***      |
| Efficiency in terms of student results | 1.0         | +5 Students will stay on tempo, finish the course on time * | 1.0        | -4<br>Will cost much more time to look at & give feedback on all the extra assignments, handle e-mail, etc *<br>*** |          |   |

**Table 7 (continued): Simplified ROI with respect to efficiency**

| <b>Actors:</b>  | <b>Institution</b> |   | <b>Instructor</b> |  | <b>Students</b> |   |
|---|--------------------|---|-------------------|--|-----------------|---|
| <b>Items:</b>   | <b>Weight</b>      | <b>Score</b>  | <b>Weight</b>     | <b>Score</b>   | <b>Weight</b>   | <b>Score</b>  |
| Finding information & literature on line                  | 0.8                | +2  | 0.8               | +2<br>Information, also via TeleTOP, will always be available****                  | 0.6             | +2  |
| Doing and submitting assignments                          |                    |   |                   |  | 1.0             | +3<br>Saves time and is handy, and according to the content of course, it would be better to do assignments in web environment * ** |
| Assessing assignments and giving feedback                 |                    |   | 0.8               | -3<br>Easier & faster to give feedback with a red pen, directly on paper*          |                 |   |
| Feedback on assignments via web-based system              |                    |   | 1.0               | +1<br>Despite above, it is handy to give feedback directly into the TeleTOP*       | 0.8             | +1<br>Good that you can read feedback, even at outside of the faculty, as soon as the instructor puts it there***                   |
| Communication   | 0.6                | +2<br>Can get information about what users need faster*             | 0.8               | +2<br>More communication with students**   | 0.8             | +2<br>More communication with instructors**   |
| Support of group work                                     |                    |   | 0.8               | -2<br>Much better if students do it face-to-face*                                  | 0.6             | -2<br>Easier to get together face-to-face*  |
| General information about the course available on TeleTOP | 0.6                | +1<br>Will be useful**  | 0.8               | +1   | 0.8             | +2<br>Will be up to date and useful**   |
| Technology skills and competencies                        | 0.8                | +2<br>Everyone will benefit from having more technology experience* | 0.8               | +2<br>Will become more effective with the computer since using web-based approach* | 0.8             | +2<br>Will improve your skills at using the Internet*   |
| ROI: Efficiency   | 15.4               |   | 3.6               |  | 12.2            |   |

Source: adapted from Moonen, 2002

Notes: \* Information from the investigator observations

\*\* Information from questionnaires

\*\*\* Information from discussion with instructors

\*\*\*\* Information from TeleTOP data.

## CONCLUSIONS

On the basis of this study a number of conclusions were reached.

Firstly, with regards flexibility and face-to-face teaching time, the interventions in these two Masters-level courses resulted in improvements in flexibility in place and time; flexibility related to content; flexibility related to instructional approach; and flexibility related to delivery and logistics. In both of the courses the time spent in face-to-face lectures was reduced. The students used their access to computers in the faculty and outside EMU to engage flexibly in learning and assessment activities beyond scheduled face- to-face meetings.

Secondly, it was noted that course changes resulting from the use of a course management system were varied. The instructors were cautious about changing their courses. Only one of the two instructors made extensive use of TeleTOP. However from a student perspective the increased flexibility and access to online resources and communication resulted in changes in communication patterns, feedback to students and a perception of improved course quality in both courses.

Thirdly, it was noted that the combination of contribution model and acquisition model fits best in this context. The combination of increased flexibility and a shift towards contribution activities is likely to be of greatest benefit to part-time students.

Fourthly, with regards costs and benefits, it was possible to demonstrate efficiency gains from institutional, instructor and student perspectives. It was also observed that a far higher return on investment could be achieved through the use of a learning environment on the EMU network.

Finally, in order to gain maximum benefit from the roll-out of a course management system across EMU several changes will be needed. At a technical level these include improvements in local network capacity, internet connectivity and IT support systems. Access speed and cost of bandwidth both offer strong arguments for the use of a course management system on a local EMU server. Finally there is a clear need for staff development activities to ensure that instructors are confident in the use of the technology and able to design and lead activities based on a contribution model.

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## ***DITonline*: A journalistic experiment in blended, collaborative teaching and learning**

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### **ABSTRACT**

*DITonline* is an independent, daily news website run by students, for students, at the Durban Institute of Technology (DIT) in Durban, South Africa. The website is a collaborative project, emanating from blended teaching and learning environments in the university's journalism department. *DITonline* was launched in August 2003, in response to a need for a credible student publication which would be an independent and reliable news source and which would provide a training ground for student journalists. By June 2004 more than 100 students had contributed to the site, which now attracts thousands of hits each day. This paper discusses the philosophical underpinnings of the project, and the growth of the site in terms of contributors, content served and its user community. Particular attention is paid to the development of student collaboration in the cyclical context of action research. The paper is mostly narrative, as we seek to document the growth of *DITonline* as a collaborative teaching and learning environment.

**Keywords:** *Blended, collaborative, online journalism, student publication, WebCT, php*

### **INTRODUCTION**

The idea for an independent, student news website for the Durban Institute of Technology (DIT) was born out of a pioneering, semester-long online journalism course of about 30 second-year students in April 2003. Students were exploring the new field of online journalism (also known as "Internet journalism") through the use of a virtual WebCT classroom in a blended environment. In one assignment, students working in small groups developed a basic website for DIT students, in response to the question: "What would students like to read?" Their suggestions included sections on news, sport, features and opinion.

The students found this project so exciting that they regularly arrived early for their bi-weekly face-to-face sessions in a computer laboratory, and always left late. Soon they started to speak of undertaking a student news website "for real", not just as a once-off assignment. While the students' enthusiasm for the new medium of online journalism was unprecedented, both students and staff in the Journalism Department had long recognised the need for a student publication to showcase student work. The prohibitive costs of printing and paper had constrained potential student publications previously; such limitations do not curb the possibilities of an online publication.

With this in mind and her conviction borne out by the students' passion for the project, journalism lecturer, Tara Turkington, approached DIT's Vice-Chancellor, Professor Dan Ncayiyana. She requested funding for two third-year intern positions for six months, in order to spearhead the student website. It was to be the first daily updated, student-run publication in South Africa, and it was uniquely conceived of in a virtual format. Vice-Chancellor Ncayiyana agreed.

However, before telling the story of *DITonline*'s birth, it is necessary to mention some of the project's pedagogical underpinnings. While the supporting student structures and the look of the

*DITonline* website have changed in its first year of existence, the understanding of teaching and learning that underpins the project remains unaltered.

## **PEDAGOGICAL UNDERPINNINGS**

The pedagogical philosophies in teaching online journalism at DIT owe much to Ortrun Zuber-Skerritt and Paulo Freire, whose approaches are embraced by the ICT-Ed section of DIT's Centre for Higher Education Development. Two staff members in this unit, Mari Pete and Charl Fregona, run a voluntary year-long course for DIT lecturers in online teaching and learning, called the Pioneers Online programme. The teaching focusses on the transformation of the individual rather than the transmission of knowledge, and the course encourages self-directed, active learning rather than teacher-directed, passive learning.

In 2003 Turkington was fortunate enough to be a participant on this course, in which she imbued much of this philosophy and sought to implement it practically in her classrooms. Drawing on this experience, Turkington's approach to teaching online journalism is collaborative and constructivist, and is based on an action research and action learning model, in keeping with the ideas of Zuber-Skerritt (1996). Most basic to this is the idea that knowledge is *constructed* rather than transmitted. Zuber-Skerritt suggests that an appropriate approach to teaching and learning must include problem solving, experiential learning and learning by discovery. "It is in these active and creative learning situations that theoretical knowledge can be generated by the participants themselves and that generative learning and action research by practitioners into their own practice may advance knowledge in that field" (1996, p. 10).

Zuber-Skerritt points out: "The process of action research [...is...] a spiral of cycles of action and research consisting of four major moments: plan, act, observe and reflect. The basic assumption is that people can learn and create knowledge: on the basis of their concrete experience; through observing and reflecting on that experience; by forming abstract concepts and generalisations; and by testing the implications of these concepts in new situations, which will lead to new concrete experience and hence to the beginning of a new cycle." (1996, pp. 11–12). Action research, according to Zuber-Skerritt (1996, pp. 12–14) is *practical, participative* and *collaborative* in that the researcher is not an outside expert but a co-worker; it is *emancipatory* for both the learner and the teacher in that the approach is not hierarchical, but that all people concerned are equal participants; and it is *interpretive* and *critical*.

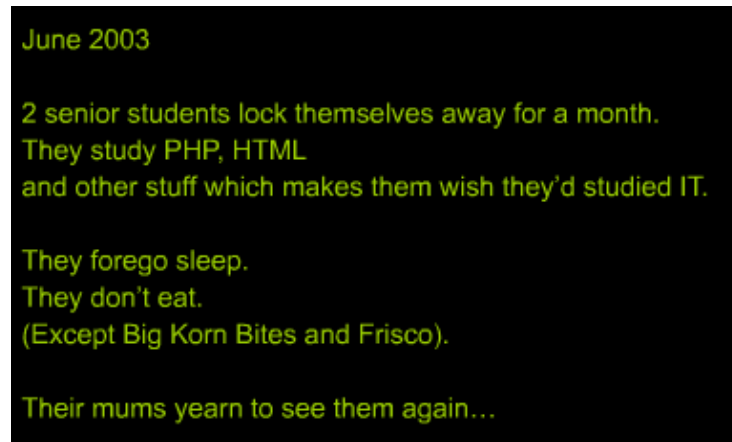
The teaching and learning philosophy that underpins *DITonline* also subscribes to Freire's critical pedagogy in which he posited, among other things, that the teacher has as much to learn as the student. Bentley (1999, p. 1) sums this up: "For education, Freire implies a dialogic exchange between teachers and students, where both learn, both question, both reflect and both participate in meaning making."

For the learner, knowledge is most meaningful when it is internalised through personal experience. Students come to *know* because they *do*. For this to happen, they must be exposed to authentic, real-world situations, or what Dunlap and Grabinger (1996) call "REALs" – Rich Environments for Active Learning. REALs encourage student responsibility and decision-making in collaboration with other learners and lecturers; they promote study within meaningful and information-rich contexts; and they use participation in dynamic activities that promote high-level thinking processes such as problem solving, experimentation and creativity.

REALs are based on constructivist values including "collaboration, personal autonomy, generativity, reflectivity, active engagement, personal relevance, and pluralism" (Lebow 1993, p. 5). Constructivist learning environments provide opportunities for learning activities in which

students, instead of having knowledge ‘transferred’ to them, are engaged in a continuous collaborative process of building and reshaping understanding as a natural consequence of their experience and interaction with the world (Dunlap & Grabinger 1996, p. 66). Finally, REALs encourage students to reflect on the processes and outcomes of learning activities (Dunlap and Grabinger 1996, p. 80). It is this sort of REAL environment that *DITonline* — a teaching material and process rolled into one — sought to create from the outset.

## LAYING THE FOUNDATIONS: ACTION RESEARCH CYCLE ONE



The first cycle of the action learning and action research project that is *DITonline* was the period between the development of the site from June 2003, to its launch in August 2003, and up the end of November, when publication ceased for the university holidays.

In June 2003, two third-year journalism students, Richard Frank and Alec Stafford, were invited to develop the website under the working title “DIT.com” as part of their compulsory six months of experiential training, which is a requirement for the National Diploma in Journalism. While both students had a firm grasp of the Internet landscape and were computer literate, they had only a basic knowledge of web publishing.

Frank and Stafford settled on using PHP-nuke, a popular open-source content management system (CMS) which is powered by PHP/MySQL. Although PHP-nuke is a complete pre-packaged CMS, it needed to be customised to suit the needs of a student news website. Most of their learning was derived from the experiences of others. Forums dedicated to the development and troubleshooting of PHP-nuke and related systems allowed Frank and Stafford to interact with a global community of developers. Most problems they encountered – bugs, vulnerabilities and limitations – were experienced by dozens of others, who had collaboratively developed workarounds and fixes to these problems. Apart from the global interaction afforded by the open-source community, Frank and Stafford relied on DIT’s ICT-Ed Centre for technical and logistical support. The Centre provided server space for the site, supported the troubleshooting process, facilitated the development of WebCT classrooms and helped set up “online newsrooms” for the student journalists.

Once up and running, the website suffered technical setbacks. In the initial stages, the *DITonline* news operation was hamstrung by limited access to the administration of the website. A glitch in the institutional network meant that the web administrator did not have root directory access to the site through Frontpage Extensions. The local IT technicians took months to solve the problem, during which time pictures were either emailed to ICT-Ed and then uploaded, or were

hosted on a free international image-hosting server. The site could not be maintained or upgraded during this time, and many glitches went unresolved until the December break.

The technical difficulties proved less demanding than the challenges of creating a committee to run the website. The first rallying call took the form of a poster with an Africanised Uncle Sam urging: "We want YOU for DIT.com". "Rallying the troops" would become a favourite saying in the newsroom. Over 30 applications were received for the *DITonline* executive committee. An organisational structure was established with a hierarchy that saw five section editors (news, features, sport, arts and opinion) and four special editors reporting to the editor and the web administrator in an executive committee. Each section editor headed a group of journalists who would file stories in their respective beat. The executive committee would then consult an advisory board, composed of journalism lecturers, if any ethical, legal or financial problems surfaced.

The formation of the committee was not very successful. Executive committee members found it difficult to form the hierarchical or vertical relationships which were required for success in their roles. The concept of the website was also hard to communicate because those leading it were themselves caught up in a challenging journey of discovery. Finally, resources were limited – cameras and computers had to be borrowed – and there was no enabling budget.

Another obstacle was that of achieving lecturer buy-in. Some lecturers doubted whether the project would work, and once it was up and running, referred to the site disparagingly in their lectures, criticising story selection and editorial quality. This did not help the students' confidence and discouraged potential contributors. While attitudes have since shifted, there remain divisions between students who work for the site and those who don't, precipitated to some degree by a few discouraging lecturers.

Despite these setbacks, the website enjoyed success far beyond its founders' expectations during 2003. Rising tensions in the institution caused a magnificent run of stories with student and staff protests, court action, bomb threats and sit-ins dominating headlines and attracting users to the site. However, the most frequently viewed story in 2003 was not a news story, but a feature headlined, "Sex at DIT: The bare facts", which proved the old adage 'sex sells'. At the end of 2003, the site had recorded 119 830 page hits and had become, in the words of Vice-Chancellor Prof Dan Ncayiyana, "the news provider of choice" at DIT.

While *DITonline* had started off as a purely voluntary exercise for contributors, at the end of this first action research cycle a process of exploration began to integrate the site with elements of the curriculum and course outcomes. This formal integration was intended both to maintain student interest in the site and ensure academic recognition for their published work. At the same time the opportunity to rearticulate innovatively was provided by the journalism department introducing its first B Tech (Honours) level course in online journalism, and committing to a semester-long module in the subject at third-year level. The department was the first in the country to implement this new diploma teaching new skills required by the international and national growth of online journalism, with learning areas only broadly described in the South African Qualification Authority's registration documentation.

One of the outcomes for the B Tech course in online journalism was a "multimedia package" for *DITonline*. This required students to produce a news or feature article with photographs, video, audio or other graphic elements for *DITonline*. While the package was marked by the lecturer, the ultimate decision over whether it would be published or not lay with the editor – at that time still third-year student, Richard Frank. Students were particularly motivated to see their work online as, according to the marking rubric, 15% of marks depended on publication. All the students in the class saw their work published online for the first time in this way. Through this exercise, the

students learnt to negotiate with an editor in a meaningful way, and to deliver a package professional enough for online publication. The collaboration between the third-year editor and the fourth-year journalists was then *vertical*, and helped to break down the traditionally hierarchical academic structure, in which students in separate years of study did not interrelate or communicate. The collaboration was also a dynamic three-way affair, involving lecturer, student editor and student reporter. The enthusiasm of the students to have their work published, and their delight in achieving publication, reaffirmed the power of the site as a collaborative tool for teaching and learning.

After this first semester of *DITonline's* existence and the end of the first cycle of action research, most journalism students progressed to the next level of study or graduated, although the two founding senior students – Richard Frank, the editor, and Alec Stafford, the website administrator – remained in these positions for the second cycle, the first semester of 2004. With the close of the first action research cycle, those involved reflected on some of the shortcomings and successes of the site, and planned for the future. It was apparent by then that the site had drawn on average more than 1 000 hits per day Monday to Friday through October and November 2003, a hit count encouragingly sustained throughout the first four months of publishing. The most burning issue identified at the end of this cycle was the need for more diverse content.

Figure 1: A recent DIT online edition at <http://olcweb.dit.ac.za/ditonline/html/index.php>

## CONSOLIDATING THE BRAND: ACTION RESEARCH CYCLE TWO

The B Tech project in the first action research cycle was a pilot in many ways. Through its success, a more radical experiment in blended collaboration was embarked on in a semester-long, third-year course in online journalism, offered for the first time in 2004. The course was again offered in a blended environment, with the students attending class in a computer laboratory for two two-hour sessions a week.

A concerted attempt was made to make the course as authentic a learning space – a Rich Environment for Active Learning – as possible. A WebCT classroom was constructed and customised by changing all the icons to images that had been published on *DITonline*, in order to give the class a sense of ownership and belonging. The students in this course became employees in a “virtual newsroom” that was assessed on a weekly basis in terms of how much the class – or editorial team – managed to publish as a team. This was balanced with marks for individual performance within the team context. The lecturer and students negotiated that the basic requirement for the 15-week course for each member would be to publish ten articles (news, features, sport or opinion) on *DITonline*. Only published work would be assessed, but if students published more than ten pieces, the ten best would be used for their final mark. Students strove for negotiated targets each week; if they published 15 or more articles with pictures and/or multimedia elements, they would achieve 100% for their group mark for that week. Even students who achieved their ten published articles quickly were motivated to continue contributing to the class’s output, to ensure a good group mark each week. Just as a publication is created afresh for each edition, so the class’s group marks were set back to nothing at the beginning of each new week.

The class employed role plays extensively. The first class agreed on the roles needed in the virtual newsroom: two news editors, two sub editors, a multimedia editor, photo editor, two photographers and 12 reporters. Each week students selected to perform a role, and at the end of the week were peer-assessed by their classmates on how well they performed. Roles rotated weekly, so that by the end of the course everyone had had an opportunity to play all the roles at least once. At the same time, they built up impressive portfolios of their work published online. We brainstormed job descriptions for each role, and published them in the classroom. The news editors were ultimately responsible for their class’s performance each week. Their job was to liaise with the overall editor over what would be published, and to motivate, cajole, plead, threaten, and inspire their classmates to work ever harder in pursuit of a good group mark. The sub-editors edited writing, spelling and grammar, wrote headlines, and ensured the website’s style was maintained (through a guide that was continuously updated and developed, using WebCT’s glossary tool). The multimedia editor was assessed on how much video or audio material provided by the class was used on the site, and the photo editor on the quantity and quality of photographs published. Effective collaboration – teamwork – was carefully tied in to assessment. As time went on and students became more proficient at taking their own photographs, the role of photo editor was dropped and the number of photographers reduced to one.

The discussion areas were the engine of the class. Here students filed stories, peer-edited them, chose to publish them, sent them back for additional work, or rejected them outright (with some suffering the public shame of having at least one story consigned to the “story graveyard” section of the discussions area). The collaboration here was transparent and recorded – anyone in the class could refer to it at any time. Learning was blended in that students physically attended two news meetings each week (unless they had interview appointments for stories), and worked together from time to time in *DITonline*’s small newsroom. But all of their work was filed electronically, often from off campus and sometimes late at night (such as one scoop, from a student who landed an unexpected interview with renowned poet Antjie Krog). At times, students



took several weeks to work on an investigative piece (such as one on the national Scorpion Unit investigating DIT for corruption), but would keep in touch through the virtual newsroom.

Each Monday, the class reviewed the work it had produced the week before, while they were able to access an html page in their WebCT classroom providing the lecturer's written comments on the original version of every story published. This was an attempt to break down one-way feedback between lecturer and student, and expose the interaction to all students, in the belief that they could learn from one another's successes and shortcomings. Each week, the lecturer would award a small prize for the best article published in the previous week. This helped to motivate students and to enhance the competitive edge in the classroom.



**Figure 2: Some of the 100 DIT Online authors in the first two semesters**

Students were also encouraged to reflect regularly and openly in the discussion area on some of the things they had learned. This feedback in itself formed a platform for collaborative teaching and learning. Some of the lessons were practical, and related specifically to journalism skills:

*"I learnt that stories need to be multi-sourced and a great deal of preparation has to be taken in conducting interviews."*

*"This past week I have learnt how to handle those big bouncers who protect VIPs and how to run for cover in case of riots. I have learnt that in order to get your story published, sometimes you need to work on Sundays and miss church. I have also learnt that as a journalist you make a few enemies."*

*"It is not always easy to get quotes from management, no matter how much you hound them."*

*"Being a sub-editor is not as glamorous as it sounds. It requires a lot of patience and is time-consuming. I also had to become friends with the dictionary again. To my horror I also learnt that journalists have the worst grammar and are too scared to use spell check."*

*"When you have a story that falls through it's always good to have backup."*

Some students' reflections were more personal, and related to themselves as people as much as to what they learned about journalism:

*"I learnt to stay determined and believe in myself."*

*"I learnt that you have to keep pushing even if you feel the going gets tough. I also learnt that working with your classmates can only make you a better person who is able to communicate with others on any level."*

*"I learnt to be persistent. Do not listen to NO!"*

After the Monday morning review, the student news editors ran the class, planning for the next week in a news meeting. They assigned stories and set deadlines for their peers using WebCT's calendar tool, while all students were encouraged to come up with story ideas. On Wednesdays, the student news editors ran another news meeting in which they checked story progress, and again motivated their classmates with a mixture of charm and berating. This was followed by a weekly workshop on an area of weakness, including, for example, sub-editing and introduction writing.

This third-year course was a turning point for *DITonline*. The depth and diversity of content on the site developed considerably, as did the number of hits on the website. In a period of 15 weeks, the 20 students in the class published nearly 250 articles, hundreds of photographs and dozens of multimedia items. In May 2004, the site received the most number of hits ever in a month – over 75 000.

By the end of the course the students were exhausted, but many expressed the belief that the experience had helped prepare them for the industry. In the words of one student:

*"I have learned to write news items. I have learned to sub stories. I have learned even computer skills. To summarise the whole thing, I can say I learned all journalistic skills that the journalist working in the media today needs."*

For some students, the course engaged them on an emotional level beyond merely learning new skills. As one student put it:

*"I am crying while writing this last lesson. I have learnt so many things from this course. Online has been more than going out, finding and filing the story. It has been a bonding experience, a self-esteem booster and a great help in showing me that I can write anything as long as I put my mind to it."*

By the end of the course, all 20 students had published ten articles, while many produced substantially more. The student who achieved the top grade in the course published 25 articles in 15 weeks. The course provided an example of relatively "formalised collaboration". At the same time it influenced informal collaboration in associated years of study as during this time there was a marked increase of voluntary contributions for the site from students in their first and second years of study.

However, students producing the content for the site are only half of the *DITonline* community; the other half is made up of those that read and interact on the site online.



## INTERACTIVITY AND THE USER COMMUNITY

The challenges in developing a user community arose from the cultural, technological and economic factors that influence the South African browsing experience. It goes without saying that if people cannot access the Internet, they cannot read online news. According to the latest South African Advertising Research Foundation's All Media and Products Survey (AMPS) which surveys media usage by people 16 years and older, 1,724 million people (5.8% of their sample) had accessed the Internet in South Africa in the past four weeks. In the same study, the SAARF calculated that 14,676 million (49.2%) had watched television and 27,318 million (91.2%) adults had listened to radio in the last seven days (SAARF 2004).

South Africa's overall Internet penetration rate of 6.8% pales in comparison with developed countries such as the USA (55.1%), the United Kingdom (42.3%) and Germany (43.6%). (International Telecommunication Union 2004). Thus, at present, the Internet is still a "marginal medium" in South Africa (Stewart quoted *in* Alden 2004). It is of note, however, that research (OPA 2004a) shows that American 18–34 year-olds are "most likely to use the Internet than any other" age group. This research concludes that, "18–34 year olds' addiction to the Web manifests itself in above-average likelihood to go online even when they are not in front of their own PCs" (OPA 2004a, p. 34).

Whether this data translates into a South African context is debatable. The AMPS study cited earlier does indicate that 524 000 of the 1,724 million people using the Internet, used an "educational institute where they study" as one of their access points. Research also indicates that where there is flat-rate access – normally associated with broadband or educational network access – the 18–34 year-olds' time spent on news sites increases by 72% (OPA 2004b). This study, although American, is instructive considering 90% of *DITonline's* hits come from within the institution – where the limited open-access available is free and purposed browsing is non-essential.

Against this national background, computer usage for ordinary students at DIT is extremely difficult (Zwane 2004). It is estimated that only a few hundred computers are shared between more than 20 000 students at DIT. Nevertheless, *DITonline's* user community has grown steadily through the last 11 months, with a range of staff, students, alumni, parents and outsiders prompting diverse discussion in the various interactive features.

The comments section of the site enables instant, unmoderated and anonymous feedback on news items from users. The site has attracted over 1 900 comments – many of them critical – on about 600 stories. Student journalists, like their colleagues in the mainstream press, have had to learn to deal with fair and unfair criticism. The comments have also sparked another form of anonymous collaboration: that between journalist and reader. Sometimes stories that have been unfairly or inadequately reported have been followed up or corrected after complaints from readers. In the normal press, responses are recorded in the letters page days after publication of the article. In the online media, responses can be recorded minutes after the article is published, and a story can be updated or corrected at any time. Although some reader comments have bordered on hate speech, readers have also posted many affirming messages. Whatever the case, student journalists realise their work is public and that people are reading it.

The interactive community ensures that the site is organic and content is not simply imposed on the user. A popular module is the "Shoutbox", which allows users to enter a message onto the front page instantaneously. The survey polls are another interactive aspect of the site, where users can vote on questions from the serious (Has the SRC represented students well this year?), to the more light-hearted (Should men wear g -strings?). While every unique "active user" (a user who returns to the site on a regular basis) is not accounted for, there is evidence that the

average number of page-hits per day on the site more than doubled in the site's second action research cycle, the second semester of operation. *DITonline* received 262 340 hits in the first semester of 2004, compared to 119 830 hits in the last semester of 2003.

## CONCLUSION

By the end of its second action research cycle *DITonline* had established itself as an independent, authoritative news website at DIT and as a useful training ground for student journalists. The site provides ongoing opportunities for experimentation with formal and informal collaboration involving both assessment and voluntary participation. It allows for the implementation of a variety of cross-curricula projects performing the dual function of enabling cross-programme student interaction as well as growing the site's user base.

As graduating students depart into industry, the site is faced with the ongoing challenges of producing regular, good content. Changes in student leadership present additional challenges, not peculiar to *DITonline*. However with a good foundation laid, it is anticipated that the energy and enthusiasm of incoming student leadership groups will consolidate and grow the project as an innovative tool for collaborative, blended, teaching and learning at the Durban Institute of Technology.

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## **The Shongololo Interconnectivity Pilot Project: A work in progress**

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### **ABSTRACT**

The Shongololo project of the KwaZulu-Natal Department of Education and Culture in South Africa aims to endorse the notion that a school can quite effectively cross the digital divide with a single online computer that is accessible to both learners and educators and which is managed by an enthusiastic and committed information specialist/teacher-librarian or IT person. ELITS (Education Libraries and Information Technology Services: a Directorate in the KwaZulu-Natal Department of Education and Culture) believes that a bank of networked computers is not necessarily a pre-requisite for online interaction, indeed this model brings with it attendant complications and expenses that can be prohibitive.

The project was designed to run on a similar basis to the Global Teenager project with short relevant topics being set for e-mail discussion for set time periods. The initial plan called for the involvement of sixty schools: 20 developing/disadvantaged schools in deep rural KwaZulu-Natal, 20 technologically developed schools in the same province and 20 schools in and around Manchester in the United Kingdom.

The main challenges experienced in the project relate to ongoing lack of capacity, insufficient technical support, problems with use of equipment in developing schools, differences between developed and developing schools and the collapse of the partnership with the UK-based NGO. The degree of success has ranged from a school that is operating on the most basic e-mail correspondence to schools which have had learners visit one another on a face-to-face basis. Many schools are communicating successfully despite problems such as stolen hard drives, unpaid phone accounts and the uninitiated interfering with settings.

**Keywords:** *Digital divide, rural schools, library services, developing countries, educational technology rollout*

### **INTRODUCTION**

KwaZulu-Natal (KZN), one of South Africa's nine provinces, has a pupil population of over 2.5 million learners and approximately 76 000 educators. Of the 6 000 schools, 27% have some sort of school library, very often simply comprising books in a storeroom. Scattered throughout the province there are also numerous education centres to provide for educator needs on a local level. The terrain and size of KZN present a challenge, especially when it comes to issues of connectivity. An additional challenge is the diverse distribution of resources; these range from historically-advantaged well-equipped urban schools which continue to enjoy world-class facilities, to mud-and-wattle schools with no electricity, no running water and little in the way of educational resources. KZN has a unique set of circumstances in terms of provision of resources, with logistical problems like no other South African province.

The KZN Education Department includes a Directorate called the Education Library, Information and Technology Services (ELITS). ELITS is mandated to cater to the school library/resource

collection of the schools. A school library policy for the province has been created and firmly entrenched within that policy is the necessity for technology within the school library/resource collection environment. ELITS does not consider computers to be solely in the realm of library administration, indeed library automation often creates its own time-consuming problems. Computers are primarily seen as a means of delivering information, be it online or offline, and to enable electronic communication between professionals and also the learners.

The principles guiding the ICT vision for ELITS are summarised below:

The rationale is that:

- ICT is seen to be a tool; a means to an end, not an end in itself;
- Computers are used first and foremost by learners and educators for accessing information as opposed to administrative work by educators;
- For computer training to have meaning, applications are taught within context and at point of need (just-in-time versus just-in-case) across the curriculum and with meaning.

Provisioning principles include that:

- Reading and literacy are not taught using a computer therefore the provision of books and libraries remains an essential in our schools. Digital libraries cannot replace book libraries;
- Where there are computers there should be a library and where there is a library there should be computers (information centres). This principle applies to all educator resource centres in the province as well as schools. Also, libraries and computer centres should be adjacent;
- A bank of networked computers is not a prerequisite for effective use of technology. A single online computer, accessible to learners and educators in a school, and managed by a nominated person such as an information specialist, provides an excellent starting point for information retrieval and collaborative learning projects, for example, Global Teenager.

The key pedagogic principles are that:

- New teaching methodologies need to be used if educators are going to use the potential of the technology (e.g. currency of information allows for authentic versus contrived problem solving i.e. PBL, problem-based learning);
- The philosophy of outcomes-based education take place i.e. learners exercise choice as opposed to traditional teaching whereby the learners all follow the same instruction (free-range versus the battery hen approach). Beyond being a sound pedagogic principle, it means that resources are more equitably shared and that learners are developing different skills through using a range of resources.

It is acknowledged that human resource requirements are central to a successful educational process and that teacher-librarians are professionals and thus need to be qualified as such (i.e. as educators, librarians and competent in the use of ICT). Teacher-librarians need to collaborate with educators to ensure that information literacy takes place across the curriculum; and they must ensure that effective information skills are taught so that learners become ethical, competent and discerning users of information.

ELITS is dedicated to creating information-literate individuals who can manage the wealth of information available online. This concept extends beyond acquiring mere information skills to making sense of this information and using it to create new and unique information.

The ELITS position is that a single online computer managed by a competent, interested individual can go a long way into taking a school from a bicycle on the edge of the information highway to a fast motorcar. The emphasis is on access to information and communication, not training in computer applications. Ideally, it is acknowledged, every KZN learner should have the resources to become completely computer literate. However, if one waits for this ideal to materialise, the learners in KZN will remain locked in a time warp of expectation and turn-of-the-last century education forever; the single online PC is therefore an interim strategy.

While committed to redress, ELITS is also committed to staying current with trends in Information and Communications Technology (ICT) in keeping with policies such as the White Paper on e-Education. It is to this end that the Shongololo Project was conceived.

### **SHONGOLOLO PROJECT OBJECTIVES**

A shongololo (or eShongololo) is an African millipede with a black shiny shell-like skin and sensitive antennae. It is a shy creature which is seen most often after a tropical thunderstorm. When touched, it curls into a circle. Shongololo was chosen as the name for the project as on the one hand, participants have to be sensitive to others and on the other hand, hard-skinned and robust in the face of technology. In addition the project 'grew legs' quite quickly as increasing numbers of schools came on board.

Shongololo was a one-year pilot project designed to link 20 developing schools and 20 developed schools (technologically speaking) in KZN, South Africa, with 20 schools in the United Kingdom. At its start the project was run under the auspices of the KZN Department of Education and the AfriTwin Education Trust, a non-governmental organisation (NGO) based near Manchester, England.

The main objective was for learners to communicate with each other via e-mail in order to mutually solve problems, identify and enjoy differences, and discover commonalities. Twenty e-mail mailing lists were created to include three schools at a time in similar phases, i.e. Foundation, Intermediate and Senior. We also planned for:

- Communication on professional topics between the facilitators (educators) involved;
- Teacher exchanges, both locally and overseas (such as an informal internship between the librarians in the developing and the developed schools);
- E-Mail exchanges between other bodies in the school community (such as a library monitor body);
- Fundraising by the overseas schools for the developing schools in South Africa;
- Information retrieval using the Internet for both educators and learners;
- Exposure to professional mailing lists for the educators.

### **PROJECT OUTLINE**

#### **Developing schools in KwaZulu-Natal**

KZN's ELITS Directorate made the finance available, and 20 schools in deep-rural KZN were carefully selected over a three month period. Lunga Molapo was elected as the project co-ordinator and Joy Rosario, ELITS Head Office i/c ICT, as the project manager. The KZN Regional

Heads nominated schools in their regions and all potential candidates were visited. Selected schools needed to include all three school phases as well as the three regional school circuits.

The list of criteria for selection included:

- A willingness to participate;
- Support from management;
- Preparedness to fund the online connection;
- The provision of strong security;
- A person in the school who was prepared to drive the project;
- Time for face-to-face training.

The principal in each school had to agree to the participation of the school as well as to a year long commitment from the date of the actual start of the project. ELITS reserved the right to withdraw the investment of the computer if a school failed to maintain e-mail contact for any reason (for example, unpaid telephone or electricity accounts). Should a school manage to sustain the project, the computer and all the peripherals would stay in the school and it would continue to be supported by ELITS.

Each of the schools was then provided with a Pentium 4 PC, a printer and an external modem. Software was bought and installed according to age appropriateness and this included Kidspiration, Inspiration, Literacy Bank, Dorling Kindersley World Explorer and all the schools received Libwin, a South African library automation programme. The Microsoft Schools Agreement (which provides South African state schools with free MS office licenses) was duly completed by each school and they received MS Office, Encarta encyclopaedia with atlas and dictionary as well as Publisher and Frontpage. The schools were also provided with a selection of other paper-based material, in the form primarily of reference materials such as dictionaries, encyclopaedias and atlases. In addition each school was also provided with the Dorling Kindersley Travel Guide to South Africa, a content-rich, illustrated title which provides learners with information about their own country, especially important as many have not had the opportunity to travel very far from home.

Once schools were selected, training took place over a period of three days. The principal of each school was invited to the initial orientation day as experience has shown that support from management helps avert problems. It was also important for principals to understand that a computer will not necessarily circumvent shortfalls in the education system, since a perception exists that technology is the answer to all ills; there is little realisation that technology brings its own separate and expensive issues.

Two educators from each school were trained – the teacher-librarian and another person chosen to support the project. This was necessary, given that already one of the teacher-librarians has been found by the Education Department to be ‘in excess’ and has moved on. The aim of the training was to create computer-confident individuals and ensure that all individuals had at least practised sending e-mail using Microsoft Outlook, as a skill necessary above all others for the success of the project. Permission was granted to use the Educators’ Network CD (produced by SchoolNet) in the project, primarily for the excellent tip sheets on using different software applications. A website in FrontPage was created by each trainee and the basics of FrontPage then taught in order for the site to be maintained locally. It was suggested that the schools use the national telecommunications provider (Telkom) as the ISP as it was the most reasonable dial-up option available, offering 10mgs of web space on the server. This, however, has proved to be

a problem because the 'free space' does not support Windows. Discussion is underway at present because the Microsoft School Agreement offers free software to schools and this includes FrontPage, yet Telkom does not support it. Telkom has otherwise been supportive in expediting telephone lines; schools that could provide a reference number were prioritised.

The educators then returned to their schools geared up with the necessary hardware, useful software and elementary training to support the project. The next stage required those involved at the schools to familiarise themselves with the equipment, to ensure the phone lines were available, security was in place, to get connected and start e-mailing.

### **Developed schools in KwaZulu-Natal**

In order to identify 20 regional 'developed' schools, the Shongololo Project was advertised on InfoLink, a South African mailing list for teacher-librarians and ICT educators, which is, on the whole, representative of functional school libraries in South Africa. Participation was voluntary and it was gratifying to note the number of these schools which came forward, possibly because most developed schools have outreach-type activities and this project offered a good platform.

It was felt that the inclusion of the schools was a necessary aspect to the project as:

- It needed to be underpinned by local support;
- Local developed schools are of world-class standard;
- Children in the same country do not have the opportunity to talk to each other (while equally they enjoy the interaction with 'overseas' friends).

The facilitator in each school (usually the teacher-librarian) made contact with the developing school and UK school. Problems to date have included incorrect e-mail addresses, firewalls, unpaid electricity and telephone accounts, and school holidays. Despite these challenges, there has been interaction, including telephonic discussions, between most of the schools.

### **United Kingdom schools**

When this project was originally mooted we planned to contact the School Librarians Network (SLN) in the UK. Fortuitously a UK-based educator working with a schools-twinning NGO was proposed as a contact and ELITS initiated contact with the NGO. Joy Rosario met the UK contact in South Africa in December 2003 and subsequently visited the relevant schools and met the UK school principals in Manchester in April 2004.

The visit consisted of a presentation at one of the participating schools, a meeting of the principals involved and visits to the other schools, which included technology colleges. These visits were revealing: for example, a "Shongololo twin" school has closed the library, put the books in storage and converted the space into two computer laboratories. The Deputy Head Teacher involved has been endeavouring to reverse the decision, as he understands what the school has lost in the process. This particular school boasts one computer for every two pupils.

'Citizenship' is a subject in the UK curriculum and several citizenship teachers are running with the project. Sustainable development, fair trade and environmental issues are relevant to learners in both countries. This is an interesting and useful development as there is plenty of material on these topics both online and offline. They also provide an opportunity to discuss issues which are



new to local learners and extend conversation beyond our current exhaustive local focus on issues such as HIV/Aids, crime and drugs. Topics for the project are therefore based on real-life problem-solving issues that are 'citizenship based' and phrased according to phase level. Topics are generated by the facilitators and pertain to issues in their schools that are of common interest.

### **Challenges experienced**

The main challenges experienced in the project relate to ongoing lack of capacity, insufficient technical support, problems with use of equipment in developing schools, differences between developed and developing schools and the collapse of the partnership with the UK-based NGO.

**Lack of capacity:** The training was sufficient to build confidence. However, there may have been too much confidence without enough knowledge to back it up. For example, computer settings have been changed to the extent that it has been impossible to provide support by phone.

**Lack of technical support:** The Education Department has not been in a position to provide technical support. As a result, when schools 'go down' there is no one to call to provide on-site support. In theory the State Information Technology Agency (SITA) is supposed to provide support as part of the two-year warranty on each computer acquired through them and although the staff is willing, it has been unreasonable to expect them to drive hundreds of miles to fix what is normally a very minor problem.

**Use of equipment:** In some of the developing schools the computer has been used for administrative or private purposes and thus was unavailable for use in the project.

**Differences between overseas, developed and developing schools:** Some of the overseas schools, and some of our local developed schools (mostly in the independent sector), have lacked understanding and tolerance for the challenges faced in the developing schools. Consequently some overseas and local developed schools withdrew from the project despite considerable time spent apologising and explaining the challenges.

**Collapse of the UK partnership:** The UK-based organiser broke away from the NGO that was organising the partnership with schools in the UK. After she approached, as an independent consultant, the schools already recruited into the project for funding, many of the UK partners withdrew from the project. It then became necessary to cut ties with the UK organiser for ethical reasons and to run the project as a wholly South African venture.

Further challenges included the damage caused by lightning strikes to equipment in local schools and the difficulty of deciding on appropriate topics for conversation. Some of the topics mooted for discussion by South African schools – such as rape, HIV/Aids, domestic violence and teen pregnancy – have been considered inappropriate discussion topics by UK schools, despite being daily realities for South African learners, even at the primary level. 'Safe' topics, such as animal rights or genetically modified foods, equally, have been considered quite trivial and irrelevant locally.

### **Successes**

The most immediately visible success of this project has been the delight and amazement of educators and learners alike as they receive their first e-mail! The degree of success has ranged

from a school that is operating on the most basic e-mail correspondence to schools which have had learners visit one another on a face-to-face basis. Many schools are communicating successfully despite stolen hard drives, unpaid phone accounts and the uninitiated interfering with the settings.

It is already evident that as the project grows there will be significant benefits to educators and learners alike. Everybody involved in the Shongololo Project has experienced a steep learning curve, including the project managers. ELITS and the KZN Department of Education as a whole continue to be supportive of the project, especially as the lessons learned to date will ensure sustainability.

The Shongololo project is informing the rollout of other connectivity initiatives. The project is now being used to persuade key stakeholders that the information highway is accessible for both learners and educators. As and when funding becomes available, the project will grow and it is hoped that there will be a reciprocal exchange with other countries as well as within KZN.

## **CONCLUSION**

The aim of the Shongololo project is to facilitate communication, build confidence and enhance skills for school educators and learners alike. There has been a considerable investment in both time and money in this project, with the ELITS Directorate committing itself to its success. It is vital to demonstrate that a single online computer in a school can make a difference to education. As the dynamics of the project change so will the management. It is not possible to foresee all the challenges that may arise, especially as they include the specific internal issues which differ from school to school. A belief in global connectivity and thus cross-continental relationship building remains core as a *raison d'être* of the Shongololo Project and it will thus be continued, no matter how demanding the challenges.

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## **Experiences with international online discussions: Participation patterns of Botswana and American students in an Adult Education and Development course at the University of Botswana**

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### **ABSTRACT**

This paper describes the experiences gathered in a Masters of Adult Education course at University of Botswana (UB), where 26 students of the University of Botswana and the University of Georgia (UGA) engaged in discussions within the University of Botswana Learning Management System WebCT. Individual participation patterns in the discussions varied widely in this course. Based on variables found in the literature, student participation patterns were analysed – both in terms of quantity (messages read and written) and quality (status of conversational moves and level of critical thinking). Results show that culture or membership of a specific group did not seem to influence participation patterns. Gender was the major influencing variable for participation patterns in terms of both quantity and quality. Other influencing variables were course design, assessment of discussions and the presence of a learning community.

**Keywords:** *Online discussions, student participation, gender, Botswana, adult education*

### **INTRODUCTION**

In 2002, eLearning was introduced at the University of Botswana (UB) as one strategy to transform teaching and learning. The appropriate use of Information and Communication Technologies (ICTs) at UB reflects a blended approach to teaching and learning, with asynchronous online communication tools, such as email or online discussion forums forming an essential part. Online discussions can be valuable in several ways: they encourage students to actively participate in communication (Im & Lee 2003; Edelstein & Edwards 2002); they can promote students' active participation and enhance students' learning (Fassinger 1995); they may lead to cognitive development (ibid); they allow students time to reflect before contributing to the discussion; (Markel 2001); they promote social interaction which motivates membership and participation in a virtual community (Oren, Mioduser & Nachmias 2002); and they can also be enjoyable for students (Williams & Purry 2002). The usage of online discussions is therefore promoted at UB to encourage students' participation in learning conversations within courses.

This paper analyses the participation of students in a Masters of Adult Education at UB, where nine UB students and 17 University of Georgia (UGA) students engaged in international discussions using UB's online Learning Management System, WebCT. This study sets out to identify the factors that influence student participation patterns, which have been anecdotally noted to vary widely. Student participation is analysed and compared both in terms of quantity (messages written and read) and quality (type of conversational moves and critical thinking levels).

## LITERATURE REVIEW

Current research suggests that there are several key variables, which are relevant to understanding the participation patterns of students in online discussions in blended learning academic environments. This literature review briefly reviews four of these: target group (in terms of gender and student type), course design (including assessment), access (to both technology and computer skills) and the presence of a learning community.

### Target group

#### *Gender*

A detailed knowledge of the target group involved in the learning process is critical in order to use online discussions efficiently. In this study, two descriptors of the target group were considered – gender and student type.

Gender in particular is an influencing variable that has been heavily researched, with conflicting results and a lack of consensus to date. A body of research exists to suggest that the online environment offers women possibilities for active engagement. It has been found that women participate more actively and enjoy greater influence in environments where norms of interaction are controlled by an individual entrusted with maintaining order and focus in the group, e.g. where a teacher controls/moderates the interaction (Herring 2000). These findings are consistent with the results of several empirical studies, which attempt to assess the factors that influence participation in online discussions. Im and Lee's study (2003) on students' participation in online discussions (n=40) in a course from the cyber university of North Korea shows that the anonymity and the social distance offered by the Internet seem to allow female participants to be more active.

Other research suggests that gender differences can work to the disadvantage of women (Herring 2000). And a third group finds no differences in online participation on the basis of gender with, for example, no significant difference in number of postings or readings according to gender (Masters and Oberprieler 2003 in their study of first-year Health Science students (n=311) at the University of Cape Town); and no difference in gender participation (Oliver 2003 in his study at the California College of Podiatric Medicine).

#### *Type of student: Traditional and non-traditional*

This study involves Botswana and American students. Generally student populations differ widely in these two countries. In the USA there is a remarkable change in the student population that benefits from flexible forms of learning like eLearning. A study carried out in the USA by the National Center for Education Statistics (NCSE) reported that three-quarters of all undergraduates are 'non-traditional', defined by: delayed enrolment, attending part-time, working full-time, financial independence, having children, being single parents and lacking a high school diploma. (Oblinger 2003)

At the University of Botswana, the only university in the country, out of a total of 15 414 students, 12 620 (82%) are enrolled full-time and only 2 447 part-time (16%). Three hundred and forty-seven students currently participate in distance learning programmes (2%). Fourteen thousand six hundred and eighty-nine students are enrolled in undergraduate studies (95%) and 725 in postgraduate programmes (5%) (UB Fact Book 2004/2005).

## **Course design and assessment**

### *Course design*

One of the essential conditions for building effective online learning communities that the Australian Flexible Learning Framework (n.d.) has found in its examination of research literature is carefully establishing and planning online activities, including online discussions. Knowlton and Knowlton (2001) highlight the importance of instructions in helping students to focus on course content during online discussions. Edelstein and Edwards (2002) list as some of necessary considerations, the time students need to effectively participate in the discussions, how critical the discussion is to the achievement of the learning objective(s) and the need for guidelines for the level/quality of participation that is expected from the student(s).

### *Assessment*

The integration of online discussions into course assessment is closely linked to the integration of online discussion in the overall course design. This is particularly true for blended learning environments, where learners do not rely solely on online communication methods to interact with their lecturers or colleagues. Assessment is widely acknowledged as a cause of increased postings. Edelstein and Edwards (2002) postulate the use of effective assessment methods to evaluate students' performance and knowledge integration, if the online discussions are to remain an integral part of the eLearning experience. Warren and Radda (1998) come to similar results and conclude that grading contributions was one cause of increased postings. Other authors, like Oliver (2003), are more critical about the usage of assessment as a means to increase students' participation. In Oliver's study a content analysis of postings in the discussion forums revealed that contributions were not strongly interactive and that students were simply playing the "game of assessment", making postings that earned marks but rarely contributed otherwise.

In their study, Masters and Oberprieler (2003) tried to promote student participation by following the philosophy of the Health Sciences Curriculum, that focused on problem-based learning, with no overt reward or punishment system, by drawing on methods, philosophy and content of the main stream, and asking questions that were important to students' course of study and structured in a way to encourage free and open debate and allowing unhindered debate. These strategies obtained large-scale and equitable participation across the student body despite the lack of immediate assessment incentives.

### **Access**

The ease of access to technology and the level of student computer and information skills in developing countries are receiving diminishing attention in the international literature. This might follow Oblinger's (2003) description of the new generation of students, who grow up with ICTs and often more computer-savvy than their lecturers. The Internet and e-mail are used for schoolwork and research and online communication tools seem to function as a natural communication and socialisation mechanism. Developing countries face a different situation, with scarce resources and a lack of basic computer literacy. Limited access to technology outside the University campus and the lack of necessary computer and information literacy skills is a major limitation to broadening the reach of eLearning in Botswana. One of the major reasons for using eLearning at UB is in order to expose students to technology. (Giannini-Gachago & Molelu 2005) The associated lack of student IT skills can be one of the major barriers to equitable participation in online discussions (Masters & Oberprieler 2003).

### **Learning community**

The presence of a learning community to enhance participation and the role of tutors' support feedback in promoting and moderating this community have also been identified as success factors in blended learning. Rossman (1999) conducted a document analysis of course evaluations in courses that used asynchronous learner discussion forums at Capella University in the USA (n=3000). Results showed that the primary requirements expressed by participants included feedback, either from a tutor or from colleagues. Oliver (2003) reports that the major factors for stimulating student participation were tutor enthusiasm and expertise.

The role of tutors are many: Lim and Cheah (2003) argue for more assertive roles of tutors for more effective online discussion, such as answering queries, providing feedback, keeping the discussion focused and posting conflicting views to elicit thinking or reflection in the conclusion of their study with preservice teachers. Im and Lee (2003) postulate a variety of roles for tutors to successfully promote online discussions, such as guiding students, providing prompt input and feedback, offering summaries of the discussions and providing resources to support discussions and thus enhance participants' learning experience. Nevertheless the tutor needs to strike a balance between encouraging participation through his/her input and letting students take the initiative. Pilkington, Bennett and Vaughan (2000), based on their experiences with strongly tutor-led online communication, suggest that the tutor should take a more hands-off approach and encourage students to express themselves more, to make communication more inclusive. From an analysis of a private chat session between two students in a one-to-one situation, students were more active and inquiring in a private chat than in a tutor-led chat on the same topic held later the same day. This indicates that when space for one-to-one peer-to-peer interaction is provided it is spontaneously and constructively used by some students. Oren et al. (2002) found that, as a result of five studies carried out at Tel Aviv University's School of Education, a decrease in teachers' involvement was an important factor in the development of social climate in virtual discussion groups. Social interaction developed more easily when students' discussion postings not moderated and when they used nicknames. These studies reassert that tutors are process facilitators, encouraging student-to-student interaction, but should not dominate the content discussion.

### **The site of study**

For this project students from the Adult Education and Development course at UB and the International Adult Education course at UGA were linked through WebCT. The objective of this co-operation was to facilitate international student interaction about topics like globalisation, in a project initiated just before the start of the semester. The ensuing inadequate time for effective planning means that it was viewed by both institutions as an exploratory step and work-in-progress.

### **The Master of Adult Education Programme offered by the Dept. of Adult Education at UB**

The teaching and learning methods in DAE 642 include lectures, group and individual activities, online research and intensive reading. Classes take the form of interactive seminars, involving discussions of topics in the whole class as well as in small groups and in online discussion forums. The participants meet once a week for three hours in one of UB's computer labs, where they have access to the Internet and WebCT (Youngman 2003).

International Adult Education is a fully distance online Masters course of the University of Georgia. Students, supported by a lecturer and an online tutor, are given mandatory weekly reading assignments and optional discussion topics (Hill 2004).

To facilitate the online discussions two discussion forums were set up. The main forum was a discussion space for introductory remarks and any other topics students wanted to discuss. The globalisation forum was dedicated to a specific discussion of globalisation. Later on the collaborative task forum was added, after experience showed that the group was too large to conduct efficient discussions ( $n=26$ ). Students were divided into three sub-groups and allocated two weeks to discuss a given topic and to reach a solution in form of a summary of the discussion. (For examples of discussions postings see Appendix 1.)

## **RESEARCH DESIGN**

This study follows a quantitative design with some qualitative elements. Data was gathered throughout semester two of the Academic Year 2003/2004. The sample of the study consists of nine students of the UB course and of 17 students from US (total  $n=26$ ). Twenty-seven per cent ( $n=7$ ) of the students were male and 73% ( $n=19$ ) were female students.

Data were collected in the following ways:

- Participation in the online discussions was tracked using the WebCT student tracking tool, providing data about student levels of activity, for example, total discussion messages read and posted.
- Discussion postings and e-mails sent to lecturers were collected through WebCT.
- A focus group discussion was conducted with the students to provide insight into students' perception of the online discussions.
- US students provided additional feedback by e-mail to their tutor.

The data was analysed using the statistical package SPSS to determine frequencies. Independent Sample T-Tests and Pearson's Chi-Square Tests were executed to determine the significance level of the influencing variables (significance level  $\alpha=0.05$ ).

The quality of the messages was categorised in two ways:

1. Following the study of Oliver (2003), who based his content analysis on the work of Pilkington et al. (2000), discussion messages were classified according to their status as conversational moves. This involves classifying messages as questions, self-contained statements or responses. This allows a more detailed investigation of how students act in an online discussion and a judgement of whether or not this engagement is particularly constructive. For examples of different levels of conversational moves in discussion postings see Appendix 1.
2. Messages were also classified according to their level of critical thinking, following a framework presented by Meyer (2004) for her study of 17 online discussions in two doctoral-level classes in educational leadership at the University of North Dakota. Garrison (2001) developed a four-stage cognitive-processing model that can be used to assess critical-thinking skills in online discussions: 1) triggering (posing the problem), 2) exploration (search for information), 3) integration (construction of a possible solution) and 4) resolution (critical assessment of a solution). For examples of messages coded for different levels of critical thinking see Appendix 1.

The researchers' main limitation was the small sample of students and the experimental implementation of the course that did not allow for a thorough planning of the study, especially the evaluation phase of the course.

## FINDINGS

In this section the courses are analysed along the variables found in the literature review that influenced students' participation in online discussions: target group, course design and assessment, access to technology and level of computer skills and the presence of a learning community.

Over a period of 11 weeks the 26 students using the online discussions wrote a total of 234 messages and read 3 143 messages. On average a student wrote nine and read 121 messages.

Altogether, 217 posted messages were analysed in terms of:

1. Status as conversational moves, for example, question, self-contained statement or response;
2. Level of critical thinking along Garisson's critical thinking categories: triggering, exploration, integration and resolution.

Table 1 shows the results of the analysis based on the type of conversational moves of students:

**Table 1: Messages per conversational move**

|  | <b>Frequencies</b> | <b>Percentage</b> |
|--|--------------------|-------------------|
| Question   | 18                 | 8%                |
| Statement  | 31                 | 14%               |
| Response: answer<br>Response: additional question<br>Response: answer and additional question<br>Response: statement | 168                | 78%               |
| <b>Total</b>   | <b>217</b>         | <b>100%</b>       |

Oliver (2003) cites Morris and others, who observed approximately three replies to every original message. In this study each original question triggered nine replies, which shows a high level of constructive engagement of students.

An analysis based on the level of critical thinking shows that the majority of messages were triggering or explorative messages. Very few students managed to integrate other students' contributions and none reached a resolution (see table 2).

**Table 2: Messages per level of critical thinking**

|              | <b>Frequencies</b> | <b>Percentage</b> |
|--------------|--------------------|-------------------|
| Triggering   | 45                 | 27%               |
| Exploration  | 104                | 63%               |
| Integration  | 16                 | 10%               |
| Resolution   | 0                  | 0%                |
| <b>Total</b> | <b>165</b>         | <b>100%</b>       |

Ten messages per participant over a period of 11 weeks does not correspond to what the literature would classify as high participation, but the individual students' participation suggests



interesting results (table 3).

**Table 3: Number of postings per student**

| Postings written per student | Frequencies | Percentage  |
|------------------------------|-------------|-------------|
| 0–5                          | 13          | 50%         |
| 6–10                         | 6           | 23%         |
| 11–15                        | 3           | 11%         |
| 16–20                        | 2           | 8%          |
| 20 and above                 | 2           | 8%          |
| <b>Total</b>                 | <b>26</b>   | <b>100%</b> |

This table shows that a few students dominated the discussion. The two most active students posted 37 and 38 messages each, while the majority of the students (50%) posted five or less messages. Seven students (26%) posted more than the average of ten messages. Out of these seven students, four were Batswana and three were American students, five were female and two male. The next section tries to establish the reasons for the differences in students' participation patterns.

#### **Analysis of participation pattern by groups**

Both the Batswana and USA-based students in this exploratory intervention were predominantly 'non-traditional' students. The majority of UB students, for example, are part-time Master students (78%), work full-time (67%), have financial independence (67%) and have children (78%). US students are distance education students and are by definition 'non-traditional'.

Table 4 shows a comparison of the participation level of the two student groups:

**Table 4: Usage of discussion forums for UB and UGA**

| Usage                        | UB          | UGA         |
|------------------------------|-------------|-------------|
| Messages written in total    | 116 (49%)   | 118 (51%)   |
| Messages read in total       | 1 185 (38%) | 1 958 (62%) |
| Messages written per student | 13          | 7           |
| Messages read per student    | 132         | 115         |

The analysis shows that the individual UB (Motswana) student was more active writing and reading messages than an UGA (US) student. An Independent Samples T-Test however did not show any significant influence on the participation level based on group ( $p=0.614$  for messages read and  $p=0.141$  for messages posted).

Table 5 shows the postings per student per group.

**Table 5: Number of postings per student per group**

| Postings written per student | UGA         |             | UB          |             |
|------------------------------|-------------|-------------|-------------|-------------|
|                              | Frequencies | %           | Frequencies | Frequencies |
| 0–5                          | 11          | 65%         | 2           | 22%         |
| 6–10                         | 3           | 17%         | 4           | 44%         |
| 11–15                        | 2           | 12%         | 0           |             |
| 16–20                        | 0           |             | 2           | 22%         |
| 20 and above                 | 1           | 6%          | 1           | 11%         |
| <b>Total</b>                 | <b>17</b>   | <b>100%</b> | <b>9</b>    | <b>100%</b> |

In both groups a small number of students dominated the discussions: One American student (6%) wrote 31% of all messages of the American group, while 65% of the American students wrote five or less messages (22% of all messages). In the Batswana group the distribution of messages posted is slightly more balanced, with one particularly dominant student composing 47% of all messages, but only 22% of the students composing five or less messages (8% of all messages).

Analysing the types of conversational moves and level of critical thinking in the discussion messages reveals the following results (see table 6):

**Table 6: Type of conversational moves by groups**

| Type of conversational moves | Total          |                 |  |                   |
|------------------------------|----------------|-----------------|--|-------------------|
|                              | Question       | Statement       | response: answer<br>response: additional question<br>response: answer & additional question<br>response: statement |                   |
| UB                           | 9 (10%)        | 15 (17%)        | 64 (73%)   | 88 (100%)         |
| UGA                          | 9 (7%)         | 16 (12%)        | 104 (81%)  | 129(100%)         |
| <b>Total</b>                 | <b>18 (8%)</b> | <b>31 (14%)</b> | <b>168 (78%)</b>   | <b>217 (100%)</b> |

No significant difference can be found in the type of conversational moves between the Batswana and American students (Pearson Chi-Square Test revealed  $X=0.455$ ), with Batswana composing slightly more questions and statements and American students responding more than raising questions. Similarly, an analysis of critical thinking levels shows that Batswana contribute more triggering messages, while Americans contribute more explorative and integrative messages (see table 7).

**Table 7: Level of critical thinking by groups**

|     | <b>Triggering</b> | <b>Exploration</b> | <b>Integration</b> | <b>Total</b> |
|-----|-------------------|--------------------|--------------------|--------------|
| UB  | 28 (38%)          | 40 (55%)           | 5 (7%)             | 73 (100%)    |
| UGA | 17 (18%)          | 64 (70%)           | 11 (12%)           | 92 (100%)    |

**Analysis of participation pattern by gender**

In total the female student population dominated the course with a percentage of 73% (n=19). UB (UB) female students accounted for 67% (n=6), UGA (US) female students for 77% (n=13) of the whole students' population. Table 8 shows the distribution of messages along gender in total and per student group.

**Table 9: Usage of discussion forums according to gender by groups**

| <b>Combine d groups</b> | <b>Total number</b> | <b>%</b>     | <b>Postings written total</b> | <b>Postings written (mean)</b> | <b>Postings read total</b> | <b>Postings read (mean)</b> |
|-------------------------|---------------------|--------------|-------------------------------|--------------------------------|----------------------------|-----------------------------|
| Women                   | 19                  | 73%          | 187 (80%)                     | 10                             | 248 (79%)                  | 131                         |
| Men                     | 7                   | 27%          | 47 (20%)                      | 7                              | 657 (21%)                  | 94                          |
| <b>Total</b>            | <b>26</b>           | <b>100 %</b> | <b>234</b>                    |                                | <b>3143</b>                |                             |

| <b>UB</b>    | <b>Total number</b> | <b>%</b>     | <b>Postings written total</b> | <b>Postings written (mean)</b> | <b>Postings read total</b> | <b>Postings read (mean)</b> |
|--------------|---------------------|--------------|-------------------------------|--------------------------------|----------------------------|-----------------------------|
| Women        | 6                   | 67%          | 83 (72%)                      | 14                             | 908 (76%)                  | 151                         |
| Men          | 3                   | 33%          | 33 (28%)                      | 11                             | 277 (23%)                  | 92                          |
| <b>Total</b> | <b>9</b>            | <b>100 %</b> | <b>116</b>                    |                                | <b>1 185</b>               |                             |

| <b>UGA</b>   | <b>Total number</b> | <b>%</b>     | <b>Postings written total</b> | <b>Postings written (mean)</b> | <b>Postings read total</b> | <b>Postings read (mean)</b> |
|--------------|---------------------|--------------|-------------------------------|--------------------------------|----------------------------|-----------------------------|
| Women        | 13                  | 77%          | 104 (88%)                     | 8                              | 1 578 (81%)                | 121                         |
| Men          | 4                   | 24%          | 14 (12%)                      | 3.5                            | 380 (19%)                  | 95                          |
| <b>Total</b> | <b>17</b>           | <b>100 %</b> | <b>118</b>                    |                                | <b>1 958</b>               |                             |

This comparison shows that the female population was more active than her male counterpart – both in terms of writing and reading messages – in total, but also in their respective groups. An Independent Sample T-Test however did not show any significant influence of gender on the participation level ( $p=0.288$  for messages read and  $p=0.478$  for messages written). Out of the seven students who wrote more than the average of ten messages (see table 5), five were females (71%). For a detailed self-presentation of the seven most active participants see Appendix 2.

With regard to the length of postings, females show a slightly higher mean (132 words) than males (130), but an Independent Samples T-Test shows no significant influence of gender on length of postings ( $p=0.288$ ).

Analysing the messages along types of conversational moves, one can see interesting results in that a Pearson Chi-Square Test shows a significant influence of gender on types of conversational moves ( $X=0.000$ ). Table 10 shows the results of the analysis. Forty-six per cent of all messages male students sent are either questions or statements, while only 54% are replies. Women's questions and statements accounted for only 22% of their messages, while 78% of their messages are replies.

**Table 10: Type of conversational moves in messages per gender.**

|              | Type of conversational moves |                 |  | Total      |
|--------------|------------------------------|-----------------|--|------------|
|              | Question                     | Statement       | Response: answer<br>Response: additional question<br>Response: answer & additional question<br>Response: statement |            |
| male         | 9 (16%)                      | 17 (30%)        | 30 (54%)   | 56         |
| female       | 9 (6%)                       | 14 (9%)         | 138 (86%)  | 161        |
| <b>total</b> | <b>18 (8%)</b>               | <b>31 (14%)</b> | <b>168 (77%)</b>   | <b>217</b> |

This corresponds with the analysis of critical thinking levels according to gender. Table 11 shows that the majority of male postings were triggering messages (48%), while females posted mainly explorative messages (69%).

**Table 11: Level of critical thinking per gender.**

|        | Triggering | Exploration | Integration | Total      |
|--------|------------|-------------|-------------|------------|
| male   | 19 (48%)   | 18 (45%)    | 3 (8%)      | 40 (100%)  |
| female | 26 (21%)   | 86 (69%)    | 13 (10%)    | 125 (100%) |

A Pearson Chi-Square Test however shows no significant influence of gender on the critical thinking level ( $X=0.010$ ).

### **Analysis of participation pattern by course design and assessment**

Since the plan to link Botswana and American students in the online discussions arose only shortly before the start of the semester, the international discussion was not explicitly part of the course design or course assessment scheme. Both courses, though, had planned to use online discussions. UGA – being a distance education course – relies heavily on online communication tools such as e-mail and discussions and the course outline clearly states discussion topics for each module of the course. UB allocates 10% of the total course marks to lifelong learning skills, including participating in discussions (defined as “frequency and quality of contribution to the WebCT Discussion Forum” [Youngman 2003]). The international discussions, though, were integrated in the course as the semester continued and were not specifically assessed, especially not for the American students. The UGA lecturer made participation completely voluntary since

the international discussion was an additional activity.

Analysing the different forums, the amount of postings written per forum category are as follows:

**Table 12: Messages as per forum**

|                          | <b>Frequencies</b> | <b>Percentage</b> |
|--------------------------|--------------------|-------------------|
| Main forum               | 78                 | 36%               |
| Globalisation forum      | 54                 | 25%               |
| Collaborative task forum | 85                 | 39%               |
| <b>Total</b>             | <b>217</b>         | <b>100%</b>       |

Even though the task students had to complete (using the collaborative task forum) was not assessed, it triggered the highest amount of messages posted (39%), followed by the open forum. An analysis of the level of critical thinking based on the various forums (table 13), shows that the collaborative task forum triggered comparatively the highest amount of exploration messages, whereas the globalisation forum triggered the highest amount of triggering messages and the main forum the highest amount of integrative questions.

**Table 13: Critical thinking level per forum**

|                          | <b>Levels of critical thinking</b> |                    |                    |              |
|--------------------------|------------------------------------|--------------------|--------------------|--------------|
|                          | <b>Triggering</b>                  | <b>Exploration</b> | <b>Integration</b> | <b>Total</b> |
| Main forum               | 12 (29%)                           | 24 (59%)           | 5 (12%)            | 41           |
| Globalisation forum      | 15 (30%)                           | 31 (62%)           | 4 (8%)             | 50           |
| Collaborative task forum | 18 (24%)                           | 49 (66%)           | 7 (9%)             | 74           |
| <b>Total</b>             | <b>45</b>                          | <b>104</b>         | <b>16</b>          | <b>52</b>    |

There was some negative student feedback concerning the task forum from students who felt they didn't have enough time and that instructions were confusing. An American student wrote, that he "would like to return to having open discussions where anyone can post anywhere and we don't divide up into groups. That way, we would be letting the 'market' work – people who post interesting topics will attract posters; others may not. When we are free to post to all threads, I believe the discussions are more lively and interesting." In the focus group discussion with the Batswana students, they pointed out that the task was confusing and they were not sure whether they had to contribute individually or as a group. They also stated that they preferred the open discussions in the main forum to the task forum.

### **Analysis of participation pattern by level of computer skills and access to computers**

UGA students participated in an online distance education course that required intensive online communication. Therefore one can assume that all students possessed the computer skills needed to efficiently participate in online discussions. UB students have poor computer skills, limited exposure to computers outside UB, and in this case, were using online discussions for the first time. Extensive support was offered to these students, in the form of an orientation class on

the use of WebCT, continuous support through members of the Educational Technology Unit during classes, support from the lecturer as well as peer-to-peer support between students.

US students accessed the online discussion from home, using their own computers and bandwidth. A weekly session in the eLearning SMART classroom provided computer access to the UB students. Outside of this scheduled class UB students could use the graduate computer lab and, if available, networked computers in their workplace. Only 38% of their messages were sent during the scheduled classes and 62% were posted outside the classroom. This implies that physical access to ICTs was not a problem for these students.

By contrast US students complained about problems accessing UB's Learning Management System WebCT. Two examples from the discussion forum posted by American student, state: "After much trying, I have finally made it to this site! Hooray!" and "Sorry for joining in on the discussion later than I would have liked, there were technical problems delaying this."

### **Analysis of participation pattern by presence of a learning community**

Both the UB and US lecturers moderated the discussions. The intensity of moderation was rather low and consisted mainly of giving instructions, keeping participants on track for completion of tasks or giving cues to keep the discussion going. Most of the moderators' messages were posted in the task forum, where students had to actually produce results (table 14).

**Table 14: Amount of tutoring according to forums in UB**

|                     | <b>Lecturer UB</b> | <b>Lecturer UGA</b> | <b>Total</b> | <b>%</b>     |
|---------------------|--------------------|---------------------|--------------|--------------|
| Main forum          | 2                  | 3                   | 5            | 20 %         |
| Globalisation forum | 5                  | 2                   | 7            | 28 %         |
| Task forum          | 10                 | 3                   | 13           | 52 %         |
| <b>Total</b>        | <b>17</b>          | <b>8</b>            | <b>25</b>    | <b>100 %</b> |

It is unclear whether a virtual learning community and a social climate emerged through the international discussions. The feedback in the focus group with Batswana students, gave the impression that the UB students differentiated clearly between themselves and the "American" group. They were using words like "us" and "them" and only few could say that they had developed an individual relationship to particular American students. They admitted to relying on stereotypes, for example that all American students are middle-class and ignorant of African realities, that Americans are not affected by globalisation and therefore lack a general understanding. Both groups felt they had contributed more than the other. An African student said in the focus group discussion: "Participants did not contribute evenly, the UGA students commented on our points, but did not bring new items of their own." They suggested a need for more time to socialise and "get to know each other", despite the fact that one-third of the messages were posted in informal discussions (see table 15).

**Table 15: Comparison formal and informal discussion messages**

|  | <b>Frequencies</b> | <b>Percentage</b> |
|--|--------------------|-------------------|
|--|--------------------|-------------------|

|                             |            |             |
|-----------------------------|------------|-------------|
| "Formal" discussion topic   | 151        | 70%         |
| "Informal" discussion topic | 66         | 30%         |
| <b>Total</b>                | <b>217</b> | <b>100%</b> |

## DISCUSSION

The objective of this co-operation was to give Batswana and American students an opportunity to discuss the topic of globalisation from their specific perspectives. The discussions started off energetically with high expectations from both sides. Students openly discussed topics that affected both groups, including HIV/AIDS, cultural identities, spiritual growth, environmental issues, problems in schools and family breakdowns. Over time the intensity of discussion decreased. In their closing messages some American students stated that the discussions had changed their ways of viewing topics like globalisation, for example, "I learnt a lot from all of you. I now see globalization in a different light", or "My experience on this discussion board was enlightening and interesting. These conversations helped me learn more about your concerns and to look for ways to solve the problems that concern us all." The focus group with Batswana students, however, showed that their expectations for the discussion were not met, and one American student wrote, that she "so looked forward to the opportunity to learn from these folks, but am saddened that they would not even respond to most of the people who posted, myself included. I can't blame our guys since most attempted to converse with relevant and meaningful discussions."

The participation level was low, with nine messages posted on average by a student. An analysis of the individual participation, however, demonstrates that some students were very active, with the two most active participants (one American, one Motswana, both female) posting 36 and 37 messages each. An analysis of the seven students (26%), who posted more than the average of ten messages, shows a slightly higher participation of Batswana students (n=4) and a higher level of female students (n=5) compared with 2 male students.

The discussions were generally constructive. Coding for Pilkington's conversational moves revealed that each question posed triggered approximately nine responses. The level of critical thinking based on Garrison's four-stage cognitive-processing model, however, remained mainly on the two lowest levels, triggering (27%) and integration (63%), while none of the messages reached the highest level of resolution.

Batswana students were more active, having written about 13 messages on average as compared to seven written on average by an American student. In both groups a few individuals dominated, yet the dominance in the African group was less distinctive than in the American group.

Gender was a significant influencing factor on participation pattern, with the female population being more active both in posting and reading messages and in writing longer messages. A Pearson Chi-square test revealed a significant influence of types of conversational moves along gender, with males asking more questions and posting more comments and women replying more. When we considered the level of critical thinking males sent more triggering messages, while women were more explorative and integrative. This is true for both groups. This is in line with Herring's observation (2000), that even if males tend to dominate online discussions, once a discussion is moderated and women feel safe, this dominance can diminish. It also supports research that shows that men tend to open discussions and state their opinion as facts or statements, while women tend to be more supportive by replying to messages.

While 10% of UB students' continuous assessment was based on their participation in the

discussion forums, UGA students participated in the international discussion purely out of personal interest – without being rewarded for it. This is likely to explain why relatively few American students participated actively in the discussions. The collaborative task students had to carry out triggered slightly more participation, but did not generate a higher level of critical thinking as compared to the other forums. Student feedback revealed that they did not enjoy the limiting nature of the forum and preferred the openness of the main forum. This corresponds with findings in the literature review, which state that assessment can trigger more participation, but needs to be integrated very carefully, without limiting students' perceived freedom of expression in the forums (Edelstein & Edwards 2002; Oliver, 2003).

Despite their low starting level of computer skills and their more limited access to networked computers, the UB students learnt to use the online communication tools quite rapidly with extensive support. Some of the American students experienced slow navigation within the course due to network problems at UB as well as technical problems accessing WebCT. Since participation in the international discussion was voluntary for the American students, they had limited motivation to overcome technological hurdles.

Lecturers provided limited moderation of the discussion to allow students take the initiative. According to some of the literature, this should help in building up a learning community (Oren, Mioduser & Nachmias 2002). The clear distinction in two groups – the American and the Africans – however, made it difficult to build up a feeling of belonging to one single group. Right until the end of the course, through feedback in focus group discussions and e-mails, the students talked about themselves as belonging to either the Batswana or the American group.

## **CONCLUSION**

This paper describes an experimental international discussion, which took place in an adult education course. Students reported positive experiences and valuable insights concerning perspectives from the other country group on critical topics related to globalisation. In general, the quality of messages in terms of conversational moves was satisfying, but messages did not reach a high level of critical thinking, remaining mainly on the triggering and explorative level. The opening discussions provided a lively start to the course, with students showing interest in each other's perspectives and providing constructive feedback, but over time the intensity of discussion decreased. A detailed analysis revealed that the discussions were dominated by a few students (mainly females) and were unsatisfactory for some participants. Some students managed to develop personal relationships with selected participants of the other group, but cross-group relationships were rare.

Membership of a specific group did not seem to influence participation patterns. Out of the seven students (26%) who posted more than the average of ten messages, four were from Botswana and three from the USA. Gender was the major influencing variable: out of the same seven most active students, five were females (71%). Gender also significantly influenced the distribution of conversational moves in student messages.

The imperfect integration of discussions in the course design including their assessment was another factor that influenced participation patterns. Participation in the discussions should not be seen as an 'additional' burden, but as an integral part of the eLearning experience. This would also help to make participation more inclusive and avoid domination by some participants. One of the critical unresolved challenges is whether and how participation should be assessed and how activities in the forums should be structured, in order to increase participation levels and also



promote a higher level of critical thinking (integration, resolution) without limiting participants in their freedom to discuss issues of personal interest.

In future courses of this type the learning community needs to be carefully moderated and supported to keep participants interested throughout the whole semester. This might include increased moderation and support by lecturers to balance out inequalities in the participation pattern of students, in this case, male students, who seem to need more encouragement to participate. Allowing more time to socialise might also help in building an effective learning community.

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## APPENDIX 1: EXAMPLES OF POSTINGS IN DISCUSSION FORUM

(Extracted from the main discussion forum)

### Posted by African student 1

#### Subject: GLOBALISATION

GLOBALISATION IS A DEVELOPMENTAL CONCEPT, WHICH SEEKS TO UNITE THE WHOLE WORLD AS ONE VILLAGE. THE QUESTION IS – IS IT A VILLAGE WHOSE CULTURE IS BEING OBSERVED IN THE VILLAGE? IS IT NOT A CONCEPT TO DESTROY THE CLOSE ASSOCIATION USUALLY ASSOCIATED WITH THE SOCIAL RELATIONSHIPS THAT EXIST IN VILLAGES?

*Type of conversational move:* response (answer and additional question)

*Level of critical thinking:* exploration

### Reply by African student 2

#### Subject: Re: GLOBALISATION

Hi Mr

I wish to comment on your observation of globalisation seeking to unite the world into a single village, since you end up confusing yourself with other questions there after. The issue here is not other peoples cultures being used over other cultures but it is a way of making societies of the world create common trends of doing things such that when you are in America you do not find yourself far displaced. For instance, since English language has been used as universal language information sharing has become very easy. Technology advancements have brought people close to each other even though they are in their various continents. Therefore, you can still hold on to your culture but globalisation is saying, Do not be confined, Be a citizen of the world not just an African or a MoTswana in a bottle.

*Type of conversational move:* response (answer)

*Level of critical thinking:* exploration

### Reply by American student 1

#### Subject: Re: GLOBALISATION

Your comments reflect what we have learned about diversity and the ways we interact with people from areas of the world other than our own. A primary objective of globalization and or diversity should be to allow all of us to become familiar with the customs and cultures of others so that we can appreciate them – not necessarily change them. We are more likely to accept people when we understand why they behave as they do. Knowledge helps us overcome our fears about others and opens avenues of communication. We don't all need to be just alike; that would create a very boring world.

I'm not sure what your reference to a "MoTswana in a bottle" means, but I'm guessing you don't know what the Cherry Blossom Festival is either. That doesn't make either us of less important; it just shows that we are different because of the communities where we live.

*Type of conversational move:* response (statement)

*Level of critical thinking:* integration

### Message posted by African student 3

#### Subject: The global paradox

The global paradox of the twenty first century is what we are facing today. Botswana has turned completely into the opposite of what it ought to be .The ministers are going around telling the

nation about privatisation without having consulted with us about the concept of privatisation. Our leadership is completely swept away by the western mentality of development. They do not even conceive the consequences of privatisation which in my home-made philosophy I see as brainchild of globalisation and imperialism and a sister of corporate capitalism. One big question is who in this country would be in a position to buy the hospitals lest we give that to the Europeans. Can Botswana really dream of privatising while people die every second as a result of the HIV/AIDS scourge? Whose responsibility would that be if the health care system would put it in the hands of the corporate bourgeoisie? Would we still shout and say "the illiterates of the 21st century would not be those who do not know how to read and write, but those who are not IT sound".

*Type of conversational move:* statement

*Level of critical thinking:* exploration

#### **Reply by African student 4**

##### **Subject: Re: The global paradox**

I CERTAINLY BELIEVE THAT THE CORPORATE POWERS OF THE WORLD ARE FOR WANT OF A BETTER TERM ABUSING THE NOTION OF GLOBALISATION AND RUNNING OVER WEAKER ENTITIES IN THE THIRD WORLD.

I STRONGLY DISAGREE HOWEVER THAT THEY ARE TO BLAME FOR THE BREAKDOWN IN OUR CULTURE. THAT IS UP TO US AS CITIZENS. OUR OWN PRESIDENTS SHUN TRADITIONAL GARB IN FAVOUR OF THE WESTERN SUIT AND TIE EVEN IN THE MIDST OF SUMMER!

WE TEACH OUR CHILDREN SHAKESPEARE INSTEAD OF WOLE SOYINKA, WE SHUN TRADITIONAL FOOD AND GLAMORISE WIMPY AND KENTUCKY FRIED CHICKEN AND WONT GO NEAR ANY LOCALLY PRODUCED ITEMS IF WE CAN FIND AN ALTERNATIVE IN A PRESTIGIOUS SHOP PREFERABLY WITH A MADE IN ITALY LABEL.

ON A GLOBAL SCALE THERE ARE IMMENSE POWERS AT WORK BUT NO ONE CAN REMOVE OUR CULTURES IN AFRICA WITHOUT OUR GIVING THEM PERMISSION TO DO SO.

*Type of conversational move:* response (answer)

*Level of critical thinking:* exploration

#### **Reply by American student 2**

##### **Subject: Re: The global paradox**

I think what you said was very wise and true. Do you have a free press in your country where people such as you can write letters to the newspaper saying what you think about these issues?

#### **Reply by African student 4**

##### **Subject: Re: The global paradox**

YES WE DO HAVE A FREE PRESS AND THERE ARE ALSO A NUMBER OF PEOPLE WHO HAVE VOICED CONCERN OVER HOW THE LOSS OF OUR CULTURE IS IMPACTING ON AIDS. RECENTLY THERE HAS BEEN DEBATE OVER WHETHER THE RITUAL OF INITIATION CEREMONIES SHOULD BE REVIVED ALTHOUGH THAT MAY BE TAKING THINGS BACK TOO FAR!

WE ALSO HAVE A MINISTRY OF YOUTH AND CULTURE AND A FEW NGOS LIKE THAPONG VISUAL ARTS THAT PROMOTE LOCAL ARTISTS. UNFORTUNATELY

THOUGH, WHEN ONE MOVES AROUND THE CAPITAL THERE IS NO ELEMENT OF BOTSWANANESS, BUT A VERY WESTERN APPEARANCE. YOU WILL HAVE TO SEARCH CRAFTSHOPS AND VISIT RURAL AREAS TO GET A FEEL OF THE CULTURE AS THE CITY IS FILLED WITH YOUNG PEOPLE WITH AMERICAN ACCENTS AND SNOOPDOG LOOKALIKES!

*Type of conversational move:* response (answer)

*Level of critical thinking:* exploration

**Reply by American student 2**

**Subject: Re: The global paradox**

Thank you for your reply.

Even though I live here in America, I do not always understand the appeal of some aspects of American culture, especially Snoop Dog! What is it about American culture that you believe Botswanan's find attractive?

**Posted by African student 4**

**Subject: Re: The global paradox**

I think in many developing countries, it is the glamorised image portrayed of America. All that is seen on TV, by the younger generation is the large living and fancy cars. No-one sees the homeless or poor in America on the media and thus in their minds, America is the ultimate.

**Reply by American student 3**

**Subject: Re: The global paradox**

I truly hope that the younger generation there does not think that the "Snoop Dog" appearance is what America is really all about!!

**Reply by African student 4**

**Subject: Re: The global paradox**

I think the younger generation has a selective perception of what they believe is out there in the "ultimate" society.

**Reply by American Student 4**

**Subject: Re: The global paradox**

This is also happening in our county. You must go to craft shows to buy things not only made in the US but also made in Georgia. They also cost more. They are better made though.

**Posted by American student 5**

**Subject: Re: GLOBALISATION**

Shouldn't we all try to achieve our own personal renaissance and find our own cultural identity? This is something I struggle with. I am a daughter of a Cuban exile. My father fled to the US in 1961 and became an American citizen years later. He married my mother, who was born in the US (Miami) but whose parents were also from Cuba. My family is very Americanized. I have never and may possibly never see the country or place my father grew up. I have relatives I have never met. My father wanted to get out of Cuba and never look back. He is a very patriotic American now. He fought in the US Army for 23 years. He wanted freedom and to protect it. Now I find myself very proud of him, yet at the same time, upset for leaving out so much of my rich culture.

Now that I have a daughter, I want to try to keep Cuban customs alive, yet I only know of so few that we practice. I am so Americanized, my language is a mixture of English and Spanish (just as

my diet). With intermingling of cultures, it is difficult to find your own identity sometimes. I am looking forward to these personal and country renaissances for us all.

*Type of conversational move:* response (additional question)

*Level of critical thinking:* triggering

#### **Reply by African student 4**

##### **Subject: Re: Greetings from Athens, Georgia, USA**

I think the average westerner and person in the developing world can start by teaching our children. The future generation is where our hopes lie. As parents we need to make a concerted effort to teach our children the value of life, to appreciate nature and to nurture an interest in the arts. We overemphasise the role of technology and our children are becoming anaesthetised against the real world. They cannot interact with one another without technology. Technology has its place but not as a baby sitter. Our schools in both worlds are guilty of ignoring environmental issues outside of tree-planting days that come annually.

We are guilty of neglecting areas such as the arts and agriculture. The reason I may seem fixed on the arts is that I believe art is an expression of the soul and is nurtured through artistic expression. Think of the power that art therapy has for depression and for abused children. If we go back a few generations we see the difference in peoples' outlook on life as education always involved some sort of craft. I mention agriculture because it is the basis of life and it is increasingly become the domain of multinational corporations. We cannot feed ourselves save by chasing after the Dollar. I am not advocating returning to a pristine life but believe as educators it is important to keep our children in touch with these issues and how they impact on us.

To emphasise the need to educate the future generations, I will cite what I read in a South African Magazine called 'Farmers weekly'. A French farmer was being interviewed about the impact of European agricultural subsidies in the Third World countries. His response? "What is the third world?" Hopefully the next generation will know.

*Type of conversational move:* response (answer)

*Level of critical thinking:* exploration

## **APPENDIX 2: SELF-PRESENTATION OF SEVEN MOST ACTIVE PARTICIPANTS**

(Extracted from main discussion forum and student homepages)

Hello, My name is am (American Student). I live in Northwest Georgia, USA, and I teach adult literacy classes at Northwestern Technical College. My interests are humane education, political science, history, and environmental issues. I look forward to meeting students from your university and learning more about your countries and your cultures.

I am (African Student), a citizen of Botswana and of Zambian/British origin I therefore consider myself a citizen of the world! I am married with three children. I completed my first degree at the University of Zambia in Psychology and Economics in 1990 and briefly worked for a consultancy which involved a number of projects with development agencies and this is where my interest in issues of development arose. I moved to Botswana in 1991 and in 1997 studied for the Post Graduate Diploma in Counselling Education and a year later commenced work as a school counsellor at Lobatse Senior Secondary School where I am currently employed. I opted to pursue a Masters in the field of Adult Education as my experience in the senior school setting has taught me that many of the issues that young people are undergoing are a manifestation of national and

societal issues that cannot be tackled in the classroom or counselling room alone. My interest lays in learning and contributing to society as a whole as opposed to one segment of it. I also strongly feel that as educators we are not providing youth and by extension the wider society with the correct 'tools' for true development and empowerment.

I am (African Student) from Tju/'ho in Gaborone. 'Tju/'ho' means 'home' in Ju/'hoansi language of San people. My parternal (Badisang) and maternal (Busang) links originate from Dikoloi and Difetlhamolelo respectively, in Molepolole. Badisang literally means 'empowering people to read', not herding cattle. Intonation becomes important in expression of the context. I am on the MEd (Adult Education) course 2003/4. I hold MA in Library and Information Systems; Post Graduate Diploma in Information Science from Universities of London and North London respectively, where I researched extensively on Publishing; Media, Indexing and Abstracting and Bibliographic Databases; a Bachelors Degree in English and Environmental Science; Diploma in Education; and Post Graduate Diploma in Library and Information Studies from UB. I'm a published literary fiction author who writes in English and Setswana. I have produced annotated bibliographies on Drug Abuse; African Folktales for Children; Botswana's Environment; and Women and Gender Issues. I am a book reviewer columnist for Flair Magazine. I have also published newspaper articles on environmental issues. My poetry has been published in a Millenium moment: Anthology of African Verse and in Mokwadi, Journal of the University of Botswana Writers Workshop. I was initially employed by the UB as a documentalist at NIR, but was later redeployed to the UB Library where I now work as one of the Customer Services personnel.

Friends regard me as a literacy and cultural activist. I work with budding and experienced creative writers, young and old. I have been contributing to simplified 'fictionalised fact' readers targeting new literate people for the past 10 years. I enjoy writing, reading and reciting poetry. I can't wait for another 'Live! Poets' session at Meropa Jazz Club where we meet every second Thursday of the month to render poetry and enjoy raggae music with our buddied Steppin' Razor. (Sadly Meropa has been closed and we now rely on Maruapula Music Room for venue). I belong to a number of associations, among others Chartered Institute of Library and information Science Professionals (CILIP, London), Writers Association of Botswana (WABO), Library Association, Somarelang Tikologo (Environment Watch Botswana), and Mmegi Publishing Trust  
I treasure the people of Tju/'ho; Dikoloing and Difetlhamolelong. I respect all humanity.

(AFRICAN STUDENT), A CITIZEN OF THE KINGDOM OF SWAZILAND, WAS BORN ON 29TH OCTOBER 1964 IN THE MANZINI REGION. I GREW UP IN A RURAL AREA CALLED EMBELEBELENI AND DID MY PRIMARY AND HIGH SCHOOL IN THE LOCAL MISSION SCHOOL. I OBTAINED MY O LEVEL CERTIFICATE IN 1984. IN 1989 I OBTAINED A CERTIFICATE IN ANIMAL HEALTH THEN WORKED AS AN EXTENSION OFFICER (ANIMAL HEALTH) IN THE MINISTRY OF AGRICULTURE IN SWAZILAND.

I OBTAINED MY DIPLOMA IN ADULT EDUCATION THOUGH PARTTIME STUDIES WITH THE UNIVERSITY OF SWAZILAND IN 1993. I THEN CROSSED OVER TO BOTSWANA FOR MY FIRST DEGREE IN ADULT EDUCATION IN 1995 AND COMPLETED MY PROGRAMME IN 1998. WITH MY FIRST DEGREE I WAS ABLE TO GET PROMOTED FROM EXTENSION WORK AND BECAME A LECTURER IN ONE OF THE AGRICULTURAL COLLEGES IN SWAZILND, TEACHING RURAL SOCIOLOGY AND AGRICULTURAL EXTENSION. AT THE SAME TIME I WAS APPOINTED AS A PARTTIME TUTOR FOR DISTANCE EDUCATION IN THE UNIVERSITY OF SWAZILAND, HELPING IN LEADERSHIP, PSYCHOLOGY AND EVALUATION COURSES. ON ANOTHER NOTE, AS A TRADE UNION ACTIVIST, I WAS ELECTED AS A NATIONAL PRESIDENT OF THE SWAZILAND PUBLIC SERVANTS UNION IN 2001, A POSITION I RELINQUISHED WHEN I WAS COMING TO BOTSWANA FOR MY M.ED PROGRAMME. I STILL WISH PURSUE THIS CAREER TO BE TAKEN TO HIGHER LIFE HORIZONS. WITH YOUR HELP I KNOW I CAN MAKE IT.

Hi everyone! My name is (American Student) and I work in the IT field for an area hospital in Georgia. I have no children, but have two dogs that are treated like children, and am married to an international man. I am from Thailand. I look forward to interacting with everyone as we explore the effects of globalization, socialism, and capitalism among so many other topics imperative to our field of study.

Hello everyone, I'm (American Student) visiting from the University of Georgia in the USA. I'm a Master's student pursuing a degree in Adult Education. Just a little background info on me... I'm 27 years old, married for 2 years, with no kids yet! I have a BA in Psychology and work at Kennesaw State University in Kennesaw, Georgia, as an Academic Advisor for the Education department. I enjoy the outdoors, running, going to the movies, and writing. I'm also an avid animal lover. I'm looking forward to this opportunity to learn from you all!

My name is (African Student). I am a Botswana national. I was born on the 15th of October 1976 in Lobatse. I am not married. I did my primary and part of my Junior secondary in Lobatse and Kane respectively. For my secondary education I went to Gabion and Gnats respectively in 1994 to 1996. In 1997 to 1998 I went for my national service (TireloSechaba) in Sorrowed village. Upon completion of TireloSechaba I subsequently joined the teaching service in Malaysia as a Primary school teacher. In the same I was absorbed by University of Botswana to study Adult Education. I finished my BED Adult Education programmed in 2003. I immediately enrolled for MED Adult Education. I have been a student of adult education for the past seven consecutive years of learning. I am currently enrolled for full time MED Adult Education. I am also the Committee Secretary for Botswana Adult Education Association (BAEA). I also work for Emang Basadi (local women Ngo) as the Political Education Officer. I have written a number of papers on gender. Such include; Women and gender based violence, Women participation in Politics. Women and entrepreneurship in Gaborone and lastly Participation of Women in Vocational Education in Botswana. My academic interest is on Gender and Political Economy of Adult Education. Besides academics I like farming and also camping. I am also a Christian.

I must confess that Adult Education is my intellectual home. It is through adult education that we have a classless, pure and just society through different kinds of social reform found in the discipline of adult education. Adult education conscientizes and liberate individuals from illiteracy. I would love to welcome everybody to seek refuge in this home and drink and a spring water from the pure chambers of social reform.

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