



## ***Higher Education Monitor***

***ICTs and the South African  
Higher Education Landscape***

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### **INFORMATION AND COMMUNICATION TECHNOLOGIES (ICTs) AND SOUTH AFRICAN HIGHER EDUCATION: MAPPING THE LANDSCAPE**

Research Report for the Council on Higher Education

**July 2006**

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ICTs and the South African Higher Education Landscape

Published by:  
The Council on Higher Education  
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**ISBN: 1-919856-55-2**  
Date of Publication: July 2006

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This project and publication have been made possible by the support of the Rockefeller Foundation.

## ACKNOWLEDGEMENTS

Thanks to the Council on Higher Education for their foresight in commissioning research in this important area, and for comments on an earlier draft at the CHE workshop. Thanks to the anonymous CHE reviewer for useful advice on a previous version. Thanks to Stephen Marquard for clarifying software issues. Thanks also to the members of our reference group for useful discussions and for finding time to provide valuable feedback on an earlier draft: thank you, Heather Jacklin, Rob Moore and Beverly Thaver.

## FOREWORD

The process of the reconstruction and development of higher education in South Africa is part of the wider process of political democratization, economic reconstruction and development, and social redistribution. It takes place in a global context of multiple, interrelated and rapid changes in social, cultural and economic relations, typically referred to as globalization. These changes are largely enabled by a revolution in the development and application of information and communication technologies (ICTs). *The White Paper 3: A Programme for the Transformation of Higher Education* of 1997 acknowledged the key role of the ICT revolution in globalization. The same understanding of the importance of ICTs in supporting and provoking global political, social and economic integration was reiterated by the Ministry of Education in its *National Plan for Higher Education* published in 2001. Moreover, the *National Plan* noted the critical and central role that higher education would have to play in contributing to the development of an information society in South Africa in terms of both skills development and research. Despite the realization of the importance of these issues, higher education as a sector has not really engaged with the implications of introducing ICTs into teaching, learning and research or with the conceptual and political frameworks informing this. At government level, the Ministry of Education has not yet focused on these issues and, in this sense, there has been no central steering of the development and application of ICTs in higher education in South Africa.

This issue of the *Higher Education Monitor* presents to the higher education community and its direct stakeholders, as well as to the interested public, a piece of research that seeks to illuminate some of the challenges presented by the utilization of ICTs in higher education. The work of Prof. Laura Czerniewicz, Dr Neetha Ravjee and Ms Nhlanhla Mlitwa is a first contribution of the CHE towards developing an understanding of the ways in which higher education institutions in South Africa have confronted the challenges posed by the information and technology revolution. In particular, this work reveals the ways in which researchers, practitioners, and policymakers understand ICTs, and how they see the relationship between ICTs and change in higher education.

This research is part of broader project of the CHE Monitoring and Evaluation Directorate focused on higher education and change. The project was made possible with generous funding from the Rockefeller Foundation. While the different pieces of research emanating from the project will be published together in book form later this year, this research report is published in its entirety owing to the topicality of the issue of ICTs in South African higher education and its importance for all public higher education institutions as well as for the broader South African society in a context of a relative dearth of research on this subject.

The CHE hopes that the report will generate further interest, discussion and research among higher education analysts, university and government officials, and also that the non-specialist public will find that it helps them to understand the implications of the information and technology revolution in South African higher education.

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*May 2006*

## LIST OF ACRONYMS USED

<b>ICT</b>	Information and Communication Technologies
<b>IT</b>	Information Technology
<b>WWW</b>	World Wide Web
<b>OLE</b>	Online learning environment
<b>VSAT</b>	Very small aperture terminal
<b>CITTE</b>	The Conference on Information Technology in Tertiary Education
<b>HCI</b>	Human Computer Interface
<b>DTH</b>	Direct to Home (satellite service)
<b>FOSS</b>	Free and open source software
<b>COTSS</b>	Commercial off the shelf software
<b>LMS</b>	Learning management system
<b>IMS</b>	Instructional management system
<b>CMS</b>	Content management system
<b>MLE</b>	Managed learning environment
<b>CLE</b>	Collaboration and learning environment
<b>VLE</b>	Virtual learning environment

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# INFORMATION AND COMMUNICATION TECHNOLOGIES (ICTs) AND SOUTH AFRICAN HIGHER EDUCATION: MAPPING THE LANDSCAPE

## SECTION 1: INTRODUCTION

### 1.1 THE SCOPE OF THIS RESEARCH REPORT

That higher education – globally and locally – is both in transition and under pressure, is undisputed. That Information and Communication Technologies (ICTs) form an intrinsic part of that turmoil and change, is generally agreed. The role of ICTs is described as significant (Naidu, 2003); unprecedented (Lockwood, 2003); explosive, amazing and disruptive (Garrison & Anderson, 2003). There is, as yet, no consensus regarding ICTs’ impact on or relationship with higher education environments, although internationally a great deal of attention is being paid to these questions. In the South African context, it is even less clear how ICTs are being understood, particularly in relation to teaching and learning. This project is therefore an exploratory mapping exercise, which describes and explores the landscape of ICTs and higher education in South Africa since 2000. Broadly delineating the terrain, the focus is on teaching and learning within higher education. This study sets out to answer five questions:

1. How are ICTs understood and described by practitioners and researchers?
2. What policies and structures for ICTs exist nationally and institutionally?
3. What does the emerging domain of enquiry look like?
4. How do practitioners and researchers understand ICTs in terms of change in higher education?
5. What are the key issues to be noted in the ICTs and higher education terrain?

The report describes the language of ICTs in higher education both in terms of the shifting, emerging terminology and the varied understandings of ICTs in terms of national and institutional policies and reported practices. It reveals the emerging organizational forms that locate the work, and argues that despite an absence of an over-arching policy framework, policy in South Africa is being formed implicitly by practice. It moves on to describe three prevalent meanings of technological change: change as improvement; change as innovation; and change as transformation. Finally, key issues and debates, which emerge from the data “texts”, are identified and examined.

### 1.2 FRAMING AND METHODOLOGY

The objective of this report is not to provide a comprehensive account of what is happening on the ground, although it is clear that there is a need for this kind of survey, as there is, as yet, no large-scale audit. The investigation forms part of the process of finding ways to delineate emerging understandings and issues. The interest is in what people think about their reported practices, in ‘what is said and the thoughts about a topic or subject’. It is also useful to mention what is not being said, as well as what is said, as ‘discourse is about what is said that, in the same space, designates the unsaid’ (Foucault, 1974: 25). Being able to comment on absence and omission may be as important as noting what is taking place and what is being understood.

When describing how ICTs and change are understood in higher education, what emerges, is that it is useful to use discourse as a way of capturing how and what is understood. Discourses signify a group of statements which represent a particular kind of knowledge about a topic. These statements work together, and fit together because any one statement implies a reaction to all the others. They refer to the same object, share the same style and support a ‘strategy... a common institutional ...or political drift or pattern’ (Hall, 1992: 291). A cluster of meanings may represent a discourse in this study.

We note during our analysis that discourses intersect and are contained in one another. This is relevant, because this report weaves between discourses of change in higher education and discourses of changing pedagogical practices, and determines the role of ICTs in each case. While these are interrelated, they are treated as separate. Key understandings, and clusters of meanings are flagged; and it is noted that, in each case, closer inspection will be needed in future.

Methodologically, we use an iterative approach, working firstly, up from the data and secondly, down from the theory to locate the data in the larger theoretical frame. The literature on higher education and the sociology and philosophy of science are drawn upon. Interview transcripts, national and institutional policies and regulations as well as published journal articles by South African researchers, and to some extent, Master’s dissertations and doctoral theses are used extensively.

The main sources of data for the report are higher education institutional policies, structures and interviews. Data on the institutional policies and structures was obtained through extensive website searches and in follow-up letters to all higher education institutions in South Africa. The interviews were undertaken with 16 people in varying roles at the intersection of technology and education within university structures in South Africa. The interviewees generally hold middle-management positions. They are interpreters at the interface between policy makers, on the one hand, and academics and students, on the other. A different picture would have emerged had the respondents been either senior decision-makers or discipline-based academics or students. The respondents were keen not to be personally identified given that they often raised institutionally based problems and critiques.

Moreover, the respondents by no means comprise a comprehensive list of those working in the field. They do, however, provide a sample of a range of South African institutions (as they existed in 2004), including historically advantaged and disadvantaged, primarily English speaking and primarily Afrikaans speaking technikons and universities. The table below describes the sample in terms of the following historical institutional types.

	Description	No. of institutions interviewed	No. of individuals interviewed <sup>1</sup>
	Historically advantaged institutions - English medium	3	5
	Historically advantaged institutions - Afrikaans medium	5	5
	Historically disadvantaged institutions	4	4
	Newly created merged institutions	2	2

No one from the dedicated distance education providers was interviewed as the focus was on ICTs in institutions that are primarily contact institutions. In the light of current debates about whether and how the increasing use of ICTs in education may blur the traditional distinctions between these two historical institutional types (that is, distance and contact), there are a host of important issues, policy decisions and empirical investigations concerning the use of ICTs in traditionally distance mode institutions that require specific in-depth study.

<sup>1</sup> In some cases there was more than one individual present during an interview.

Recent work in technology studies, particularly Feenberg (1996) and Brey (2004), provides a good starting point for understanding the relationship between ICTs, and the social context (educational context) and change. Feenberg presents a typology of the relation of technology to society along two axes. He does so by introducing two dichotomies – technology as value-neutral versus technology as value-laden; and technology as autonomous versus technology as humanly controlled – and views each quadrant as representing a different position along a ‘means-ends’ line of logic. He identifies four approaches – determinist, instrumental, substantive and critical – to the relation between technology and society.

Determinist approaches view technology as neutral and as developing autonomously (as having ‘an autonomous functional logic’), but also having powerful social impacts. Technology is seen to be changing everything, from the nature of society to social practices, identities, lifestyles, interactions and leisure, to the ways that people learn and teach. Technical functions are seen to be changing the nature of society. The history of this position can be traced back to different traditions, from the determinism evident in classical Marxist theory, to recent studies claiming that information technologies are leading humankind into a new kind of society, termed variously as post-industrial society (Bell, 1976), risk society (Beck, 1999), the information society (Carnoy *et al.*, 1996) or the network society (Castells, 1996).

Instrumentalist approaches view the logical means-ends relation as important, where technology is seen as a neutral means, serving a variety of ends: social justice, empowerment, transformation, economic competitiveness, active learning, student-centred learning, critical thinking, community development, and so on. This approach emphasizes the ends (the outcomes), and views technology as the neutral means towards a variety of ends. Substantive approaches emphasize the deep substantive effects of technology on society, including subjectivities and inter-subjective spaces. While technology is not viewed as value-free, its effects are seen to be fundamentally changing the nature of society.

Finally, critical theories of technology, in which Feenberg locates his work, differ from determinist and instrumentalist approaches to technology in their emphasis on the social contexts of technology – of technology as entirely embedded in the social world. It is therefore not neutral, and should be studied as a social object. Technology is seen to be determined in both its meaning and content by the social world; and because of this, it ought, according to Feenberg, ‘to be subject to conscious social control’. In other words, democratic processes ought to play a role in deciding on the direction, design, use and impact of technology. It is not merely a means to an end – for example, technical design standards and regulations come from social processes and social struggles. This approach views technology as a site of social struggle – a ‘parliament of things’ (Feenberg, 1991: 3).<sup>2</sup> It represents a non-determinist approach and also focuses on the ‘design’ of things. The meaning of how to democratize technology may be understood by looking at such aspects as struggles over its environmental effects, union struggles over health and safety, educational issues involving access, outsourcing, copyright, and so on. These technological controversies often include questions of design and may point to new forms of resistance, or counter-tendencies to the technocratic rationality pervading social spaces and practices.<sup>3</sup>

<sup>2</sup> The Freirean idea of “technology” as a site of social struggle.

g examines

<sup>3</sup> Feenberg explains some of the tensions arising in what he calls “technically mediated domains” by referring to the effects of the use of computers in healthcare, for example, where “caring” (or healing) is sometimes viewed as a side-effect of “treatment” understood in technical terms, with patients viewed as mere objects of this technique. Resisting this would involve identifying counter tendencies to the technocratic organization of medicine. This important point is also evident in studies into alternatives to the technocratic organization of education.

Feenberg's framework is a valuable point of entry, but two tensions in his typology are problematic. First, he refers to each position in the singular, which may be limiting, because each approach lumps various traditions and diverse literatures, which may often straddle determinist, substantive and critical positions, together. Second, the distinction between value-neutral and value-laden may be problematic, because 'neutrality' can arguably also be seen as a value.

Brey's (2003: 50-54) work is also useful in pointing to current thinking in technology studies, that is, that technology and society are co-constructed, or 'deeply interwoven'. Brey argues that technology is socially shaped, and that society is simultaneously shaped by technology. Social-shaping approaches assert that social factors and social processes shape technology, and oppose determinist claims of technological change as a linear process resulting from an internal technological logic. Strong versions of this approach would include social constructivist approaches. Technological-shaping approaches, in contrast, claim that technologies shape their social contexts in various ways – by opening novel possibilities for change, in their side-effects (for example, environmental pollution; unemployment), and in their multiple uses.

Technologies become part of the fabric of society, part of its very social structure and culture, transforming it in the process. ...[and] seriously affect social roles and relations; political arrangements; organizational structures; and cultural beliefs, symbols and experiences (Brey, 2003: 52-53).

Actor-network theorists, for example, view society in terms of socio-technical networks of human and non-human actors.

The assumption of a causal relationship between technology and change in other non-technological spheres is evident, but not dominant, in the empirical data that we gathered for this report, particularly in some of the policy descriptions and reported ICT practices in South African universities. Examples include the idea that introducing an online learning environment will lead to better teaching and learning, or that online activities support constructivist learning approaches. This seems to appear in policy documents and practices reported in interviews. The strongest metaphor in the higher education literature is that of ICTs as the 'catalyst' of change in higher education. The related metaphors that emerged in the interviews, conducted for this research report, are those of a staircase (with a shining light at the top), and a door (behind which is a better place). Instrumental approaches focusing on technological use are also dominant in the data, and appear in terms of the metaphor of a tool or a vehicle. The tool may be perceived as neutral or as value laden; either way, it is the social rather than the technological factors, which are seen to cause effects.

The idea that technology, in addition to other variables (in the context), can function to enhance teaching and learning and bring about other changes in higher education appears quite strongly in the data. This explanation of the role of technology also seems to suggest a causal relationship between technology and higher education change, but views technology in relation to other variables that may impact on change. This seems to be a dominant understanding of the role of technology in the data; that the context plays a central role in influencing why and what technology will be used. Educational context and needs driving the use of technology are repeatedly reported.

It was found that the emphasis on social context is particularly useful in framing the emerging issues, and this is illustrated in the discussion of four key issues at the end of this research report. Technology may enhance educational goals, depending on the context, and social factors play the leading role in determining the ICT take-up. In accordance with these views, technology should be seen in relation to the specific context of its application. The specific context shapes the way in which technology can and will be used. In South African higher education, this includes paying attention to the colonial institutional histories and inherited systemic inequalities, the division of the universities, the student body, the ideologies of administrative elites, and so on (Ravjee, 2004b: 48). The emphasis on social context is particularly evident in the narratives recorded in this project. One example is the historical legacy of unequal resources, with some universities reporting that they have sufficient laboratories and others having very few available.

Ultimately, it was necessary to problematize the concept of technology – its language, assumptions, strategies, practices and effects – in its different contexts, as a way to explore both explicit and implicit power relations. This meant accepting that technology can at times function to enhance teaching and learning, but it can also disadvantage, stigmatize and exclude people in various ways (Ravjee, 2004a: 3-4). It also necessitated an examination of the technology itself, and asking about the different meanings that it might have for different groups of people – that is, determining whether the design, for example, privileges a dominant view, culture or gender. It was also important to acknowledge the different aspects of the ways in which change is understood in practice, which may be expressed in the choice of a specific online learning environment (OLE), in terms of proprietary versus open source options, as is discussed later. Such decisions may challenge or support prevailing intellectual property relations. These choices also relate to broader issues of higher education change.

### **1.3 GROWTH OF ICTs IN HIGHER EDUCATION**

This review of the landscape reveals that there has been an increase in interest in technology in many higher education institutions in South Africa since 2000. In other countries, the interest in technology is related to national policy frameworks, rapidly changing ICT sectors and the impetus provided by funding bodies. This is not the case in South Africa, where there are no specific technology policies in higher education explicitly steering practices. Despite this, higher education institutions are spending more of their budgets on ICT infrastructure than in previous years, in the face of a poor ICT infrastructure nationally and in higher education (as is discussed in more detail later, in the section on Key Issues, Section 6 of this report).

#### **1.3.1 Reasons for an increased interest**

There appear to be several reasons for the increased attention paid to ICTs. The most common reason deduced from the data is that universities are refocusing their positions in the global economies and in the redefined local landscapes. There seems to be consensus that the move is towards a new kind of society – a knowledge society – for which ICTs are considered a basic requirement. Such a society requires a support infrastructure in the form of people with knowledge, skills, and the ability to deliver ICT services. It also involves a reformulation of the nature of learning and of what is required of a graduate.

These views are often expressed, at both the policy level and the practitioner level, as ‘common sense’. For example, at institutional policy level the following statement is typical:

Strategic Priorities 3. Optimise student learning:

Develop and implement open learning plan (introducing new modes of learning, new teaching/learning technologies, flexible learning opportunities). (University of the Free State Strategic Priorities, Challenges, Projects And Actions: 2004 to 2006, 9)

For many, working at the interface of technology and teaching and learning, it is accepted that technology is a prerequisite for the enhancement of teaching and learning, research, and communication and access to information.

Why are we a university? We are a university because we need to educate our students; we need to prepare our young South Africans for the future in the country and the future in [a] knowledge society. And we need to create people who are knowledge worthy, that is, in that [knowledge] society. But primarily we need to give them the best possible education that we can. (I.M.)

It is acknowledged that as an academic environment you actually need an effective means of communication within that [environment, and] with your external peers and also need access to information taking into account that WWW is an important source of information sharing and information gathering. (I.P.)

A number of institutions regard technology (specifically ICTs) as playing the role of agent for educational change, while others regard technological and educational innovation as intertwined.

#### 2.4 Technology-enhanced education

The University should exploit technology, and particularly information and communications technology, to the utmost in order to enhance its teaching and learning processes. (University of Pretoria Strategic Plan Inspiring the Innovation Generation 2002 – 2005)

While this view is widely shared, its dangers are noted in a more critical perspective that suggests that hidden in these assumptions are protectionist mechanisms supported by legislation and specific practices, which ironically end up being obstacles to innovation.

Because what people usually mean when they talk about knowledge economy is hiding knowledge and protecting it through legislation and keeping it from people and dishing it out to people in bite-size[d] chunks that you pay for and human society has developed over the years largely because knowledge is available and freely shared. ...copyright, patenting everything under the sun ... [these practices are] not protecting innovation, they are killing it. ...So yes, the knowledge economy, yes you can make money out of knowledge but you don't have to do it by protecting and hiding it. (I.H.)

The question is therefore about innovation, but ‘towards what end?’ Is it towards ‘more of the same’, albeit more efficiently, or does innovation have a transformative potential? Implicit and explicit responses to such questions are described later in this report, in the section on understandings of ICTs and change (Section 5).

Some have more prosaic reasons for embracing innovation: technology is a fact of life and has to be engaged with, and engaging with it is either a competitive necessity or the result of circumstances. In the example below, the merger of two institutions will force the issue:

... but one of the reasons why they [the other merging institution] ha[ve] suddenly become interested in the online thing is because they have to move here. ... Yes, in the medium term but they have been resisting that and I don't know how far they will actually get because the then Minister and even the new Minister are quite adamant that they must move, but certainly in the meantime we have maybe five years of being two separate campuses or maybe even longer and certainly in terms of distributing learning I think it is going to become quite important. ... I don't think medicine is something that you can very easily do at a distance, you can certainly blend it, but one of the reasons why they ha[ve] suddenly become interested in the online thing is because they have to move here. (I.M.)

A few universities had put ICT strategies in place as long ago as the late 1990s. Such strategies were part of university-wide initiatives at the universities of Stellenbosch (E-campus) and Pretoria (Virtual University). For most institutions, however, policies and strategies have only been put in place in the last few years. In a few cases, it has been impossible to find any evidence of action in this arena at all. It may be worth investigating ICT in these other institutions in order to ascertain whether or not the lack of action was a deliberate policy choice.

Interest in ICTs appears to be part of the response to the global pressures that the twenty-first century South African university has to respond to in a technology-mediated world. In general, it seems that the purpose is an attempt to join that globalized knowledge economy. It is also interesting that increasing use of ICTs does not generally appear to be part of the response to historical inequities characterizing the national terrain. We noted that none of the reasons we were given in interviews for increasing use of ICTs included the idea that technology might serve as a tool to overcome inequalities. Whether or not this initial impression is valid deserves further attention.

### 1.3.2 Drivers for the increased interest

The three prime movers that emerged from this study are individual academic staff (in the form of champions), senior leadership (either informally or formally) and students.

#### **Institutional staff**

In all institutional contexts, individual institutional champions were cited as drivers: staff (academic and non-academic) already using computers. There are numerous examples of ICTs being introduced into higher education by key individuals. Sometimes, they are located in pockets of group activity; at other times, they are largely isolated.

They are located in different places in the structures and hierarchies, as described below.

It is also noteworthy that these individuals come from a variety of disciplines. The ones noted in the interviews include Botany, Archaeology and Literature, but there is a multiplicity of possibilities judging by a review of the different disciplinary domains in which ICT related research is taking place.

These individual champions became involved, because they had experienced technology on a particular course, or because they were ‘playing with technology’. Many began their involvement with technology, because they had taught a course and had used ICTs for administrative support, and had then moved on to experimenting with the possibilities in teaching and learning.

### Senior leadership

Sometimes, the drivers are individuals at a senior level who recognize and support activity on the ground. In one case, an individual who had been innovative with technology in Humanities courses was asked to head a teaching and learning structure reporting to the Deputy Vice Chancellor for Academic Planning. The DVC subsequently employed the same member of staff as the senior level driver for e-Learning in a structure for e-Learning – and without a policy in place. The individual commented that she “got e-Learning started on campus”.

A similar case is reported below, in which the individual appointed to the job was asked to write the University Policy Document.

How did I get to be doing this? Well, there was a post in the IT division that had been frozen for many years and it was resurrected by the then administrator who was acting as Vice Chancellor, Council and everything else and I was asked to take that post. That is how I got there. That was in November 2002.

*And what do you think made them decide to unfreeze the post?*

I think it was about a year before that there was a big shake up of the university and all sorts of things happened and one of them was that there was a whole strategic document drawn up for the university and ICT was recognized as strategic and ICT in curriculum in particular was recognized as strategic in the development of the university so that is how the whole thing came about. It was a very senior decision.

*And that was an institutional strategy document, it was not an e-Learning one?*

No, there has been no document produced since then and one of the things that I have to do is produce some sort of policy document which I am working on but that is the only document that supports the delivering of online learning. (I.M.)

These two responses are excellent examples of policy being made in practice, as described in more detail later. Indeed, strategy is evolving from practical experience in both further education and training and the final phase education sector (Strategy for Information and Communication Technology in Education, Departments of Education and Communication, 2001).

There are also examples of senior level strategic decisions being taken to support the take-up of ICTs in higher education, with several institutions making senior level strategic commitments as well as pledging significant resources for the development of ICTs. These resources were acknowledged in one instance as a way of levelling the playing fields inside the institution.

The project is 2002 to 2007.... The document said we need a quantum leap, we need money and the fusion of money to get everybody up to the same level, the minimum presence with e-Learning, e-Research, we wanted to really push that, e-Registration, you know everything “e” so what we thought at that stage was we need an infusion of money... to get everybody up to a level and then make sure that is sustainable and then move on from there so that was the motivation behind that. (I.I.)

In other cases, there is senior level support as well as energy being spent on developing institutional resources, but there are no resources to partner this commitment. As one senior-level respondent emphasized in response to a question about the specific challenges or barriers being faced, “Besides money? The first one is money, the second one is money, the third one is money and the fourth one is ...money.” (I.X).

It is of note that one respondent commented on the need for internal change to be externally driven and said that where senior leadership was lacking, outside structures should play this role. “Sometimes, outside institutions are ... needed to drive internal processes; we need to be pushed from the outside.” (I.A.)

### **Students**

According to the data (none of which is derived directly from students), the third significant group driving the increased use of ICTs is students.

My experience has been so far that students have been absolutely hungry for change and many of our lecturers also ... and you get some people that are negative, by and large people are very hungry for the role that technology can play in changing their lives. (I.H.)

Students are also understood to be the key drivers for and in the future.

I think eventually the demand is going to come from the students. The reaction of the students to the courses that are currently online is just absolutely phenomenal, they so excited, they are so committed, it actually becomes quite a problem, because they put too much time into their online courses to the detriment of other things and the reports and the experience that I have had in the courses myself, it has just been phenomenal. So, as more and more students go online, more and more other students are going to be asking, “Why are we not [online]?” and that is going to be a driver. (I.M.)

This research has revealed that the institutional drivers for this work appear to be located inside institutions, rather than the impetus coming from direct external pressures or incentives. In the next section, the day-to-day understanding of and discourse on ICT use in selected institutions are explored.



## SECTION 2: PRACTITIONER-BASED NOTIONS OF ICTS IN SOUTH AFRICAN HIGHER EDUCATION

### 2.1 HOW ICTs ARE UNDERSTOOD

There is an emerging consensus that technology in higher education refers to information and communication technologies (ICTs), a term that can be defined as the amalgam of computing and telecommunications technologies. It includes equipment, such as computers, the Internet, CD-ROMS and other software as well as digital cameras that can be used as part of the teaching and learning process. It is noted that networked computers have shifted the emphasis to include not only information or content, but also communication.

...what I mean by ICT is in fact a combination of the two Technologies. I mean computers and the Communications Technology provide the Internet connection. So in a sense, when I say IT, I literally mean computers by themselves. And when I say ICT, I understand computers plus the communications channel, because in fact ICT is a hybrid, in fact of Information Technology, Computer Technology and Communications Technology. I mean a computer can only just get you this far in your office, but you've got to be connected to somebody else. And the connections then bring in the Communications Technology. I mean you can be connected just from a computer to a computer, in which case you are just using computer technology, but the minute you that include the Internet, the Internet connections are based on telephone communications. So what we are actually reading, whether they be satellite or cable, or whatever, it is the merger of the two concepts – the IT and the telephone communications which makes it ICT for me. (I.B.)

One person commented that what is traditionally known as IT has become a subset of ICTs: “Information and communication technologies, now it talks about this environment which IT is just a little part of – it's like an island of its own type of thing” (I.A.).

The explicit link between information and communication is important, because it underlies many of the debates regarding the role of ICTs in higher education, with some arguing that the value lies in the increased possibilities of online content, while for many others the importance is in the communication. This difference of opinion can be sharp, and can reflect important differences about the priorities and purpose of the teaching and learning experience itself.

With regard to content, there is often a focus on increased access to content, especially for those in disadvantaged circumstances:

...effectively what it [technology] has done is it has given access to almost any kind of information. There is almost nothing that you can't find and there is no question that you can't find an answer to these days by creatively looking on the Web. (I.H.)

This point is extended to emphasize how increased access is provided to a larger system:

... if you think about it a normal university course that just starts in the classroom, your ability to get into it from outside is larger to begin with than what is in the library. And as we know, our library is under-resourced and has been for a long time. So you don't typically accept [the

idea that] if it is a strong research area you don't have access to the latest information. But if the subject is what technology enables you to do, it is for you to not only have input but to give output to outside as well – so the ecosystem becomes bigger. (I.H.)

The immediacy of information is also stressed, and the value of immediacy and speed for research purposes:

OK, let me take an example. One of the things that I think faces us in the 21st Century is that we've to find up-to-date information. ... in terms of my students finding research, for example if we've got a paper from a particular author and we're not quite sure of how he's explained something, we can find his e-mail and we can mail him and say, "Tell us, what do you think about this?" We've got this query with the person who is really able to help us. Previously you may [have] writ[t]e[n] a letter, but you would never get that information back as quickly. (I.X.)

On the other hand, a repeated criticism of online learning is that it is used too often to 'dump' content, and that the real opportunities lie in the communication possibilities of the technologies.

I reject that notion that a computer can teach you. It is not about information, delivery of information, I think ICTs are about openness, about allowing people to communicate, about giving you tools to recreate in other ways. So learning to me is a process, it is not about information. Information is important but the delivery of information is not learning. Information is having the information and converting it into knowledge through processes and that is where technology can play a role, lots of different types of roles but it is communication which facilitates our desire, flow, design, all those kinds of things that technology can do. It is not about delivering content. I am very much against using technology just as a means to dump your notes on the Web and say "I have a course on line". (I.K.)

A similar sentiment was expressed more bluntly, as the excerpt below shows:

OK, let's put it this way, a computer is a machine, it has no life to it, it has no personality to it; it's a creation of man [sic], Ok. All that a computer has done [is that] it has made communication a lot more effective. (I.D.)

For many people in higher education, using ICTs means using the Web. Thus the term 'web-based' is used as an equivalent to ICTs even when, technically speaking, the two are not the same thing. The shift from stand-alone multimedia machines to inter-connected web-based technologies was summarized by one of the few interviewees, whose university has been systematically working in this area even prior to 2000.

I would say there have been two moves. The production has moved to do-it-yourself. The multimedia, I would say moved by the end of 1999. I would say we moved from production to the whole idea of "give them a fish or teach them to fish" so we would "give them a fish or teach them to fish" in 1998. And then with regard to multimedia I observed the move at about the end of 1999, the move to more web-based, not moving away, I mean not saying that you should not have the multimedia elements but not the stand-alone multimedia applications, rather a web-based approach [with] much more focus on communication, interaction, those types of elements or that was the idea of it. So moving away from the language lab., where people sit alone with

their earphones, to an environment where we share and work collaboratively on anything in the earth's atmosphere or web-based whatever ...environment. (I.I.)

For many people, it has only been since the advent of the Web that ICTs have been 'mainstreamed' into education. This shows how relatively recently the utilization of ICTs has been. As one person said quite simply, "It's online because it is the Web that drives it – that is why I always talk about online learning"(I.S.). The growth and prevalence of the Web is indeed widely considered to be associated with the growth of ICTs in education, either as a facilitating environment or as a key driver.

While there is some consensus about what ICTs are, there is less about what they mean. The debate rages instead around the purposes of the possibilities afforded by ICTs and the way that they are being taken up, or not taken up. These debates feed into larger and sometimes competing discourses on technological change evident in the literature, as is discussed later. The understanding of what technology means in and for teaching and learning in higher education can be evocatively suggested by the metaphors used to describe them. These metaphors reveal the ways of thinking about technology and society through time. As mentioned earlier, these metaphors can also be usefully interpreted through the technological shaping of society and the social shaping of technology – and a co-construction approach that combines elements of both of these (Brey, in Misa *et al.*, 2004).<sup>4</sup>

The metaphors used to describe technology in education have been grouped as:

- the metaphor of a tool or vehicle; and
- the metaphors of ecology and the bloodstream.

There are two salient points about these metaphors. First, they all reflect serious thought about the issues surrounding technology, clearly placing competing ideas about teaching and learning at the centre of the e-Learning debate. Secondly, while these specific metaphors refer to ICTs in higher education, they can be seen to reflect larger discourses on the relationship between technology and change, and the role or function of technology in higher education.

The dominant conception of ICTs in education is that of the tool. In this sense, technology is a vehicle for change. The nature of this tool varies. For example, some view technology as a neutral tool, with the value located in the use alone:

Technology is neutral; it is what you do with it that is important. [I]t is what you do with the tool that is important and it is the same in learning, that ICT is just a tool, it is not learning itself and that is where some of the people get confused. I think they see technology as being able to teach people and I don't believe it can. (I.K.)

Another respondent expands this point into a discussion of issues of appropriateness, and the fitness of ICTs for the particular purpose and use:

I see it [ICT] as a vehicle, [or] different vehicles for different purposes. I suppose that's my metaphor I use as well. So that we can match more carefully what we need. For example, if we are going to [use technology then] the students need to just be sending e-mails to each other and that... a lot of students would just be sending e-mails to each other. Then in fact we don't need the latest up-to-date computers in those labs. We can actually roll out some of the less capable computers into special e-mail labs and keep the [top]end computers for more specific stuff.

<sup>4</sup> While we cal□

*et al.*, 2003.

I think that my big concern is that perhaps we're not clearly matching the right equipment to the right purposes. In time gone by you'd find that perhaps the head of departments had the best and newest computers, but in fact he or she didn't know how to use it properly. Whereas the secretary, who was actually doing most of the work, was sitting with an old dilapidated one. I actually used a strategy when I first came here six years ago of getting an inventory of what people thought they had and what they used and what they would like and then on that basis of the kind of "higher" end users, the newer computers that we ordered I gave to the people who were actually using them most and that did not necessarily mean at that time the head of department. It does now, but it didn't then for that particular head of department. And that was a bit of a change – in "cascading" down from the purpose for which it was used, rather than using a position as an indication of computer use. But I think that [a] metaphor of [a] vehicle is: what is the most suitable vehicle for this job? Do you need a tractor? Do you need a bus? Do you need a car? Do you need, you know, a motorbike? I think I'm seeing computers in that perspective. (I.B.)

Different uses do not necessarily imply neutrality:

Is there any such thing as a neutral tool? [You can use it in different ways but] that does not make the technology neutral. It empowers me to do something that I would not otherwise [have] be[en] able to do and whether I do it or not, that is my choice, so it depends on what you mean by neutral. Because if by neutral you mean [that] by itself [it] does not do anything well of course, you know.... There are lots of computers sitting in boxes in the back rooms of institutions where people are not using them and they are not adding any value so it is what you do with it.... (I.X.)

A less commonly articulated approach imbues tools with human values:

Tools do have politics but the interesting thing about the internet and I think that sort of covers your last question [that] it is such an amorphous anarchical [thing] and it will continue to shrug off any attempts that might be made to formalize it or whatever. And that is the beauty of it; you can't have societies in the future saying, "Well we did not know" because you do know, this source of information, the source of understanding, whatever you want to call it, is just not controllable by any government or anybody and so that is the positive side of it to my mind. (I.M.)

Some interpretations of technology as a tool problematize it further by arguing that it can, under certain conditions, be beneficial, but it may not be under other conditions, and it is highly dependent on other factors, such as the specific context, the history of the institution, and so on.

No, it is a tool and tools are used to manipulate. So how can it be neutral? In fact, that is one of the frightening sides of it and there is enough of an anarchist left in me from my youth to know that that is a frightening thing. It is a divisive tool and it is being used as a divisive tool and will continue to be used as a divisive tool just as genetic engineering is going to be used as a divisive tool. And it is up to us who are going to be on the wrong side of the divide to keep fighting like hell that it is not going to do that because otherwise we are going to be in deep trouble. (I.M.)

Thus, this research found that the predominant understanding of ICTs as a tool in higher education is that it is one that shapes society and is not necessarily neutral.

There are also some indications of an attitude that acknowledges the value-laden nature of technology; and there is also an indication of a belief that ICTs and education are co-constructed. These attitudes or beliefs tended to be expressed in two other metaphors, which were less dependent on specific images and suggest stand-alone or linear components. These metaphors suggest more systemic approaches: the ecology metaphor and the bloodstream metaphor. Both begin by explaining or defining ICTs in higher education as some kind of network. Interestingly, they both move towards describing ICTs in relation to processes of change.

The metaphorical comparison of ICTs in education as an ecology is expressed as follows:

Well the ecology metaphor is suitable for learning – period and the E-part of it is just one approach. But what the E-part of it allows is it allows the ecology to be bigger.... What technology enables is for you to not only have input but [also] to give output to [the] outside as well, so the ecosystem becomes bigger.... You know, that is why I talk about knowledge ecology, because those conversations happen in clusters that are like ecosystems and those clusters are in bigger clusters which are also like ecosystems, so the institution itself is just a series of these conversations and the more isolated the conversations are the more difficult it is to effect change. (I.H.)

The ecology metaphor forms part of a broader grouping of ecological concepts for e-Learning in education emerging in the form of information ecologies (Nardi & O'Day, 1999; McCalla, 2004), learning ecologies (Brown, 2000) and networks ecosystems (Kelly, 1994). These questions have been explored in more detail see (Frielick, 2004) by authors who ask whether the ecology is just a metaphor for thinking about a process or whether a networked learning environment indeed functions like an ecosystem. Frielick draws attention to the above-mentioned authors among others and argues for a perspective that goes beyond constructivism, into a new ecology of cognition and learning known as 'en-activism'. The bloodstream metaphor is used to indicate networks, but it is also used to suggest a diffusion mechanism by which ICTs are appropriately and selectively utilized, and are mainstreamed into the core business of the university.

Basically this was part of the whole e-Campus project; that is where e-Campus is the blood stream of the network type of University metaphor that we used for that and e-Learning was just one part of it...you know, so that network type of thing, so it is not just e-Learning anymore, it is teaching and learning. Yes, the technology is part of it; it is part of the blood stream; it is part of business as usual; it is part of the way we do things. It is not just e-Learning any more, it just teaching and learning practice. You see that was the idea of the e-Campus. It is a system thing and then it does not mean you have to be part of all the arteries. (I.I.)

The diffusion metaphor is indicative of a theme not covered in this project, that of the processes and mechanisms of organizational change, especially in relation to ICTs. The 'how' of such unfolding and elaborate change in institutions is the subject of much international literature and is certainly an area of investigation that would be valuable here.

## 2.2 THE TERMINOLOGIES AND LANGUAGE(S) OF ICTs

In the same way that the parameters of the field of work are still being defined and named, so are the practices themselves, as well as what they are called. The language of ICTs in education therefore

varies a great deal, although the most commonly used terms are e-Learning and online learning. Other common terms include ‘blended learning’, ‘open learning’, ‘multimodal learning’, ‘distributed learning’ and ‘telematics’.

Different, and often contradictory meanings are ascribed to these terms, relating to whether or not distance education forms part of the meaning, whether the term relates to networked computers or stand-alone computers, or even to computers at all. There is a differing emphasis placed on the ‘e’ and on the ‘learning’ part of the words.

### 2.2.1 e-Learning and the Web

The most atypical comment was that e-Learning need not have anything to do with computers. For example, one respondent said:

My definition of e-Learning is electronic learning, ok, so electronic learning ...is everything electronic. So it need not necessarily have anything to do with computers at all. E-Learning could just simply be putting up information on an overhead projector. (I.D.)

On the whole, most practitioners assume that e-Learning has to do with networked computers, specifically the Web, rather than stand-alone computing. Thus,

I think in practice if people talk about e-Learning they are talking about using the Web and e-mail, which is not quite using a PowerPoint presentation or using a tutorial even on a stand-alone computer. (I.H.)

Well e-Learning to us is when a lecturer and sometimes with and sometimes without students creates a learning environment on the World Wide Web and where learning in collaboration takes place. But it very much again depends on how the lecturer uses it so sometimes it extracts content of simulation and [at] other times it is collaboration to various degrees. (I.C.)

### 2.2.2 An emphasis on learning

Given the emphasis on the social aspects of ICTs observed in this study, it is not surprising that for many it is the ‘learning’ part of the word which is important, whether the term is e-Learning, or online learning (another quite common term):

We use the term e-Learning. It is not quite just habit. I think the whole issue is clearer when I write it; I always try to be consistent and make the “e” small and the “l” large to emphasize the learning and the “e” as the small or abbreviation type of thing but the learning is the most important thing.... (I.I.)

Online learning... is not about technology; it is the way that technology is used to convert, to support learning cognition and meta-cognition, that is what online learning is to me, it is about creating environments where people are given the tools to negotiate information, to turn information into knowledge. (I.K.)

I use the term “online learning”. ...This what I have said to all my students. When we start out our research work is, “If you don’t know about learning, you don’t know about anything in this field, you can’t judge or evaluate or implement anything if you don’t understand how people learn”, so I always like to see the word “learning” in any terminology. (I.L.)

### 2.2.3 Different pedagogical associations

E-Learning can also be associated with a specific pedagogical approach.

I hate the word e-Learning...because it means that, if you say e-Learning, people think about the model that M-Web puts forward that all the content is online and you go and get the content and that is e-Learning and I reject that model so I reject the word associated with it too; so for me online learning is an experience, [it] is what I do. You can call it e-Learning if you want to but I don’t like the term; I don’t like the label “e-Learning”, because it is associated with the instructivist approach to learning. (I.K.)

On the other hand, a report stated, some [higher education] institutions even equated the mere use of technology with constructivism (CHE, 2004).

That e-Learning is associated with opposing pedagogical approaches, instructivism and constructivism, is an indication of how diverse the connotations of the concept can be.

### 2.2.4 Distance education and open learning

One respondent associates e-Learning with distance learning and argues that the more correct term for using ICTs in a residential context is ‘blended learning’.

I started in ’98, ’99 when everybody else was starting to realize that we should experiment and he [the then VC] was 100% behind what they were calling e-Learning at that stage, but what they actually mean is “blended learning”. There is no idea of turning us into a distance education university using WebCT. I have been trying to say that we are doing blended learning rather than e-Learning, but then nobody has paid any attention. (I.G.)

Another perspective is that when distance learning is to be supported, it is called ‘open learning’, regardless of the platform on which it occurs.

Open learning networks [are those used] to facilitate distance education and to promote life-long learning. It facilitates access. (University of Natal, 2000. Strategic Initiatives for the University of Natal. October 2000: 15 & 12)

However, the term e-Learning is sometimes also used explicitly for both situations.

e-Learning [is] the process where education technology is used in the virtual campus to enhance both distance and residential education processes. (University of Pretoria, 2002. University of Pretoria Strategic Plan, 2002-2005)

It is of note that the term ‘distributed learning’, a term quite commonly used elsewhere in the world to indicate a separation of lecturer and student mediated by ICTs, was used once only, and in quite a narrowly defined way. The person who mentioned this said that the common term was e-Learning, but that he thought this was incorrect:

“Distributed learning” is what it should be called ... distributed learning basically is where you broadcast your lessons to students and then they can use [the information] at any time that is convenient for them. (I.D.)

### **2.2.5 A plethora of other possible terms**

Another term that was only used once is that of ‘multimodal learning’, a term that has several meanings even within a single institution. It is of interest that there are a number of terms used elsewhere in the world that are not used in South Africa. These include ‘virtual learning’, a concept often linked to the idea of a fully online ‘cyber-university’, and ‘networked learning’, a term commonly used in the United Kingdom.

In the light of this assortment of terminology, the following comment is understandable:

It means different things to different people. ... My approach is a very pragmatic one; I don’t give a hoot what you call it; it is what you do with it that matters. (I.H.)

Thus far, the diversity of meanings of ICT usage and its terminology have been noted. The next sections explore frameworks and forms that enable and constrain the implementation of ICTs in South African higher education institutions. Some of the issues about the current uncoordinated nature of ideas concerning ICTs, at the policy level, are noted.

## SECTION 3: POLICIES AND STRUCTURES

In this section, national policies, which pertain to ICTs in higher education, are discussed. Given that higher education is a national imperative, no provincial policies are recorded. Understanding of policy in this report is data-driven. It can be described as contemporary rather than classical in that it meets the criteria of Crump and White (1993) in taking a critical perspective, having an ethnographic, sociological approach, avoiding models, highlighting micro-politics, and seeking to identify loci of power. This view assumes a need to encourage further research.

### 3.1 NATIONAL POLICIES

While ICTs for education at schools and in the institutions of further education and training (FET) are prioritized at national policy level in South Africa (Department of Education, 2003), there is no coherent national policy framework specifically steering ICTs and higher education in South Africa (Czerniewicz, 2004). In fact, there is no specific educational technology policy for higher education, nor is there any monitoring or coordination of relevant related policies.

References to educational ICTs in a number of related educational policies do exist in *ad hoc*, limited and indirect ways. Discourse on ICTs in the knowledge society is found in higher education documents as well as in related policy arenas. For example, the higher education *White Paper 3* (1997): ‘A Programme for the Transformation of Higher Education’, stipulates in sub-section 1.13, that ‘Successful policy must restructure the higher education system and its institutions to meet the needs of an increasingly technologically-oriented economy...’. The National Plan for Higher Education also observes that

These challenges have to be understood in the context of the impact on higher education systems worldwide of the changes associated with the phenomenon of globalization. The onset of the 21st Century has brought in its wake changes in social, cultural and economic relations spawned by the revolution in information and communications technology. (2001:5)

The importance of ICTs for education, specifically teaching and learning, is noted also in ‘The Foresight ICT report’ (1999), one of twelve reports tackling specific aspects of the South African society and economy as part of South Africa’s National Research and Technology Foresight Project. The report notes:

As economics move from the industrial paradigm to the Knowledge paradigm, ICT will have a growing impact on the learning and development of individuals and organizations... Focus is needed on needs-driven, ICT facilitated, virtual learning...(1999:49)

This echoes sentiments expressed in national human resources and research development documents, which also stress the importance of ICTs and explicitly mention the role of higher education institutions. The National Research and Development Strategy (2002) of the Department of Science and Technology states that

...we have to ensure that as many of our people as possible master modern technologies and integrate them in their social activities, including education, delivery of services and economic activity. This relates in particular to communication and information technology. ...we have to devote the necessary resources to scientific and technological research and development.... (2002:3)

The strategy declares universities and research institutions key role players in the national system of innovation (NSI) and states (in Section 2.2) that the sector would expose itself ‘to insurmountable security risks’ if it does ‘not commit to maintaining and developing competencies across the system (universities, research councils, private sector, etc.) in critical strategic areas’ (2002:21).

Higher education’s role in developing a knowledge society in South Africa is made quite clear in the National Plan:

Higher education has a critical and central role to play in contributing to the development of an information society in South Africa both in terms of skills development and research. In fact, as Manuel Castells, the noted social theorist of the information revolution as argued, “if knowledge is the electricity of the new informational international economy, the institutions of higher education are the power sources on which a new development process must rely”. (1997:2)

The focus of the Foresight ICT report is on ICTs as a content area, but pertinent reference is also made to technology-enhanced learning. The report makes explicit the link between economic change and educational change:

Through access to the information society, many new methods of education and training become possible.

“ICT-enabled, world class learning methods” is one of the aspects of ICT that the respondent group believes offers the greatest prospects of wealth creation and improvement to quality of life for the citizens of the country. (1999: 54 & 79)

It also stresses the importance of ICT-related graduate competencies:

The acquisition of new skills and continuous learning are needed to develop a population of effective users. The aim is to graduate students who are not only computer literate, but knowledge literate. (1999:23)

This echoes the National Plan, which reads:

A priority of the National Plan and higher education – [is] to produce graduates with the skills and competencies required to participate in the modern world in the 21st Century. (1997:1)

These competencies are also mentioned in the schools’ policy literature. The role of higher education in ensuring that teachers are technology-literate in their classrooms is emphasized:

There is a need to ensure that the new generation of teachers emerges from higher educational institutions with an understanding of how to incorporate and use ICT in their schools teaching. This in turn would imply that their higher education experience would take place in a congruent environment. (Strategy for Information and Communication Technology in Education: Departments of Education and Communication November 2001, 25)

The Foresight Synthesis Report: Dawn of the African Century (2002) includes among its recommendations that

...the human resource base should be developed in schools and colleges of education. This should include the training of teachers on the use of Internet and multimedia technologies. Rural and outlying schools could be linked with tertiary institutions. (72)

By implication, these policy statements refer to teachers of all subjects emerging from all disciplines. It is not known to what extent higher education teacher training structures have integrated these imperatives from different policy arenas into their strategic planning and curricula.

The Foresight Report is of interest in relation to the subject of this report, because it is a non-educational document, which recognizes the possibilities of ICTs in education. It observes the role that ICTs can play in education:

VSAT and DTH services can aid access to communication and information in remote areas, which can be combined with other facilities to support distance education....(26)

It is evident that ICTs and education are integral, often implicitly, to a number of education, science and technology, and human resource policies and structures. In addition, there are numerous national ICT policies, structures and initiatives, which define and steer a national commitment to ICT take-up. 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,<sup>5</sup> all of which frame educational possibilities and intersect with higher education.

However, a concern has been expressed within the ICT sector itself about the lack of up-to-date policy coordination:

Although the centrality of ICT to economic growth and poverty alleviation has been widely articulated, and although various departments have initiated ICT policy visions, and although Presidential commissions and national strategies have been established over the last few years, currently no integrated ICT policy framework exists for the country. Until this framework exists, ICT policy will be uncoordinated, *ad hoc* and often undermined by duplication.

To find a broad national vision, a review of policy and strategy in the telecommunications sector is required, *a review that will need to be integrated far more systematically into other national policies in the areas of innovation, research and development, education, health, and e-government.* (Gillwald & Esselaar, 2004) [emphasis added]

It is essential that higher education should participate in and play a leading role in such a national policy review. Specific policies need to be closely interrogated and the intersections between them examined, in order to ensure that the needs and interests of higher education are being addressed (or, at the very least, are not being overlooked). The fragmentation of references to ICTs in higher education across so many pertinent policy documents leads to contradictory decisions being made, as well as unintended consequences occurring. Such a lack of coordination also opens up the possibility of key issues falling through the cracks. The lack of a single critical eye on these issues is a matter to be noted and addressed at a national oversight level.

<sup>5</sup> Numerous examples exist, including, for example, the Telecommunications Act of 1996, The Convergence Bill of 2005, the Electronic Communications and Transaction Act (2002), and the ICT Charter (2004).

### 3.2 INSTITUTIONAL POLICIES

At the institutional level, there is a continuum of policy examples of ICTs in higher education. On the one hand, there are formal policies complete with strategic plans and regulatory procedures, as well as statements of policy principles. There are a number of cases of draft policies or of individuals tasked with producing them. On the other hand, there is a significant group of institutions where there is no evidence of such policies at all.

The policy approaches observed can be summed up as follows:

- *Approach 1* – Institutions with formal policies in place
- *Approach 2* – Institutions with ICT-and-education policies incorporated into related policies
- *Approach 3* – Special merger issues
- *Approach 4* – Institutions with no evidence of any policy frameworks
- *Approach 5* – Institutions with relevant structures, but no policy frameworks

#### *Approach 1*

This approach is typified by serious attention to institutional ICT and education policies, although to different degrees of detail. A handful of institutions have detailed and comprehensive policies and associated documents in place. Stellenbosch University, for example, has an E-Campus strategy, an e-Learning policy, and a general IT policy. The E-Campus strategy is comprehensive, incorporating all university business specifically including e-Learning, e-Information, e-Student administration, e-Research, and e-Services. The document talks of Electronic Information and Communication Technologies, all of which, it is understood, will improve the quality of the core functions of the university (teaching, research, and community service). The e-Learning strategy is separate and focuses on ensuring a minimum online presence for all courses by the end of 2004. The “minimum electronic presence” is defined as a module outline (with outcomes) on the Web and some form of electronic interaction or communication, for example, e-mail or a Bulletin Board (van der Merwe & Pool, 2002).

The University of Pretoria provides another case of a detailed institutional policy framework, with its Telematic Learning and Education Innovation Strategic Plan 2002-2005 (September, 2002). The strategy outlines an integrated approach to the attainment of quality teaching and learning practices, and the production of well-rounded, creative, and productive graduates who are ready to lead in modern careers.

It specifically mentions technology enhanced education; education technology; and ICTs (Section 2.4). The same institution also has an Electronic Communications Policy (March 2004) and University Technology Plan.

While it may be of interest that the two institutions with the most explicit policies and generous resource allocations are historically advantaged, Afrikaans medium institutions, it is not clear whether this is true of all such institutional types. It may be worth enquiring further into what the impact of such institutional choices might be on the higher education sector as a whole.

Other institutions have formal policy or strategic documents which make their key principles and intentions clear, although there do not, as yet, appear to be accompanying operational or implementation documents. For example, the University of Cape Town’s Education Technology Policy (2003) outlines an integrative approach to the use of educational technology, encourages (rather than compels) ICT

usage, and prioritizes a linkage between ICT and pedagogy in ICT usage. The policy defines educational technology as a ‘knowledge domain that deals with the articulation of education and information and communication technologies (ICTs)’ (1). A similar example is the Tshwane University of Technology (TUT). The TUT has a Teaching, Learning and Technology (TLT) programme, which appears to be substantially based on Pretoria Technikon’s pre-merger TLT Strategy. The programme encourages educators to enrol for and commit to at least 12 months – to focus on ‘well-rounded technology enhanced courses that address specific challenges such as large groups, retention rates, geographically dispersed learners, non-traditional students...’. (2001)

The University of the Western Cape’s Integrated Information Strategy (IIS, 2002) forms the basis of its draft e-Learning strategy as an implementation goal. Among the stated goals of the IIS is the production of graduates who are able to use technology to find, understand, apply, analyse, synthesize, evaluate and report on information from a wide variety of sources and who are competitive in twenty-first century careers. The overall goal of the ICT policy, here, is the support of overall educational values: to strengthen its participation in the global academy of scholarship, and to build a world-class research and publication profile while producing postgraduates who are internationally competitive in their fields (2). The draft e-Learning policy elaborates on strategic objectives of the IIS, outlines an implementation framework as well as time frames, and allocates responsibilities across different sectors and persons.

Other institutions are either working on draft policies or acknowledge the need for them. A policy was still in draft form in July 2004 at the University of Fort Hare, and a draft educational technology policy was being formulated at the University of Free State. In several cases, policies are being written from the ground up. Two interviewees, appointed fairly recently to coordinate ICTs in education in their institutions, commented that among their first tasks was the requirement to produce “some sort of policy document” to frame their work.

### *Approach 2*

In some cases, ICTs and higher education are incorporated into related policy documents. The Durban Institute of Technology (DIT), for example, has no educational technology or general IT policy, but includes the use of ICTs in its Learning, Teaching, and Assessment (LTA) strategy. Spearheaded by a Centre for Higher Education Development (CHED), the LTA strategy represents a campus-wide shared understanding and a best practices policy on innovative teaching, learning and assessment at the DIT. Emphasis is placed on learner-centred flexible education with increased access, information sharing, and on-going knowledge construction. Key terms are web-based learning, distributed learning, blended learning, and online learning – which are also presented as the main ICT tools. As mentioned earlier, there is a strong focus on the Web, on ‘sustaining and growing web-based learning...’ and a ‘multi-layered approach to the development of web-based learning practitioners’ (Fregona & Pete, 2004). In another case, a respondent from a large urban university commented, “There is simply not a policy on the use of e-Learning or on the use of technology in education here. The policies that we have [are] the teaching and learning policies on curriculum development, on assessment, and on evaluation of teaching and courses, those three”.

### *Approach 3*

Because of the mergers, in some cases, it is difficult to assess whether newly formed institutions have policies that apply across the new structures. In two cases, where a historically advantaged institu-

tion had merged with an historically disadvantaged one, it was possible to identify a relevant policy located in the historically advantaged partner. The University of Johannesburg, for example, merges Vista University East Rand and Soweto campuses with the Rand Afrikaans University (RAU). Within these campuses, the former RAU has a policy on Access to Information that guides and directs the use of electronic resources. This university also has a multimodal teaching and learning strategy with a major focus on student constructivist learning, using various methods of access and presentation of teaching and learning events. Methods include traditional face-to-face teaching as well as computer-mediated technology.

In a second case, the University of KwaZulu-Natal (UKZN), which incorporates the former University of Natal and University of Durban Westville, there appears to have been no separate ICT policy at the former UDW. The former University of Natal had a Strategic Initiatives policy (2000) that outlines commitment to quality teaching and learning with educational ICT playing a major role. Here, ICTs were argued to be a driver of a paradigm shift, as well as supporting and enhancing existing education programmes. References to online learning include phrases, such as Web-based learning and open learning (UN, 2000). Open learning networks were seen as facilitating distance education and access, and as promoting life-long learning.

#### *Approach 4*

In some institutions, there seem to be no frameworks at all regarding the use of ICTs in higher education. This was true across all institutional types, and includes the University of Witwatersrand and the Walter Sisulu University of Science and Technology (previously University of Transkei, the Border and the Eastern Cape Technikons) where the only related documentation identified were guidelines on access to information at the Border Technikon. The Nelson Mandela Metropolitan University appeared to have no general IT policy; there were no educational technology and no IT-related teaching and learning policies at either UPE or Vista PE that could be identified. Similarly, the North West University (previously the universities of the North West and Potchefstroom) does not appear to have created or inherited educational technology, general IT, or teaching and learning policies from any of its constituent campuses.

#### *Approach 5*

In one case, the Cape Peninsula University of Technology (a merger of the former Cape and Peninsula Technikons), there were no inherited formal documents on educational technology, yet the institutional Web site suggested a strong commitment to the use of educational technologies, including the practice of e-Learning and the use of a WebCT learning management system. In this institution, information technology is described as 'having redefined the way in which business is conducted and the way in which learning is delivered'.

Thus, it is argued, the use of technology is defined by the nature of the institution, and not policies. In a related way, while no relevant policy was unearthed at Peninsula Technikon, a massive investment in a large computer laboratory has recently been made, a key statement in terms of resources.

And finally, while no evidence of a separate policy on the use of technology in education was found at Rhodes University (there are policies on curriculum development, on assessment and on the evaluation of courses), there is a relevant structure, the Technology Roundtable, which investigates issues relating to the use of educational technology on campus.

The last two cases of the Cape Peninsula University of Technology and Rhodes University provide examples of institutions which operate without written policy frameworks, yet have relevant structures, the purpose of which is to focus on ICTs and teaching and learning within the institution. It is therefore clear that, in order to understand what is happening in institutions, it is necessary to look beyond formal policies to the institutional structures formed in this arena.

### 3.3 ORGANIZATIONAL FORMS

The form and location of organizational structures is revealing as these indicate something about how that institution views the nature and role of educational technologies. Even without formal policies or regulations in place, there are relevant structures in existence at most institutions, located in several settings, including teaching and learning structures, higher educational development structures, IT structures and faculty departments.

In the institutions surveyed, the largest concentration of expertise is located in teaching and learning structures. Both Wits and Stellenbosch, for instance, have e-Learning coordinators in a Centre for Teaching and Learning. The coordinator at Rhodes University is located in the Academic Development Centre. This can also vary. At the University of Johannesburg, the Centre for Teaching, Learning and Assessment has combined with the Bureau for University Education, while the former Cape Technikon had both a structure for e-Learning, and one for Teaching and Learning, each with its own dedicated premises.

A more recent trend has been to set up structures called Centres for Higher Education Development. In three cases, programmes for ICTs in higher education are to be found here. The DIT's Technology in Education Project is located in its newly formed Centre for Higher Education Development (CHED), and the recently appointed e-Learning coordinator at the University of the Free State is in the Centre for Higher Education Development Studies (CHEDS). Similarly at UCT, the Multimedia Education Group, which existed until the end of 2004, was located in UCT's CHED, while the new Centre for Educational Technology (which succeeds MEG) is also located in CHED.

The location of such centres in learning and teaching structures represents a significant shift from the past, and signals an emphasis on the educational role of educational technology. However, despite this, a supportive champion is an important element in the power play of legitimacy and growth. Hence, one e-Learning coordinator noted that their director (of a teaching and learning structure) had no interest in e-Learning and had not included that element in the current strategic plan. By contrast, there are examples of relevant structures being closely aligned with institutional strategies and senior level support; the new Centre for Educational Technology at UCT, for example, is closely integrated with other developmental structures which exist to facilitate and to support academic development within the institution.

There are still instances where structures are located in the ICT services structures. This is usually because champions supporting the work are located there. In one instance – the University of the Western Cape – the head of the Teaching and Learning Technologies Unit in 2004 reported to the Executive Director for Information and Communication Systems who has been responsible for the institution's IT and e-Learning strategies. Similarly, the UKZN's structure for ICTs in Educational Development (Howard College campus) seems to be located in the IT Services for historical reasons. It is an unusual mix of roles including teaching, research, support and development. In another case,

the IT person himself suggested that such work should be located elsewhere, in a teaching and learning structure he said, rather than in an IT structure where it is presently found.

Some institutions have two structures, which divide the roles of support, development, research and teaching along traditional academic/non-academic lines. Thus teaching and research of ICTs is likely to be located in academic departments such as the education or information systems department. Other structures play support, service and/or development roles. This division of labour differs from institution to institution as does the extent of collaboration – and any associated tensions. At one university, for example, there exists a close partnership between the coordinator located in the Academic Development Centre and the academic course convener located in the Education Department, with shared teaching and research projects taking place. In other cases, there is evidence of more tensions. In one example, a respondent in an academic department was quite dismissive of the kind of research being conducted by the institution's structure for ICTs in higher education. In a third case, the respondent in the teaching and learning structure commented how difficult it was to collaborate with colleagues supporting online e-Learning in an ICT structure.

These different arrangements may be due to a lack of senior level overview of the kind of integrated work required of ICTs in higher education, itself a new area crossing over several disciplinary domains. They may also reflect long-standing tensions within universities between the craft knowledge of practitioners in what are generally regarded as support posts, and the specifically discipline-based knowledge of traditional researchers.

In addition to listing existing structures, it is also important to note which of the key players are active, which are passive, which are present and which absent. This is part of the process of ‘...identifying the significant actors within a particular political system and exploring how those actors seek to protect and extend their authority, their institutional character and responsibilities and their budget’ (Samoff, 1994:21). This kind of political jostling may be suggested in the range of titles and levels of these positions. These titles include: Coordinator of Technology and Education; Convener of Computer-based Education programmes; Director, Centre for Educational Technology; Convener, Computer-based education; E-Learning Coordinator; Coordinator of Master’s in Computer Integrated Education; IT Manager; ICT Manager; Coordinator of Education and Technology; Senior Adviser: e-Learning; E-Learning Project Leader; Interim HOD, Information Systems and Technology; and Director, Centre for IT in Higher Education.

The terminology used for different positions is likely to be in accordance with the language of local structures, which may favour terms, such as ‘coordinator’ or ‘manager’ depending on the culture of the particular institution. The term convenor indicates an academic role, while the term manager generally does not. The lack of standardization of these position titles may hint at different roles, divisions of labour and educational priorities.

It is important to note, however, that a lack of standardization may only be an indication of the emerging status of this field of educational development. The fragmentation and dispersed location suggest how important individual champions remain at this early stage, especially given the absence of dedicated, coherent policy frameworks. Actors may express self-interest, but also have different roles and may be representatives of other interests. These interests are all held in some kind of tension and may be balanced or compromised, and of course, these tensions exist within implicit power relations. Thus policy-making touches on the nature of the democratic process and the relationship between the key parties.

This section of the report has touched on the relationship at an institutional level, between individuals, emerging organizational forms, roles and practices and current uncoordinated policy frameworks. It is essential that these relationships be explored more fully given the crucial role being played by educational technologists implicitly and explicitly as change agents. Through decisions and choices on the ground, important decisions are being made framing an emerging policy framework. While this daily work is exciting and often innovative, it needs to be guided or enabled by conscious policy principles that exemplify the clear objectives of South African higher education.

It is also important to look closely at the key players in terms of their roles, competencies, career trajectories, and so on. Such work can draw on the existing work established in the United States of America and more recently in the United Kingdom, but it must also be fully localised in the context of South Africa's shortage of skills, uneven human capacity development, and competing higher education needs.

Some of the questions which need to be answered, in order to begin to articulate a national policy framework for ICTs in South African higher education include:

- How are the effects of educational technology activities being facilitated by designers and coordinators of learning being felt and being played out?
- To what extent and in what ways are such people acting as agents for change?
- What are the implications for meaning-making and learning outcomes in South African higher education institutions, now that educational technologists are acting as 'brokers' across academic disciplinary domains?<sup>6</sup>
- What kinds of training and competencies are needed to encourage a coherent strategy for ICTs in South African higher education? The process of developing standards is part of the reification of practice leading to 'a canon of knowledge' (Wenger's term used in interesting ways in Jones's 2004 paper). While work has been done in the United States to name the competencies of "instructional technologists" (Surrey & Robinson, 2001) and the United Kingdom (Beetham, Jones & Gornall, 2001), such work has yet to be undertaken in South Africa.

### 3.4 POLICY BY IMPLICATION; POLICY THROUGH EMERGING PRACTICE

As has been noted, there is no overarching policy framework for the use of ICTs in higher education in South Africa, such as is found in many countries, including England, Australia and Canada. However, it has also been pointed out that there are policies being made implicitly and in practice, where policy is understood to mean 'any course of action (or inaction) relating to the selection of goals, the definition of values or the allocation of resources' (Codd, 1988:235). Indeed, the state's non-intervention in this area is also a policy statement with its own implications that need to be explored (Offe, 1996:75).

It is clear that there are fragmentary and uncoordinated references to ICT in higher education in a number of related higher education policies as described above. These are likely to exert unintended influences. Policies 'take on multiple guises and can be viewed differently at many points of a complex system' (Kogan cited in Ranson, 1995:430). Thus, although policy exists in the form of an allocation (or non-allocation) of national state resources, there is an emerging policy in the form of an implicit allocation of values. It is, therefore, essential to continue to conduct research into the ways these fragments are being understood and taken up in practice.

<sup>6</sup> See Conole 2004, and Jones 2004 for some useful UK work in this area

In line with such authors as Christie, 1996; de Clercq, 1997; Ball, 1994; Corbitt, 1997, the concept of policy-as-practice (or what Christie calls practice on the ground) is seen as central. Policies are usually represented in a formal way, through legislation or the like. But there may be times where status and commitment can be seen through practice, by observing that something has gradually become the case. This gradual change means that it may be difficult to identify the moment when that practice became so widespread that it has, *de facto*, become policy. Policies about ICTs in higher education are seen as emerging from organizational structures and practices. Actions being taken express decisions, and the discourses of implementation are revealing. As expressed explicitly by respondents earlier, in many institutions, policy intentions are first being formally marked and only articulated at a later stage.

Clearly, attention needs to be paid to the issue of a potential single national policy. There are arguments both for and against an overarching policy, especially in the light of the currently policy-intense higher education environment. A national policy would provide a clear statement of principles, and express values in relation to overall intentions and goals. Such a policy could play a role in ensuring that the required human resource development could take place in a coordinated way and in a manner that is appropriate and responsive to local conditions. It could also play a role in an accreditation system for the emerging career paths of people working in this field. On the other hand, a national policy might spawn additional regulations which change-weary academics and managers could be resistant to even if the intentions were sound. There is also the problem of resourcing given that the national department is already so financially stretched.

## SECTION 4: RESEARCH IN ICTs AND HIGHER EDUCATION IN SOUTH AFRICA

### 4.1 WHO, WHAT, WHERE, HOW, HOW MUCH

Local research trends suggest increased interest in ICTs in education as the focus of attention and a new research area. National funding bodies, such as the National Research Foundation (NRF) support such research obliquely, through the focus area on ICTs, globalization and education. In response to the call for proposals by the the Council on Higher Education (CHE) in 2003, the NRF was the first to offer funding for ICTs and teaching and learning research at the post-secondary level.

While there are international conferences where issues of ICTs in higher education can be shared and debated, it is only recently that such opportunities have been taken up and expanded in South Africa. For example, the IT Directors Forum (a grouping of Directors of ICT structures across South African higher education institutions) hosts a bi-annual conference on computers in tertiary education (CITTE), which was started in 1996. At the 2004 conference, a founding member of the Forum noted that it is only recently that academic and research computing issues have been considered important (Watermeyer, 2004). The related university conferences, such as the 'WWW in Africa', are predominately technical, but provide a space for educational technology papers. Highway Africa, an annual conference hosted by Rhodes University's journalism department, is naturally biased towards journalism, but inevitably intersects with some of the key digital debates.

In 2003, for the first time, the Kenton Education conference included a session with three papers on ICTs in education. There were also a number of ICT in education papers at the SAADA (South African Academic Development Association) conference in 2003. And in 2004, a pioneering two-week conference was held entirely online (<http://emerge2004.net>.) Hosted by the Multimedia Education Group (MEG), in collaboration with the Western Cape Schools Network (WCSN) and TENET, the peer reviewing of abstracts by a national committee led to 26 presentations and three workshops. Over 200 practitioners, researchers and policy-makers in secondary and tertiary education in Southern Africa registered and participated. A capacity building element included a pre-conference training programme for online moderators.

With regard to postgraduate research, the Nexus database on Master's and doctoral research records 135 Master's dissertations or PhD theses in the areas of technology (computers or ICTs) and teaching, learning or education since 2001. Only a small percentage of these focus on higher education. The dissertations/theses are based in Education (40%), Information Systems/Computer Science (22%), in specific disciplines (21%), in Commerce (8%) and in Information Studies (9%).

Local publications also indicate a growth in ICTs in education in the country, and there are also signs of increasing publication in international journals. One example of the growth and direction of this emerging field is revealing. A key local journal where relevant articles are to be found is the *South African Journal of Higher Education*. In this journal in 2001, there was one article on ICTs in higher education. However, there were three in 2002 and 2004, and six in 2003. The articles that have been published in SAJHE come from several different institutions. Two were from the University of Cape Town, two from the then Rand Afrikaans University, two from the University of Pretoria, and one each from the University of the Western Cape, the University of the Witwatersrand, Cape Technikon, Unisa, the then University of Natal, and the University of Stellenbosch.

Of the topics, five were 'big picture' articles: on challenges, imperatives, change and critique.<sup>7</sup> The remainder were located in specific sites (for example, information literacy and early childhood interventions) or focused on specific issues (including learning design online and online games).<sup>8</sup>

South African researchers are also publishing in relevant overseas journals, such as *Educational Media International* and *Computers in Education*. In March 2004, the *British Journal of Educational Technology* devoted a special issue to the work of the Multimedia Education Group at the University of Cape Town, signalling an interest in local understanding of internationally shared issues.

## 4.2 OBSERVATIONS ABOUT RESEARCH IN SOUTH AFRICA

### 4.2.1 The nature of the research

A review of online learning in South Africa in 2002 (van der Westhuizen, 2002) noted that local research focused largely on case studies. This trend is in line with international experience, where the preponderance of case studies and personal descriptions has been challenged (Garrison & Anderson, 2003). Although rapidly growing, much of the work can be described as preliminary.

The focus on case studies may be ascribed to the early stage in which this field of work finds itself, although in South Africa the lack of large scale and cross institutional studies may also be due to lack of large scale funding. A rare exception is a donor-funded cross-institutional Western Cape study into access to and use of ICTs in the province at five higher education institutions.<sup>9</sup> There is a glaring lack of other large scale or longitudinal studies in higher education. This is unlike the schools sector where such research study has been undertaken at national level (Lundall & Howell, 2000, Howe, Muller & Patterson, 2005). Given the rapidly changing nature of ICTs, and the unpredictable ways that ICTs and higher education practices intersect, there is an urgent need for longitudinal studies which track changes, impacts and influences over time.

Although micro-level studies exist (as mentioned above), there is also an absence of research and analysis at a national policy level. In the light of the policy fragmentation mentioned earlier, this is of particular concern. Since both education policy and IT policy formulation and analysis are substantial loci of study, this is a striking omission.

As Van der Westhuizen noted in 2002, there is surprisingly little research addressing and locating specifically local concerns, such as access and diversity. There is little research that has been located in historically disadvantaged institutions. Exceptions do, however, exist: the work of the MEG published in the *British Journal of Educational Technology* (BJET) interprets and locates the work in the diverse local context, and some interesting work is emerging (see, for example, Henning & van der Westhuizen [2004] on pedagogy and access). Nonetheless, these studies remain the exceptions rather than the norm.

<sup>7</sup> The topics were: Distributive justice and information communication technologies in higher education in South Africa (Broekman, et al, 2002), Challenges of Online Education in a Developing Country (Mashile, & Pretorius, 2003), How the Internet Necessitates a Rethink of Multimodal Education (Wentzel, & Jacobs, 2004), Technology Development: Imperatives for higher education, (Broere, Geysler, & Kruger, 2003), E-Learning: Some Critical Thoughts (Le Grange, 2004).

<sup>8</sup> Reflections on Learning Online - the Hype and the Reality (Czerniewicz, 2001); Developing a Theoretical Evaluative Framework for Information Literacy Interventions: a South African Initiative (Haberle, 2002); Early Childhood Intervention: Web-based training for Transformation (Alant & Mophosho 2003); The benefit of Introducing Audit Software into curricula for computer auditing students - A student perspective from the University of Pretoria (Coetzee & Du Bruyn, 2003); A Questioning Environment for Scaffolding Learners' Questioning Engagement with Academic Text: A University Case Study (Hardman & N'gambi, 2003); Educational Game Models: Conceptualization and Evaluation (Amory & Seagram, 2003).

<sup>9</sup> This forms part of a broader, Western Cape Carnegie funded initiative, HICTE, Enhancing Quality and Equity in Higher Education through the Innovative Application of ICT

## 4.2.2 The roles of practitioners and researchers

In this applied working environment, one needs to be mindful of the relationships between practice and research, and practitioners and researchers, especially as these generally involve a single person. However, researchers from elsewhere suggest that the roles of educational technologists, as practitioners, on the one hand, and as researchers, on the other, can be separated. They suggest that until quite recently in the UK it was likely that the same person undertook both of these roles, but that as a second generation of educational technologists arises, more differentiation is taking place. They note that there is a danger in such differentiation, given the applied nature of the field. This danger is reiterated in a local paper, which expresses concern about the ‘separation of the functions of technicians from teachers’ when gearing up for the digital era (Tomaselli & Shepperson, 2003).

It is essential to ‘ensure a continuous feedback loop in which practice, evaluation, research and theory are part of a cohesive whole’ (Armitage *et al.*, 2004). Given the roles and positions of authors of conference papers and published articles, it seems that, locally, there is a mix of reflective practitioners and researchers currently working in the field. There is an argument to be made that it is important to acknowledge the value of this diversity, and consciously to try to ensure that a dialogue of reflexive research, informed by daily practice, remains central in South Africa.

## 4.2.3 An emerging domain of enquiry

As has been noted earlier, research in this area both in South Africa and abroad is published in and emerges from a range of disciplinary locations. The most common are education, new media studies, language and literacy studies, computer science, information systems and economics. Even without considering the work that is deeply discipline based and specific, the key disciplines drawn on have quite different content, practices, theories, methods and epistemologies. It has been suggested that this leads to inconsistencies and tensions in theory and practice, owing to the fact that human sciences tend to have deconstructive (not in a Derridian sense) theories and practices while the sciences (including economics, artificial intelligence, engineering, etc.) have theories arising from constructive practices (Bolter, 2003). The interdisciplinary nature of the field has been described as both a strength – in terms of its range of expertise – and a weakness, in terms of a shared understanding (Conole, 2004).

This field of research is still in the process of defining itself and clarifying its boundaries. It is even named differently in different parts of the world. In the USA, the field is known as instructional technology, while in the UK it appears to be called learning design. European countries, such as Germany and the Netherlands, tend to call it telematics. South African researchers often choose terms on the basis of the tradition they are following, although the use of educational technology seems to be growing locally. For example, it is defined as follows in one institutional policy document:

Educational Technology – “Knowledge domain that deals with the articulation of education and information and communication technologies (ICTs)” (1). Technology used to support educational activities. It is also a domain – or sphere of knowledge, influence, or activity. (UCT Education Policy, 2003)

Educational technology is also used as a framing concept:

We are now talking about education technologies as the core collection of things. Educational Technology is much broader [than e-Learning], Educational technology is the basket, it is the

container and within that you get all these different things of which one is e-Learning. It is like a container, an umbrella. (I.C.)

Despite their different legacies, South African institutions do have a shared community of enquiry (Fish, 2001), even if Educational Technology is arguably not yet a formal disciplinary domain. There are still no shared agreements about what counts as knowledge nor have the kinds of discourse in which communication between specialists takes place been specified (Ruthven, 2000). Even in the UK, where it is more than a decade old, learning technology is described as a young field (Jones, 2004) and a relatively new discipline (Conole, 2004).

It has been agreed both internationally (see, for example, Garrison & Anderson, 2003) and locally (van der Westhuizen & Henning, 2004) that there is not yet a coherent theory of online learning, despite work taking place in many domains. There is also insufficient local work founded on theoretically nuanced and contextualised understandings of technology in education. Relevant learning theories, which firmly locate learning in context, do exist. These have been rigorously developed over the last decade and are very slowly being taken up locally. These include theories of situated cognition (Brown, J. S., Collins, A., & Duguid, P., 1989; Clancey, 1997), and distributed learning (Lea & Nicoll, 2002), new literacy theories, (Cope & Kolantzis, 2000; Lankshear, 2000 and 2002; Kress, 2000), and explored locally, for example, by Walton and Archer (2004). Activity theory (Nardi, 1996, Engestrom, 1999) now has a substantial literature (especially in Human-Computer Interaction), and is beginning to be used locally (see, for example, Hardman, 2004). It is important that local empirical research entails explicit theorising, and that such work informs and is in constant dialogue with the theory building taking place in the field internationally.

ICTs are impacting on theories of curriculum design. The five key philosophical frameworks suggested by Toohey (1999) to describe current approaches to curriculum design each implicitly imply a take-up of ICTs. The impact on these ICTs frameworks<sup>10</sup> need to be explored.

While these issues have been investigated internationally (see, for example, Johnson, 2003, on how new technologies render more authentic outcomes driven performance based types of learning), they are only beginning to be addressed in South Africa (see Blignaut, 2003, as an exception). It is important to determine why so little is understood about the uptake of ICTs locally, and why so much of the international literature has failed to problematize the relationship between ICTs and higher education change.

Many research challenges in this field are similar to other applied, rapidly changing and politicized areas of work, which draw on different disciplinary bases. It will be important in the future to pay attention to developing a solid theoretical base to underpin and inform the work, especially given its complex and collaborative nature. In an area which is too often framed by hype and hyperbole, national research agencies and other outside bodies need to play a role to encourage rigorous theory-based research, which systematically investigates actual practices. Good practice can be encouraged and steered through integration with government quality assurance processes.

The dynamic mutual engagement of theory and practice is to be encouraged. It is early days yet, and developing countries, which confront inequalities and diversity in universities daily, have a special role to play in contributing to this emerging field of enquiry.

<sup>10</sup> These approaches are t□

## SECTION 5: UNDERSTANDING ICT CHANGE AND HIGHER EDUCATION

This paper has thus far sketched the terrain of ICTs in higher education in South Africa in terms of policy frameworks and organizational forms, the language and understandings of ICT and the emerging research domain. ICTs are being taken up in a higher education context characterized by change, change with which ICTs are almost inevitably associated. The following section therefore explores the ways that the intersections of ICTs and higher education change are being understood and constructed.

These notions of change are interpreted as ‘clusters of meaning’, which are represented in formal texts, reported practices, and emergent meanings. In attempting to understand how meanings emerge and how meanings are learned, dominant meanings in specific local contexts, in networks of institutional actors are explored. The way in which contested meanings of ICT within and between groups both shape how institutions use (or do not use) particular ICTs is also examined. These different meanings both influence how institutions use ICTs and give rise to new practices (for example, prioritization of funds) and new issues (for example, choices of software).

Three clusters of meanings of the relation of technology to higher education change emerge from the empirical research: first, ICT and higher education change as improvement; second, ICT and higher education change as innovation; while the third locates ICT change in and as transformation (in different ways). The first two meanings seem to be located firmly in the overarching globalization discourse on higher education change – evident in the language of improvement and innovation in associated policies, structures and practices – and generally tend to present an unproblematic view of the relationship between ICTs and change in higher education. The third meaning seems to oscillate between an optimistic view of technology in transforming higher education, and a critical perspective that problematizes certain aspects of the higher education space.

The first cluster of meanings, of ICTs as improvement, was the least common one. The second two sets of meanings of change – as innovation and as transformation – were more dominant, with both emphasizing local contexts as determining the extent to which ICTs will enhance the quality of the educational experience. Of the various approaches identified in the introduction of this paper, these views coincide most strongly with the social shaping approach to the relation between technology and social context. The third meaning evident in the data corresponds, in addition, although not strongly so, with aspects of critical theories of technology which problematize technology in its different contexts.

These three meanings co-exist and overlap, contradict and compete, at different times. They jostle with one another and are foregrounded at different times, at different levels within institutions and at meso-levels and macro-levels, often operating within the dominant meanings of the globalization discourse, but also intersecting with other subaltern discourses to form various clusters of associated meanings and practices.

### 5.1 CHANGE AS IMPROVEMENT

The idea that the recent ICT inspired changes leads to various kinds of improvements in higher education – from increasing access to higher education, reconfiguring libraries and institutional management and administration, to improving the quality of teaching and learning – is evident in institutional policy documents, in the interviews with key institutional players, and in the local literature. It is also

to be found in some national policy texts. Key terms in this discourse include ‘enhance’, ‘improve’ and ‘added-value’. This perspective is expressed in the progress-linked metaphors respondents used to describe e-Learning as described earlier in this paper – door, horizons, staircase – which suggest an improvement in the form of a movement to a better place. This discourse is also generally underpinned by a notion of technology as a tool (either neutral or imbued with human value), which can be used to positive ends. Two quotations exemplify this view:

... if anything it [e-Learning] is a staircase I suppose, you know because it is a difficult uphill struggle but you get there in the end. [This is both] a positive and a negative metaphor. [It is] hard but rewarding work, a staircase with a great shining light at the end. (I.B.)

The University’s Virtual Campus, which was established some years ago, has proven to be a very effective mechanism for enhancing the learning experiences of both residential and distance students. (University of Pretoria Strategic Plan Inspiring the Innovation Generation 2002 – 2005)

In the above meanings of change, existing relationships and activities within the institution and within pedagogy remain fundamentally the same. There is neither a threat, nor a fundamental challenge to a sense of identity or an existing notion of what higher education or pedagogy comprises. However, prevalent institutional and pedagogical activities can be accomplished more speedily, or more efficiently, or to a greater extent, via technology. Rather than a fundamental shift in pedagogy or in the higher education space itself, there is rather some kind of added value. The meaning of ‘change as improvement’ is evident in ways that include increased access to content and better communication, and forms part of an efficiency paradigm.

### 5.1.1 Increased access to content

Networked computers are often advocated, because they increase access to information. Increased access to content was emphasized in the interviews:

... but technology will give you access to additional information and that is where the quality comes in. (I.D.)

... as we know our library is under-resourced and has been for a long time so you don’t typically accept if it is a strong research area you don’t have access to the latest information but if the subject is what technology enables is for you to not only have input but to give output to outside as well so the ecosystem becomes bigger. (I.H.)

... we want to become competitive, if we want to have access to this global library of knowledge we’ve got to have the right tools, and I feel one of those tools that everybody should be empowered with today, is that they can get access to this information...If I had to rely on journals and uh, dusty books in the library I wouldn’t have the breadth of knowledge that I have on a number of different subjects. (I.D.)

Having access to more content is prioritized here. Who uses that information, what skills are needed to enable successful access and use of the content, and even the quality and appropriateness of that content are discussed later in the section on access.

### 5.1.2 Extended communication

There is consensus in South Africa and beyond that ICTs extend the possibilities of communication.

OK, let's put it this way, a computer is a machine, it has no life to it, it has no personality to it, it's a creation of man, ok. All that a computer has done, it has made communication a lot more effective. (I.D.)

The possibilities of extended communication occur in two ways: by collapsing distance and by compressing time.

... distributed learning is basically where you broadcast your lessons to students and then they can use it at any time that is convenient for them. (I.D.)

The most common manifestation of extended relationships is the fact that technology facilitates relationships across distance. Not surprisingly, the way that technology opens up distances was mentioned as central. Not only does it effectively offer a bigger classroom, but it can also take students beyond the classroom:

To me the real difference between e-Learning [and] network learning is the fact that it opens up; it knocks down the walls. You are not restricted to the library, you are not restricted to your classroom; you are not restricted to interacting with your classmates in this physical building. We have 50 people [in a project] that are spread all around Africa and they are interacting with one another, they would not be able to do that in the same way without physically moving their bodies and they will have to physically move their bodies all to one location whereas what the E-part of it allows is it allows the ecosystem to be not just a classroom in the institution but a kind of virtual classroom around multiple institutions. (I.H.)

Well, it offers a huge amount, I mean it offers access into the real world and which you can use, which you can create, and the second order representations of that, I mean it can certainly be a very dynamic and very exciting and very interesting learning environment. (I.M.)

This 'anywhere anytime' language has become commonplace, but its realization is conditional upon other factors, which determine whether there is a real shift in practice. Therefore the opening up of distance was described as being experienced in both a positive and a negative light, with explicit links being made to costs and pedagogical approaches. Two respondents commented that extended delivery across distance might be meaningless in isolation:

So now you take those notes and put them on the Web, all you have done is you have stopped the writing out of the information and now you are using a very expensive media to deliver content, put that content onto a CD and give the CD to the student, why do you want to use a Web server, why do you want to be connected to a Web server to deliver it, because in South Africa that is expensive. Maybe it is not so expensive in Europe or America, but in Africa and India and all those places it is expensive to send it, so what benefit has technology given to you if all it does is give you information. (I.K.)

Yes, I mean it is just the exporting of a face-to-face classroom to an online environment with talking heads and so on.... I said to a few people that I was talking to that my mental picture

then became a student falling asleep in Internet cafés and at home and all the rest of it because that is exactly what is happening; it is the same boring old stuff that is being sent out over the Internet. (I.M.)

At the same time, there was a sense that opening up relationships across distance provides opportunities for new models that provide increased control and power:

...maybe you can't get to some people without technology, I am thinking here for instance of the Medical Schools and the way they are starting to train people, they are starting to use the whole [geographical] area as a means and students go into hospitals all over the place right from their own yard and the way they communicate is using technology so if you took that away, that model would fail, so there would be failures in that sense and I would not like to go back to a world without technology because it gives us power. (I.K.)

The way that technology shifts experiences of time was also mentioned in terms of immediacy and the ease of updating recent material:

I think the other thing that the lecturers really appreciate and why they would go for the Web environments – two other aspects is the immediacy, that means if they find something this morning, a good article that they want their students to have this afternoon, they can post it immediately and the other aspect is also the use of updating material on the Web, so if you use the multimedia, the CD, the stand alone and you go into production and that's it, it is very difficult to then go back and change... (I.H.)

Under what conditions these extended possibilities can enhance pedagogical communication and how online communication is being used, are the subject of a growing research area, as described later in this report, bearing in mind that the costs of this medium do not automatically lead to relevant educational use.

### 5.1.3 Efficiency paradigm - more of the same

Improvement approaches are often associated with an efficiency paradigm that does not seek to transform existing practices, but rather to make them more efficient. The fundamental nature of the system is not seen as problematic, only inefficient, and technology is seen as a useful tool in this regard. ICTs allow teaching to continue in ways that are already taking place, but make these ways more efficient. The efficiency paradigm can also be both positive and negative. For some, efficiency means lightening teaching and administrative burdens so that the real pedagogical issues can receive attention:

What's in it for the lecturers I think is to make their teaching and learning situation easier and more comfortable; a lecturer, she is one of my colleagues now that used WebCT, the one way she used it was to lessen [her] administrative load.... Instead of having 50 students in front of her office, she used the bulletin board quite extensively to post notices and to get replies and ... that freed her up much more to do the "stuff" that she was really interested in doing instead of just answering queries the whole time. So I think those types of things are good, if you can show lecturers that it makes their life easier, just their general day-to-day administrative life easier. If you can also show them that it adds value to the teaching and learning experience for the students; that is what I found was a number one motivator to actually show and I think show ...the way it works. (I.H.)

In this example, a lecturer's time is made more efficient by the use of technology; thus teaching and learning needs are enabled by the technology. ICTs can assist academics with increasingly demanding workloads by reducing the administrative load through, for example, placing frequently asked questions on a Web site thus freeing them to concentrate on in-depth instruction. ICTs can be used in carefully targeted ways to assist with aspects of teaching and learning, for example, by using automated feedback, drill and practice where appropriate.

Opposition to the efficiency paradigm commonly arises, however, if technology begins to determine and set the parameters of higher education change, rather than the other way round. Concerns are expressed that the introduction of ICTs into higher education is part of and supports increasing outsourcing, increasing centralization and lack of consultation.

The suggestion is that incremental changes in teaching and learning processes occur as more ICT components are added to existing courses and programmes. However, some argue that common practices are simply add-on approaches, which include using technology for the delivery of course content without adding value in the form of follow-up, interactive learning activities, or without addressing issues of curriculum transformation. This argument is in line with remarks that e-Learning is currently 'merely an enhancement of existing practices' (see, for example, Garrison & Anderson, 2004). Some regard this as a simplistic view of e-Learning. This perspective – more of the same – may suggest a linear notion of change supporting an 'add-on' view without any major changes. This perspective is not dominant in the interview data, and indeed references to this point of view usually appear in the form of a critique of constant improvement that does necessarily question the nature of that change.

I remember saying to people in the opening keynote address that there was a slide of a student falling asleep in the classroom and I said to a few people ... I was talking to that my mental picture then became a student falling asleep in an Internet café and at home and all the rest of it, because that is exactly what is happening. It is the same boring old stuff that is being sent out over the internet and so the process that I take staff through when they go online is very much aimed at changing pedagogy or at least [at] making people think, because a lot of people who come on the course have a huge amount of teaching experience and I am not saying to anybody, "Just throw that away or throw it out [of] the window"; that is the last thing I want to do. Your courses must reflect who you are and where you come from and all the rest of it, but just start thinking a little bit out of the box and try and see how you can ... (I.M.)

There is an increasingly common acknowledgement that ICTs, or any other technology, cannot improve teaching and learning or effect change independently of the context of its application. Thus, the degree to which Web-based teaching enhances learning depends on the context. For some, the context rather than the medium determines the effectiveness and the extent of added value. Dutton and Loader (2002: xxii), for example, argue that the value to higher education added by ICT is not 'predetermined by the features of the new media', but can enhance existing programmes and institutions by making them more efficient, and by increasing access to more students.

In summary, on the positive side, ICTs are seen as providing the tools to make higher education more efficient in various ways – by reducing administrative work and assisting with repetitive teaching activities. On the negative side, efficiency can become an end in itself at the expense of other educational values.

## 5.2 CHANGE AS INNOVATION

ICTs and innovation are often spoken of in one breath as twinned concepts, inextricably linked to the idea of a knowledge society, as can be seen in South African policies at the national and institutional levels:

The role of higher education in a knowledge-driven world – production, acquisition and application of new knowledge: national growth and competitiveness is dependent on continuous technological improvement and innovation (National Plan for Higher Education, 2001: 10)

The University of Pretoria is devoted to quality education aimed at the enhancement of student learning. The environment in which the University operates, including the educational environment, is experiencing rapid change in many aspects. These changes are driven by many factors, with developments in information and communication technology (ICT) and the associated emergence of the knowledge and information society being very prominent. (University of Pretoria Strategic Plan, Inspiring the Innovation Generation, 2002 – 2005: 6)

In contrast to the ‘improvement’ paradigm’s focus on adding-on new elements to make the existing system more efficient, innovation approaches emphasize ‘doing things differently’ and are more likely to pay attention to the teaching and learning contexts of technology. The various examples discussed below suggest the concept of ‘something new’.

### 5.2.1 Reflective practice: doing things differently

The meanings of ICT-enhanced change as innovation stress the original and the unique, that which was not previously possible. They focus on what is afforded by the different forms of new media, arising from and part of ICTs. They also refer to doing something original, using artefacts for purposes for which they were not originally designed. As more than one respondent suggested, change is about innovation. It is not more of the same thing in a different way, “like putting existing stuff behind glass” (I.O.), but is about doing something new.

I think it is opening new doors in terms of learning, in terms of teaching, in terms of opportunities, challenges, everything. ... I think really it is new horizons. (I.O.)

Trying something new moves people beyond add-on approaches by facilitating ongoing change:

... I think in this case we have an opportunity, at least I see it as an opportunity to go back to the people and say, “Listen, let’s just rethink this whole thing; there is a medium that we can use that can open up a whole different approach and support is relatively easy, so you can get away from this chalk and talk, which nine times out ten is totally mindless and let’s try and see if we can use it in another way and see what happens”. The interesting thing about it is that [for] those who have done it, their experiences have been so positive and they have become so excited by it that it just keeps driving them on and on to change more and more and to keep rethinking the whole thing; that has been the interesting part. (I.M.)

Another view emphasizes the role of technology as ‘forcing’ a kind of reflective practice, leading to positive educational outcomes. For example, the requirement in some institutions (locally and else-

where) for a significant per cent of courses to have an online ‘presence’ means that all course outlines are now open to public scrutiny (including that of other lecturers and students). It has also led to changes in practice, as one respondent observed. However, it can also be experienced negatively as an imposition with ‘online presence’ requirements at some higher education institutions being met by strong faculty resistance to this kind of mandatory use of ICTs, which are perceived as diminishing faculty autonomy and independence.<sup>11</sup>

ICTs are understood to offer something new to teaching and learning in higher education. Pedagogical practices are understood to comprise three key agents: teacher, student and content (Lusted, 1986; Bernstein, 2001). Practices are about interrelationships among those three agents. Pedagogical practices also consist of a repertoire of teaching and learning activities. Reported practices (from both respondents and the literature) focus on new activities and new relationships, as discussed below.

### 5.2.2 New kinds of teaching and learning activities

This study cannot begin to capture the large and growing international literature, samples, databases, Web sites and so on, which demonstrate all the kinds, possibilities and experiences of new teaching and learning activities that exist because of ICTs. The examples in the data collected are discussed briefly. In this study, there was mention of activities to do with content presentation, practical activities, simulations and real life activities, as well as activities which benefited from anonymous learning environments.

New kinds of ICT enhanced activities described novel ways of presenting content, such as online animations, which in one example helped explain a complex concept which the student only understood when presented with it in an animated format. Another respondent similarly commented that presentations can be made less static:

... I have always battled to understand Vygotsky’s zone of proximal development and to really get a grip of it, and I saw it once in an e-Book available online and in it they’ve got a Flash animation illustrating it just like a sliding scale with a little window that moves and things that pop up and it really brought the message home; so, sure, people definitely learn from media in other ways than [those] you can learn from text. (I. J.)

... obviously there is the dynamic thing of certain constraints of certain knowledge and very dynamic things that you find very hard to explain with words. We have diagrams, the flows and processes and ... animation is a very important thing again to make things unpack in different orders and obviously if your design evolves you can manipulate those things, and unpack it in different orders and then depending on your simulation I think it is a very, very important part. (I.L.)

Technology provides the second set of activities – practical application – with opportunities for safe, self-paced and varied activities not possible in a non-digital context. Ironically, in a medium criticised for policing (Noble, 2002), the opportunity for anonymity as a safe learning experience was noted in a few cases, for instance:

<sup>11</sup> For example, the recent two-month long faculty strike at the University of York in Canada and the similar faculty and student resistance at UCLA provide two comparative cases of resistance to requirements imposed by university administrators to put aspects of courses online. For a further discussion of this see Noble (2002).

We have an example of a lecturer that is teaching a very sensitive topic on HIV Aids and he made one of the bulletin board areas anonymous and for the first time he had comments from the students that he has never had [before], just because they felt safe in that type of environment, something that they did not feel safe with ... in class. (I.I.)

Similarly, a class of students who were able to practise academic questioning skills in an anonymous Web-based environment, were able to take risks, reveal ignorance and assist one another without having to reveal who they were (as described by Hardman & Ng'ambi, 2004). These examples provide a glimpse of the prevailing practices in South Africa, as do other studies, such as online debating at Rhodes (Hodgkinson & Mostert, 2004); and a computer supported reasoning skills development initiative at the UKZN (2004), among others. The opportunity provided by networked computers for students to lead productive activities, usually in 'real-life' was also noted:

...you know I think that the technology, the research is certainly showing that the best use of technology is in those sort[s] of environments in sort of creating these micro-worlds, in creating these authentic learning environments, etc. (I.M.)

These examples provide a glimpse of prevailing practices in South Africa. It is clear, however, that there is a need for detailed investigations of these kinds of ICT-enabled activities in South African education with regard to their extent, nature, quality and effectiveness.

### 5.2.3 Increasing interactivity: online communication and collaboration

Interactivity is believed by many to lie at the heart of the educational experience. It is therefore perhaps not surprising that several respondents mention the possibilities of ICT-enabled interactivity:

A lot of these students I don't see for four months; the whole course is online but we interact with a small core, 10 students and of course the interaction I achieve with those students [is] far higher than anything I am used to, so the interaction thing is important and the interaction is normally a good thing. There is a lot of trivial interaction; there is lots of off task interaction, but there is also on task interaction and those are the beautiful things....(I.L.)

In fact interactivity forms a part of a whole range of different activities online:

Why I teach online is because we have so many tools available to us to help the learning process. The learning that I create has very little to do with me creating content; they get content from the Internet, they [synthesize] it; we look at it from different perspectives; everybody is involved in peer reviewing, co-writing and co-development. There is no closed book examination and we use threaded discussions for problem solving, we use chat instead of tutorials, and what it does is it makes a permanent record, gives you a record that you never had before, so it makes the interactions more real, I think, and I enjoy them more because I get to know the students better... (I.K.)

Indeed, it is argued that ICTs make it possible for universities to get back to the interaction that should be central to its work. ICTs are seen to offer tremendous possibilities in improving communication and a sense of presence in large undergraduate classes:

When you are sitting with big classes it is very difficult not to fall into a trap, because quite frankly the easiest way of teaching 400 people is to sit them down in a room and "blab" at them and then

give them some garbage at the end of the term, an exam. or a test and then put a tick or a cross next to it. I mean, it is actually quite easy but it has pretty little educational value in my opinion particularly at an academic institution, but I think technology allows us to create this sort of environment that universities grew out of in the past and so we have to go back to the future; we can go back to that sort of environment and then go into the future with those. (I.M.)

You are probably aware of Moore's theory of transactional distance.... He says we are tricked into label[ing] distance education as "rubbish" and as one directional, unidirectional and not interactive at all, but he says just compare it with [a large lecture theatre], and our university says something when it builds a lecture hall that can seat 800 people; you are saying something to your students when you do that and we have classes that are so large that they go from the A's to the G's and from the G's to the M's and the M's to the rest so they have to redo the lecture three times, because the 800 lecture hall can't accommodate those students – so you are talking about distance in that situation. (I.L.)

Not only does the technology enable lecturer-student communication, but the way that it enables peer communication in large classes is also specifically highlighted:

It adds value in the type of communication that I have with these students. [In] some of the big classes (1 800 students), they say it is contact education, but it is not. I mean those students are incredibly anonymous when they sit in a class of 1 200 students. Suddenly some of those lecturers realized, "Wow, these students actually have voices, they will act on the bulletin board, they have things to say..., they want to say things, they want to share". So I think that is one way both between the students and the lecturer, but I think also what they realized was these students actually share with each other as well. (I.I.)

The observation is also made that technology makes it possible for different kinds of students to communicate:

I have examples of somebody who was dead quiet in class and became a really verbose list contributor and somebody who was very verbal in class and does not exist on the list.... You get those that are quiet in the class and quiet on the list.... Exactly, there is a whole spectrum and then you get those who are noisy in class and noisy on the list. I think there are people who just do it when the urge takes them so it is hard to [generalize] – but those are the dynamics that one can look at. (I.J.)

You know, there's more active participation of students. Perhaps it might break the barriers of the communication aspect. If a person finds it difficult, especially in an institution like [ours], there may be inabilities that certain students may have in terms of communicating. So they may not be very good at communicating in a classroom environment, but if you put them behind a computer and you say you've got a newsgroup or a user group that communicates, then they could be very good at the keyboard and ... communicating that aspect. So in that way you're going to get those students becoming developed much more, faster as well. And as they adapt to the use of the technology and what they can acquire from it, you'll find that, you know, students may feel very comfortable that way. (I.A.)

While this has been a research area internationally for some time, it has also become a growing niche area locally. Examples include one local study exploring how computer conferencing is opening up

new possibilities for making learning interactions more dynamic, cognitively stimulating and challenging (Kizito, 2002).<sup>12</sup> Other local studies explore modes and methods of participation with a view to identifying the nature and extent of participation (Carr et al., 2004); and evaluate the educational effectiveness, course design, group dynamics, and facilitation style in the collaboration in blended learning courses (Cox et al., 2004). Clearly online communication and collaboration is an important new practice, one that is also acknowledged at the South African policy level.

ICT has created one specific new form of contact...Online communication allows learners and educators to remain separated by time and space (although some forms of communication assume people congregating at a common time) but to sustain an ongoing dialogue. In online discussion forums for example, spatial separation between educator and learner is removed by the “virtual” space of the Internet but temporal separation remains.... This suggests that there may be cause to suggest a new descriptor of educational methods of educator-learner contact that are not face-to-face but are mediated through new communications technologies. (CHE, 2004: 76)

#### 5.2.4 Changing roles of staff and students

New roles for staff and students alike may arise from ICTs. On the one hand, it is noted that staff, such as tutors, can play an enabling or monitoring role. At the same time, it is emphasized that ICTs do not mean that there is no longer a role for staff.

I also invited the coordinator to begin to work to [the idea] that we design our own program that would help learners learn at their own pace and that would involve perhaps, if you take something like topic analysis in essay writing or in text writing and we would do topic analysis like breaking up the question and asking questions etc. And I said let's put that on a computer and let the learner be able to log in into a theme-like topic analysis and she's got a number of examples that she can have and she can have a number of topics that she can analyse and respond to on her own and work independently. And then the role of the consultant will be to monitor.... (I.N.)

Research also shows exporting classrooms to the Web is counter-productive and it is not long before you get student resistance and student backlash and all the rest of it, because as soon as you take the lecturer out of the whole equation, which is what people are doing by putting their classroom online, there is very little contact with the student and [students] need nothing else there, needing no sense of community there, then you are just pulling the rug out from underneath them, your group of students, and leaving them to flounder; that does not work. (I.M.)

Student roles are also changing, as “this [e-Learning strategy] puts much more learning in the hands of the student” (I.D.) ... and, with experience, students are able to take control.

I did that with my very first Web-based classroom in '90 whatever when I suddenly discovered that the students knew much more than I did and all I had to do was get them to talk to each other and prompt that conversation but I needed to prompt that conversation. I sent as many messages as all the students together, but as mailing list etiquette and mailing list knowledge of students is growing, so they are beginning to take over and run the list independently, and we are finding that at Master's level, [with] bright students, the list starts getting a life of its own and runs. (I.J.)

<sup>12</sup> The study concludes that potential sources of barriers to effective adoption include macro contextual issues, institutional issues and pedagogical issues. Once again context is acknowledged as crucial.

To summarize, new practices are emerging and unanticipated effects are being identified, as the innovative possibilities are explored by the enthusiastic (and sometimes, by mistake by, the unenthusiastic!). The meaning of technology as innovation in higher education change tends optimistically to focus on exciting possibilities and has been critiqued for underplaying existing power relations. This lack of attention to issues of power, knowledge, institutional cultures, and the dynamics of historical redress is also part of a general critique of the information society argument. For example, it can be argued that participation in innovation processes depends both on access to state-of-the-art communication resources, and on the power relations that structure communication patterns and access to resources (for example, the gross inequities in access to resources across and within nation states, or across and within institutions in any one region). So participation has both a distributive and a relational dimension, and will be limited to those in society having access to these resources (Ravjee, 2002). Some of the specifics of these criticisms are discussed in the issues section on access later in this paper.

### 5.3 ICT CHANGE AS TRANSFORMATION

In this study, ‘clusters of meanings’ of change as transformation occurring in two dimensions have been observed. The first emphasizes ICT in relation to institutional transformation, while the second is about the relation of ICTs to the transformation of pedagogies.

#### 5.3.1 ICT-Enhanced Institutional Transformation

This meaning emphasizes integrating ICTs into the very fabric of the institution. Thus, as ICT-related learning structures continue to expand – with differential levels of funding across different institutions – they raise new issues that intersect with existing issues facing higher education institutions. ICTs are therefore more likely to form one thread in a complex net of transformation, including historical redress, curriculum transformation, diversity, equity and so on.

Interestingly, terms like ‘pervasive’ and ‘total’ are observed, forming part of the argument that the introduction of ICTs is extensive and systemic. This understanding is alluded to in a comment made on the inter-connectedness of the various elements of the work of the university, how changes in one element inevitably cause changes elsewhere:

You see we realized already then that infrastructure, all of these old elements are like a spider’s web, you pull on one little aspect and all the others start moving, so there was no way we could have done just e-Learning ... that is what we found. It was just amazing what jumped out of the cupboard when you start moving the one little piece and still does and it is just amazing... So teaching and learning impacts on research impacts on admin impacts on.... Incredible. (I.H.)

This view is evident in some policies and structures. For example, the National Plan sees ICTs as playing a central role in the post-apartheid reconstruction of South Africa. This is evident in a number of key initiatives listed in the National Plan, such as prioritizing the telecommunications sector and the creation of new structures, such as the Presidential National Commission on Information Society and Development and the Presidential International Task Force on Information Society and Development. As a second example, the Foresight Report explicitly associates technology with transformation:

An investigation of institutions, which are now world leaders in technology-enhanced learning, showed that the introduction of technology went together with transformation:

- Planning began to focus on the needs of the learner rather than the institution.
  - A mix of technologies was used, depending on the unique needs of the learner.
  - A total transformation of institutions was needed so pervasive is the effect of ICTs.
  - Content needs interdisciplinary teams (educationalists, specialists, Internet experts.
- (Foresight ICT Report, 29)

This understanding of ICT-led transformation can also be associated with a developmental approach, evident in some institutions in the strategic location of new structures which support the overall aims of the institution. In three cases (UCT, UFS and DIT), the e-Learning structures are part of a Centre for Higher Education Development characterized by an attempt to understand the systemic implications of change and ICTs. This choice of structures also suggests an integrative approach to institutional transformation.

MEG aims to research and harness the potential of interactive computer based technologies and approaches (ICBTA) to support effective learning and teaching. Our work focuses on meeting the needs of South African students from diverse backgrounds, particularly those at the University of Cape Town. ([www.meg.uct.ac.za](http://www.meg.uct.ac.za))

and

We are part of the Centre for Higher Education Development and at the moment the Centre for Higher Education Development has got overlapping projects of which ICT is one, Technology in Education is one, so we would foreground the technology, but we would also participate in and feed into the other projects, for example, Curriculum Development, Recognition of Prior Learning and Foundation Programmes and so forth. (I.C.)

Evident in the meanings of understanding ‘change as transformation’ is an attention to the power relations within higher education institutions. Research and reflections published by South African academics consider the tensions implicit within such transformation. For example, one study critically investigates the implementation of online learning technologies at higher education institutions, with the accent on the needs of society and the role of business. The conclusion is that the process may be directed towards the needs of business, while the overarching needs of society are neglected (Heydenrych, 2000). Another explores the dilemmas of distributive justice with regard to whether South African universities should introduce or develop online learning for flexible mode delivery under circumstances in which some students do not have access to Information Communication Technologies (Broekman *et al.*, 2002). And yet another provides some sober reminders of the difficulties dictated by context, in the form of enabling or constraining conditions:

... we worry that idealistic uptake of the idea of a networked society obscures the very real challenges involved in accomplishing inclusive education and a sustainable civil society in most African countries. It also obscures the dilemmas of justice that must be addressed by nation states with severely limited resources and populations living below the poverty datum line. ICT can only contribute to education and democratization in Africa if social capacity is developed to a sufficient level on the continent.

The context of reception needs to become a context of production that is responsive to local requirements and accountable to citizens. This in turn calls for lecturers, teachers and citizens who have the skills, understanding and confidence to engage with national policy and strategy deliberation and implementation. In the absence of these conditions, the educational and democratic goods of ICT are a chimera (Lelliot *et al.*, 2000).

This stance is useful in understanding both how contested meanings of ICT actually shape everyday, normal practices – for example, the choice of what type of technology to use, and what kind of practices emerge to support that choice – and also what power relations are in place to either support or challenge these choices and related practices.

For some, ICT-led transformation is useful ‘at the level of techniques’, but is unable, if isolated from other transformation initiatives, to speak to the ‘essence of transformation’:

Can ICTs contribute to transforming higher education? Not necessarily. Not transformation in the SA context. It may be transformation in so far as it may challenge people to think of different methodologies, so at the level of techniques, but at the essence of transformation? In fact, it can actually suffer from the digital gap that people are talking about in terms of the poor being disadvantaged because the technology is becoming more and more expensive to access. You have a computer now, the next time you are told that it’s outdated, it’s obsolete. (I.N.)

And for others, there is simply no choice. The generally accepted view of technology is the idea that ICTs are necessary if institutions are to survive:

... quite frankly, I don’t think if this place has to say we will no longer use ICT technology so then this place might as well shut down. (I.P.)

### 5.3.2 ICT change and the transformation of pedagogy

As explained earlier, there has been a shift in the use of ICT in higher education institutions, from the initial emphasis since the late 1980s/early 1990s on the administrative environment, to an expansion into the academic environment, accompanied by e-Learning policies, structures, and new academic related practices. While further empirical studies into the history of these new structures and their emergence out of existing IT or non-existent IT, or teaching and learning structures, would clarify the understanding of these changes, there is a strong view, derived from the findings in this study, that these shifts towards supporting teaching and learning require a change in focus, and a change in mindset regarding the new functions of ICTs.

Among key writers in the international literature, there is a determinist strain, which confidently asserts causal relations between ICT innovations and changes in teaching and learning and in peoples’ behaviour. It is stated, for example, by the authors of a recent influential book on e-Learning, that that ‘e-Learning will inevitably transform all forms of teaching and learning in the twenty-first century’ (Garrison & Anderson, 2003:2), while a well known researcher, the Chief Scientist at Xerox and Director of its Research Centre, asserts that the new information and communication technologies are changing peoples’ behaviour, and ‘In quite the same way, the World Wide Web will be a transformative medium, as important as electricity’ (Seely Brown, 2002:2).

Little evidence of this deterministic view was found in the data assembled. To a large extent, respondents and local researchers perceive ICTs not as the inevitable cause of change, but rather as an opportunity for rethinking practice. The argument is that it is not technology *per se* which causes change in pedagogical practice. Rather, it is the act of using a new kind of technology (usually networked computers), which provides an opportunity for academics to reflect on their practice. For a sizable group, ICTs play the role of a catalyst for pedagogical transformation. This group views technology as neutral, with change occurring in the pedagogy, because of a disruption, rather than because of the nature of the technology itself. This view is strongly located in the social shaping approach, one that locates all impetus for change in the social dimension rather than ascribing any causative effects to technology itself.

Technology thus provides an opportunity to rethink current ways of learning and teaching:

... and so the process that I take staff through when they go online is very much aimed at changing pedagogy or at least making people think, because a lot of people who come on the course have a huge amount of teaching experience and I am [saying] just start thinking a little bit out of the box and try and see how you can do things differently....(I.M.)

Using the same pedagogical practices in a different medium can show those practices up in a new light, or it may be the examination of and focus on the new medium that provokes the attention to existing practices:

... a lot of the lecturers basically just do exactly what they do in class on the internet so if they were to go to class and just deliver the notes and speak to the notes, not even speak to the notes, read the notes, they would do exactly the same on the Web environment and what is one of the big concerns on campus for some of the lecturers is that the students are not coming to class anymore because why go to class if you can get the stuff on the web and what you get in class is just exactly the same. So I think in that sense I do see there is a lever of change, very effective educational change because for the first time [we have a]...roundabout way of trying to get into conversation, a conversation that we probably would never have had with that lecturer because he or she would have happily gone along up to 65 doing the stuff that they had been doing for the past 30 years, or 10 years or two years, because some of the young lecturers also just do what they have seen being done to them so I... so I think that really has started a discussion on campus about what do we do in our classes and that is something different, that is not technology, that is something else. (I.I.)

... at least I see it as an opportunity to go back to the people and say, "Listen, let's just rethink this whole thing, there is a medium that we can use that can open up a whole different approach ... so you can get away from this chalk and talk, which nine times out ten is totally mindless and let's try and see if we can use it in another way and see what happens", and the interesting thing about it is that those who have done it, their experiences has been so positive and they have become so excited by it that it just keeps driving them on and on to change more and more and to keep rethinking the whole thing, that has been the interesting part....

I love playing with technology but it really is to my mind a change agent and a supporting agent and helps you to do things that might be a little bit more difficult in other circumstances and that is why I promote it with great emphasis on the change environment because I want people to think about their teaching, I want them to think about what they are doing. (I.M.)

The difficulties of this approach, often due to inherited conservative approaches, are also acknowledged:

... but that is not always very easy and you talk about different learning styles as well so you always have to think about incorporating that in your design so we are trying on campus now to make it more of an interactive process and what I have found is that first year students are battling with taking responsibility for their own learning. They come from a system that is still spoon-feeding, I think and hopefully it will change in the near future and they want to really just sit and get the notes and that's it and you know, "Let me write my test" but now they have to work really actively and that is quite a mind shift and paradigm shift and the lecturer as well because it is a new way of teaching and some of them are really used to just providing traditional lectures face-to-face and they don't do it in this new way, so they also have to change and think new about this as well. (I.O.)

There was also a rarely expressed view that the use of ICTs changes the way not only activities, but also indeed the way that thinking itself happens.

I think it changes the way some people think. (I.L.)

A lot of people wear glasses permanently and it is a prosthesis to help them see and they don't think about it anymore; when they wake up in the morning, the glasses are on the face, they don't think about that act consciously, they just do it, they just use this prosthesis to get on with what they have to do, which in this case it is to see and it becomes invisible to them, their own glasses become invisible until they lose [them], till they can't find their glasses and it becomes a huge issue for them. The same with technology, I don't think about my computer anymore, I don't think of it as my computer, I am going to do my computer, I am thinking I came into the office today to write my new study material and all of these tools, the Word tools, keyboard, all of these things are becoming invisible for me unless I can't do something and then it becomes an obstacle, it becomes visible, I need to learn how to use a feature and I learn it and I move on, so it always fades back into invisibility but it is a prosthesis, it is just something that I am using for my mind, for constructing my thoughts, for instruction. (I.L.)

This perspective is in line with learning theories that argue that activity and cognition are interrelated, thus the social and mental cognition cannot be separated, and tools (such as ICTs) form a mediational link between the two. The growth of such theories is important and is being explored by local researchers (such as Frith *et al.*, 2004, Hardman, 2005) following activity theorists (such as Wertsch and Engestrom) to understand cognition, tools and context.

This attention to pedagogical change in context can be observed in all the studies which support the idea that ICTs will enhance teaching and learning if certain other things are in place, particularly if there is a paradigm change (King, 1993; Rogers, 2000) from traditional ways of teaching, and if they are linked to the overall instructional design (Cronje, 1997; Baldwin, 1998; Czerniewicz, 2001) as a central part of the course, not an 'add-on' (Green & Gilbert, 1995; Coetzee & du Bruyn, 2003). There are also local publications which explore how 'modern offerings of programs can be enhanced [by technology] considerably if planned and implemented properly as long as critical conditions to integrate technologies into teaching and learning are adhered to ensure optimal application in HE' (Broere, *et al.*, 2002). It is illuminating too to review the statements in the National Plan that follow –

Some institutions see information technology-related approaches as the central solution to the problems experienced by disadvantaged students. While the innovative use of technology is to be welcomed, there is a strong risk that approaches which focus only on improving delivery through information and communication technology, and which leave traditional curricular structures unchanged, will not provide a comprehensive solution. (National Plan, 2001: 2.3.2)

The various interpretations of pedagogically led ICT transformation described in this section indicate that the plea made in the National Plan in 2001 for ICT innovation to be closely aligned with curriculum transformation has been heard, at least by some.

## SECTION 6: KEY ISSUES

The data here has captured some of the ways in which several issues and understandings play out differently in the local institutional contexts, depending on the peculiarities of the institutional environments. In particular, different notions of change embraced by key national and institutional players in the field will determine the kind of issues prioritized in the different institutional contexts. It became evident during the course of this study that how ICTs are understood and taken up (or not) is context specific, particularly in the absence of provincial and national policy frameworks and resource allocations. The emphasis on context was most evident in the second and third clusters of meanings in the data gathered. Thus, ‘context’ is a significant theme, because the potential for technology to enhance teaching and learning happens at certain times and under certain conditions, which are institution specific. This means that technology led changes need not necessarily lead to improving or changing teaching and learning paradigms in any substantive way. The extent to which it does is crucially dependent on its broad social and educational contexts. In this view, ICT-enhanced learning can contradictorily be superficial or deep, depending on the context. ICTs in themselves do not change anything, but may have the potential to do so, depending on the context. These observations about context permeate the issues illustrated below.

It is impossible to do justice to this complex and rapidly changing arena. However, it is important to mention some key issues, which emerged as pertinent from the review of the literature and policy texts, and from the interviews conducted. This last section therefore describes four clusters of issues:

- ICT growth implications – new costs, unequal resources and competing priorities;
- software issues – key debates surrounding software choices and imperatives;
- institutional mergers – issues arising specifically from the reshaping of institutions; and
- access issues – inclusion and exclusion to access and use of ICTs in terms of technological, personal, contextual and content resources.

### 6.1 NEW COSTS, UNEQUAL RESOURCES AND COMPETING PRIORITIES

The growth of ICTs in higher education institutions requires the consideration of new costs, unequal resources and competing priorities. The fact that South African institutions are spending more on ICTs as a percentage of their total expenditure than they did five years ago (Greaves, 2005) raises several issues for the higher education sector. Between 2000 and 2003 there was a 62,9% increase<sup>13</sup> in expenditure on new computer equipment from R134 361 000 in 2000 to R218 980 000 in 2003 (figures from STATS SA). The new cost areas include new infrastructure (networked computers, Internet access, computer laboratories), maintenance and upgrading of existing infrastructure, software staff capacity, training, and other general administrative costs. Three areas, in particular, demand annually escalating costs and involve huge budgets: bandwidth, computer security and information systems (Greaves, 2005).

#### 6.1.1 Bandwidth

Actual bandwidth increased from 8Mbps of international traffic in 2000 to the 104Mbps in 2004/05. Greaves (2005) suggests that while the cost of bandwidth has fallen during this period, the absolute

<sup>13</sup> This is not only a local issue. For example a recent survey (Foster, 2004) of information security issues facing US universities found that over 50% of colleges and universities in the United States spent a greater proportion of their IT budgets on information security in 2004 than in 2003. The University of Pennsylvania, for instance, spent \$287 000 to deal with computers infected in August 2003 with the Blaster worm. The costs were related to staff time to rebuild or to patch infected computers.

expenditure has increased, with much of the bandwidth going to new PC installations for students. These changes have resulted in further costs related to firewalls, proxy servers, networks software, mail servers, mail server administrators, network managers, switches and routers, user support staff, and so on.

### 6.1.2 Computer Security

The institutional costs for computer security to deal with computer worms and viruses are increasing. Related issues include requiring new staff for information security, whether the computer security systems of institutions should be centralized or decentralized, educating staff and students on protecting their computers, purchasing security products (hardware and antivirus software), a security strategy (including putting security measures in place, hiring security officers, automating some aspects of security systems, such as ways to identify whether campus machines are installed with security software and quarantine infected machines), and so on. A necessary follow-up study would need to investigate the kinds of security measures in place – the current range in use includes antivirus software, the use of firewalls, spam filtering tools, spy ware-control software, virtual private networks, smart cards, and biometrics.

### 6.1.3 New Systems

Institutions are spending large amounts of money on new software for administrative information systems, such as Oracle and Peoplesoft, and these costs, according to Greaves (2005), may not be a part of the institutional IT budgets. Similarly, many institutions spend large amounts on E-Learning software, such as WEBCT and Blackboard, while others are developing open source alternatives. The related debates about the advantages and disadvantages of using open source or proprietary software options include issues of costs, building institutional and national capacities in software development, and the use of public funds to develop software programmes for use in public institutions as a way to break the increasing reliance on proprietary software.<sup>14</sup>

In addition, the amount that institutions devote to ICT-related expenditure differs by institution and clearly leads to unequal student access to ICT resources, both across institutions (nationally, regionally, and by historical privilege) and within institutions (by faculty, department, student residences, and the status of students by class and level of study). As one respondent observed,

... now the DVC has been trying ever since to solve the huge problem areas that we have now, such as we have no money for, student bursaries, the staff are completely demoralized, it is a nightmare, so the last thing DVC is interested in is e-Learning. (I.B.) The possibility of regional collaboration around the sharing of ICT resources deserves further study.<sup>15</sup> As mentioned earlier, some institutions devote a significant proportion of institutional funds to the development of IT and e-Learning structures, initiatives, and capacity, while others rely almost entirely on donor funds.

<sup>14</sup> Kiernan (2004) cites recent warnings about the security flaws in Microsoft's Internet Explorer, which has over 90% of the worldwide browser market, and is closely aligned with the Windows operating system. Some university Web sites provide links to download alternative browsers, including Firefox, Netscape, Communicator and Opera. Firefox is an open source program (i.e. not commercial, but developed by volunteer programmers) and its programming is open to inspection. Software issues are discussed as a separate issue later in this section.

<sup>15</sup> TENET is a good example of institutional collaboration around ICTs. An area for further investigation (with a linked implementation plan) could involve the higher and FET sectors around ICT resources, multilingual curriculum materials, teacher education and institutional conditions that facilitate access to higher education.

Finally, the unequal resources across institutions suggest that prioritizing institutional ICT allocations in relation to other pertinent areas of higher education transformation is a crucial issue related to: the location of ICT structures in the institutional hierarchies (and hence their decision-making power); the degree to which the institutional elites see ICTs as important; and the relation of ICT initiatives to other change initiatives.

## 6.2 SOFTWARE ISSUES

Software issues in teaching and learning in higher education are not only about technical matters. The debate rages over the use of proprietary software and free and open source software (known as FOSS). Entangled in these debates, are political and pedagogical issues, as well as resource issues, many of which relate to broader debates in society about the choices, priorities and decisions for higher education institutional transformation as a whole.

There are three broad classes of software used in relation to teaching and learning: generic software (including desktop operating systems, productivity applications such as word processors and spreadsheets, and information and communication tools such as email clients and web browsers), specialist software (such as simulation or modelling software designed for a specific need, purpose or discipline), and online learning environments, which make available a range of content, communication and administration tools designed to support and extend teaching and learning practices.

Generic software applications can often be customized and used for more specific educational purposes. Examples of this approach include departments and faculties in some institutions, which have used Excel extensively as a learning environment. While this class of software is sometimes referred to as COTS (commercial off-the-shelf) software, open source equivalents exist for most applications (such as OpenOffice, broadly equivalent to Microsoft Office). It makes little difference in pedagogical terms whether this type of application use is built on proprietary or open source foundations, although there are arguments made about the value of exposing students to open source as well as or instead of proprietary products, because of perceived social and macro-economic benefits of open source.

Pedagogical debates are far more central in the choice of products for online learning environments, (OLEs) variously known as Learning Management Systems (LMS), Instructional Management Systems (IMS), Content Management System (CMS), Managed Learning Environments (MLE), Collaboration and Learning Environments (CLE) and Virtual Learning Environments (VLE).

There is at present an increase in South African higher education institutions in the use of such software. There are three choices regarding OLEs: a licence for proprietary OLE software, open source software, and 'home-grown' software. The latter two are not mutually exclusive, as in some cases 'home-grown' software products have been developed or subsequently released as open source products, and taken on a broader life.

There are examples at different levels within the institutions of all of these decisions. Many South African institutions using proprietary software use an application called WebCT (with Blackboard and TopClass being used on occasion). There are also numerous institutions using or moving to FOSS. To a lesser extent, there are examples of locally produced OLE software (see van der Merwe and Moller, 2004, for a discussion of what happens when two such systems are confronted by a merger situation).

In many institutions there is a range of OLEs being utilized, with ownership resting at Department or Faculty level rather than at the institutional level. However, in South Africa, as elsewhere, the tendency is to reduce the number of available OLE choices and the debate rages particularly over the first two options: using proprietary software or open source software. Institutions which have developed home-grown solutions have realized that this is a relatively expensive option, and are either looking at alternatives (whether proprietary or open source), or are positioning their products as open source projects which can gain wider use and attract external resources, thereby reducing overall development costs for the institution.

At first glance, the decision between proprietary and open source solutions appears to be about cost. WebCT requires a licence denominated in foreign currency, whereas open source software requires no licence costs. However, licence costs are typically not the most important factor:

The cost is an interesting by-product of the other benefits. The real benefits are being able to get something that does what you want it to do and having control of the tools that you are using and then as a side benefit you also typically end up saving money if you do your planning right. Of course you can spend money on free software and you can spend more money on free software than you do on proprietary software if you don't get it right, so it is the getting right that brings cost benefits, I mean the financial benefits. (I.H.)

Other factors are also important including ease of installation, use and support, capacity building, local/foreign support and development, etc. The open source debate rages beyond education (as elements of government have expressed support for FOSS through for example the National Advisory Council on Innovation, while the Department of Education is simultaneously accepting free Microsoft software for all South African schools).

In educational and pedagogical terms, software issues are usefully located within the debate about standardization and flexibility. Here, Agre's (2002) article on infrastructure and educational change is helpful. A key premise is that ICTs considerably amplify incentives to standardization. The key tension lies in separating those elements that need to be standard from those which need to be diverse. A university is a particularly diverse environment, a 'diverse assemblage' of social and situated practices. These need to have space to be diverse and locally located (in disciplines, levels of study, educational objectives and so on), but also to be interconnected, to be able talk to one another and to be re-usable. Standardisation can either be a force for uniformity or for diversity depending on how it is designed. The ongoing debate (which flares up at conferences regularly) about software, such as WebCT is to what extent it is able to serve flexibility and diversity and to what extent its design encourages and supports specific pedagogical practices (while potentially discouraging or constraining others). Tricky decisions have to be made regarding meeting competing requirements, while balancing affordability, features, flexibility and risk.

Risks associated with proprietary software include vendor lock-in (that it will be difficult to switch to competing products in subsequent years), uncontrollable escalations in licence fees, costs escalating through exchange-rate variations, or vendors going out of business. Risks associated with open source software can include lack of formal paid-for support, and open source projects not gaining sufficient momentum to ensure a long-term future.

A common response to these concerns in open source projects is for institutions to join open source consortia. It is for this reason that some South African institutions have joined global initiatives, such as the Sakai Project, which is designed to build a standardized framework within which local solutions can be created. Moodle is another open source solution being adopted by local institutions, and at least one higher education institution is developing a consortium around its own open source product.

Software choice is a hotly contested issue and, as Agre notes, the future is not yet foretold. As he says, ‘the forces that encourage higher education to standardize its technologies interact with other forces that may push in other directions. Information technology is uniquely malleable and is easily shaped by the ideas and interest of whatever coalition has the wherewithal to guide the development and implementation of new systems’.

It is not possible to do justice to the complexity of these issues here. What can be done, is to flag the importance of this debate and stress that decisions have ramifications beyond the practical question of a software choice.

### 6.3 ISSUES ARISING FROM INSTITUTIONAL MERGERS

The institutional mergers have a number of implications at the infrastructure level, including the integration of operating systems and additional operational costs. These issues are mentioned in the interviews and discussed with particular reference to ICTs in a paper by Paterson (2004). In one case, the merger is seen as the priority. Other matters, such as ICTs, simply have to take a back seat:

At the moment the focus is on making this merger integration work, now the focus is certainly not on e-Learning as a high priority for a new [...] University, I heard that [our merger partner] has experimented with WebCT as a means for trying to encourage e-Learning. It hasn't taken off in a big way, whether that will survive in new merged institution I do not know, I think over the next two years technology is currently used by institutions will probably prevail for the next two years. What focus and emphasis is going to prevail in e-Learning that I cannot tell you. It will probably be dictated by a new academic strategy....

The merger will certainly put everything on hold, what has been realized is that e-Learning will require a huge upfront investment both in terms of resource and support infrastructure and time before you can actually get in there. The risk that you are running is that you have to do things to the last degree in parallel until you are adequately resourced. (I.P)

Unlike the view that nothing will happen until the newly created institution develops a joint strategy, there is a more common view that the ‘stronger’ partner, the one already using ICTs, is likely to be the dominant one in this domain.

Well I think we were taken over very well by [...] University, because that's what it is and I'm not a liar, I'd rather be honest about it and say we've been taken over and hence all their policies and procedures and that kind of thing have, or will be transferred here at some stage, ok. But I don't have a problem with the ICT because they really were progressive in relation to what we've done here. (I.D.)

This might be viewed positively with regard to ICTs, as in the above example, but may also be problematic and lead to situations of ‘othering’ when potential partners in an institutional merger do not meet as equals. In several cases, one of the partners was considered the principal partner. One respondent observed that they were the lead partner, because the institution they were going to be merging with had shown no interest to date, but that they would have to once the merger had happened. In another case, the institution that had already been working with ICTs had assumed responsibility for the institutions that would be joining them.

X is not incorporated yet but what we have planned to do is to incorporate them, and X is from next year onwards but we will have a very thorough training the first six months of next year in X for the students as well as the lecturers there in Computer Literacy, Computer Training, how to use the software, what is e-Learning, etc.... We are still also busy to get their labs ready and stuff like that but [they have had] no IT education. (I.O.)

The ‘othering’ of the partner perceived to be the weaker often occurs in the setting up an us-they antagonism where ‘we’ are in the know and ‘they’ will be taught, as in the above quotation.

In another case, students were somehow seen to be at fault for their perceived weaker computer skills, and were clearly stigmatized:

The fact that these students who really do not deserve to have a XX University badge on their degree certificate are going to get that has to do with the merger. (I.J.)

Mergers may in themselves be leading to the use of ICTs. This is particularly the case where there are already, or are going to be, multiple campuses.

The other capabilities that we’re looking at as well, and this is also dependent on the usage of the bandwidth, is actually edu-conferencing. We find that there is a great need, especially with the geographical location of the campuses... AA campus is approximately two hundred and forty kilometres apart from the BB campus. So effectively what we will be doing is looking at video conferencing across that link, perhaps for strategic meetings that would need to take place. You know, there could be, that bandwidth could be booked for lecturers to conduct a lecture, for example, across campus. So these are possible ICT technologies that will be implemented within the next three to four months, in terms of the direction forward of the institution itself. (I.A.) Interestingly, being a residential institution located in an isolated place was considered a contextual advantage in one case. Another residential institution commented that full-time students are travelling long distances and do not have access to campus facilities.

Our university has the highest proportion of residential students... most of our students are on campus which is interesting because it allows us to make technology available with that in mind and not having to worry about where the students are accessing the Internet from etc., whether it is Internet cafés or home or whatever it is, you know we can concentrate on building facilities here which we are doing. (I.M.)

But the other interesting thing that we really struggling with is the students who actually commute and that is a huge problem for us because a lot of the students do commute, they have to be off campus by about 4 o’clock especially in winter time. They are full-time students who live far away. It is ... becoming an issue on campus as to how to provide access to those students after hours. (I.I.)

In both the above cases, neither of the universities concerned claims to be involved in distance education. Clearly access is a central issue in both residential and distance education contexts.

Finally, the contextualization of change is clearly crucial to exploring the power dynamics of ICT-related change in higher education; particular historical and national contexts present institutions with unique challenges. It can be argued that changes arising from the innovative use of ICTs are dependent both on the broader socio-economic and political contexts, and on the local struggles and strategies around the distribution of resources and other aspects of redressing historical inequities in educational institutions.

#### 6.4 INCLUSION AND EXCLUSION: ICTs AND ACCESS

There has been a strong view in the broad literature on ICTs and higher education that connectivity and online education are great equalizers. Increased access to higher education across institutional and national boundaries through various Internet-based options is believed to be achievable for all (Coombs, 2000). Access to connectivity would leapfrog those who have been excluded from the information society while also bridging the legacy of apartheid (Naidoo, 1998). However, this perspective has receded as the local realities and complexities of implementing ICTs in education in a diverse and divided terrain have become more evident.

This cautious view is evident in the growing research on the existence of digital divides and strategies to deal with them. Much of this literature accepts broadly that ICTs can change the way HE institutions operate, but also points to the existence of new digital divides, emerging out of existing social divides around class, race, gender, nationality and disability as impediments to that potential role. These divides restrict higher education access and participation and therefore lead to the continued exclusion and under-representation of historically excluded groups in ICT fields. This makes access to ICTs a redress issue.

There is agreement that issues of exclusion and inclusion involve access to new technologies if students are to have appropriate educational opportunities and are able to participate fully in the social, economic, political and cultural realms of life (Burbules & Callister, 2000; Castells, 2001). This requires an understanding of 'access' as 'thick' and multidimensional (Burbules & Callister, 2000b), covering both the quantity and quality of access, which involve issues of distribution and recognition.

As has been noted earlier, there is surprisingly little local research into access and use of ICTs in HE in SA (van der Westhuizen & Henning 2004). Here, the key concepts and frameworks used in such research as is currently underway in the Western Cape is drawn upon. This framework (see Czerniewicz & Brown, 2004) argues that the notion of access to different kinds of resources is 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. Such resources may be socio-cultural capital (Gee, 1999) or 'rules-resource units', a term, which describes rules that exist in relation to social practices (Giddens, 1979). Indeed, the very resources that people need access to are the same resources to which they will be able to contribute (Warschauer, 2003c). Thus, access and use are closely interrelated: access to resources and the creation of resources are interdependent. 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 contextualizes them.

It is therefore necessary to develop quite detailed resource groupings: a) technology resources; b) resources for personal agency; c) contextual resources; and d) online content resources. Further explanations of such groupings are discussed elsewhere (Czerniewicz & Brown, 2004); they do however provide a useful as a way of commenting on the data texts reviewed for this study.

### **6.4.1 Technology resources**

There is generally consensus that access to technological resources is the primary requirement for teaching and learning; and this observation remains at the forefront of all accounts of access in the literature. This includes the tangible resources of computers and associated telecommunication infrastructure including appropriate location, availability and adequacy. Access is also required to practical resources in the form of control over when and to what extent computers are used.

While recent, accurate and comparable figures are hard to come by, it is clear that the situation in South Africa is uneven nationally and lagging internationally. Teledensity rates are low: 11 in 100 people have fixed lines and 36 in 100 people have mobile telephones (Bridges, 2002; TU, 2003).

#### **6.4.1.1 Access to computers**

Estimated personal computer density is low at 7.2 in 100 people. Students are coming into higher education from a rapidly improving school system. Nationally, 39% South African schools have a computer and 26% have one for teaching and learning (Department of Education, 2003). While direct figures are hard to pin down, it is clear that school access to computers in developed countries is substantially higher. 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), for example.

Of Cape Town's 105 public libraries in 2003, only six had any computers – five each respectively – available for public access. Higher education statistics are hard to find. It seems that one-sixth of South African users are in the academic sector.

#### **6.4.1.2 Internet access**

There were 3 523 000 South African Internet users in 2004, 7.4% of the population (according to Internet World Stats). While exact national breakdowns are hard to ascertain, a report on one city reveals ongoing class, education and gender disparities: most computer users in Cape Town are men from the highest income group, living in middle-class areas and with post-secondary education (Bridges.org, 2003).

In terms of Internet access, South Africa, with 7.4 in 100 people, is way ahead of the rest of Africa which averages 1.4 in 100 people. But South Africa still lags 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). Only 57% of students and staff in higher education were Internet users in 2002 (Czerniewicz, 2004).

Internet access relies on Internet service providers (ISPs or hosts). South Africa had only 0.12% of total world hosts in 2004 (according to the Internet Systems Consortium, 2004).<sup>16</sup> The total number of computers permanently connected to the Internet in Africa (excluding South Africa) exceeded 35 000 in 2001, according to Jensen (2002).<sup>17</sup> Access to the Internet also relies on access to basic telecommunications infrastructure, which is lowest in African countries, which have limited connectivity, and generally slow connections because of insufficient bandwidth (see Beebe *et al.*, 2003; Jensen, 2003). Beebe *et al.* (2003: 3-4) list the following factors that limit the development of ICT infrastructure in African countries: a) telecommunications policies and regulatory frameworks (including harmonizing the regulatory frameworks in the education and telecommunications sectors); b) lack of telecommunications specialists; and c) inadequate contribution of telecommunications to economic and social growth. The costs of Internet access vary considerably in Africa, depending on the country – for example, Somalia and Liberia have no Internet access (P & E), while the comparative costs for the USA and UK are: USA (\$6pm) and UK (\$16pm). The costs also vary according to the type of connection, based on telephone cables, ISDN connection or satellite connections.

Finally, dependent colonial relations between Europe and Africa persist, for as Lelliott *et al.* (2000) point out: ‘Direct connectivity between countries within the continent is almost non-existent. This means that for African countries to link up with each other via the Internet, they have to connect through a European or American ‘hub’, sometimes provided as part of an aid package.’

Yet despite given the historically skewed access to resources and the fundamental inequalities that continue to characterize South African higher education, there is a marked interest in ICTs. In this context, it is therefore not surprising that physical and practical access was so strongly foregrounded: As one respondent put it bluntly “the issue is access – physical access”. Access to computers is limited and often has a very limited starting point. One institution reported that less than ten years ago it had 20 computers on campus for students (in 1995). Another institution reported that the current ratio of students to computers is still 1:100 (I.A.). Access to Internet connections, computer laboratories and printers is also limited in many cases by specific institutional practices, such as laboratory operating hours, and time limits and booking systems for computer use (Mkhize, 2005). The problem is exacerbated by slow telephone access, lack of connections to residences and limited broadband access as elsewhere in the world.

What is considered adequate access, varies too. In one case, 1:20 is considered a major improvement, but in general this is considered too low.

I think up to about two years ago, access to facilities was a major complaint; we had technology, PC's for students who actually required them as part of the learning process within their disciplines. In other words they would be taught theory and then they have to get and execute that theory on their PC's. There were very little facilities and students were required to go and type up assignments but not actually having access to facilities – that was the major problem up to the end of 2002. Then we created a general-purpose laboratory where students do have access. In one instance, it is 24/7 and that has served the student community well. We also have facilities at the hostels for convenience sake but they are limited at times and other general purpose are also for limited times and the complaints right now is for more facilities to be opened for longer. ...

<sup>16</sup> The Internet Systems Consortium does a survey of the Distribution of Top-Level Domain Names by Host Count Jul 2004 <http://www.isc.org/index.pl/?ops/ds/>

<sup>17</sup> However he notes that these figures have also become increasingly meaningless in Africa with the widespread use of .com and .net domains, and the frequent re-use of Internet address space behind firewalls due to the difficulties of obtaining public Internet space. As a result many of the African countries surveyed by Network Wizards show zero or only a handful of hosts when in actual fact there might be hundreds if not thousands of machines connected to the Internet there.

I think the problem that ... we at this stage are not sure whether we have got our ratios correct as yet, like in the general purpose labs we are still faced with a situation of above 20 students per PC which for most of the time may be adequate but there are certain times of an academic year typical just before your semester ends. Just before the exams starts, there is a huge bottle neck for the submission of final assignments or so, then I think that ratio is impacting on the access for students because then the competition for access to a seat is much higher and the student to a PC ratio at this stage is not healthy for that situation. (I.P.)

Existing laboratories are full to capacity. At one university, laboratories are open 18 hours a day, everyday. At another, they are open until midnight, and reported to be always full. Most institutions have general all-purpose laboratories open to all students, as well as faculty or department-based stations in certain disciplines. While these may be discipline appropriate in terms of ICT (for example, it would be difficult to teach Information Systems without computers), there are nevertheless inequalities of resourcing across faculties.

Access to computers for everyone is stressed:

... and then you have to ensure that you have adequate access to learning stations for you. E-Learning is fine when you actually have a market which owns their own learning stations, in our target market, a large percentage of them do not have technology facilities at home. We have also have a ratio where students do not have to stand in a queue for a workstation. Those are the issues you have to resolve before you can actually embark on e-Learning in a big way. (I.P.) It is not only historically disadvantaged institutions who complain of inadequate access to computers. Even those historically advantaged institutions, which have prioritised ICTs in both policy and resources, are struggling with access, especially as computer integration increases:

Our computer user areas are totally over-used at the moment. [They are] insufficient, yes. Not all of them but some of them so there is quite a few projects on the way at the moment trying to assess what is the ideal way to go – to put up another massive computer user area or to go for hotspots or to go for kiosks or go for laptops for every student, I mean I am just mentioning.... [Even though everyone else thinks you have got the perfect infrastructure and is the best equipped, you are saying it is still not enough?] No, we found a huge increase this year, especially in our concurrent users. Because I think ICTs are becoming more and more integrated so it is not so nice to have add on anymore – students they have to access a computer some time, not all of them most probably but a lot of them have to actually get to a computer during the day or the night or somewhere during the week to actually access learning material, communicate, do assessments, quizzes, stuff like that. (I.I.)

There is also acknowledgement that access to a computer is only the starting point, and that a broader infrastructure is required:

Now a student may get the media and documentation and so forth related to that [electronically], but he may not necessarily have the support infrastructure to be able to communicate online with a mentor, and so forth. You know, so when I talk about that it's not...because if you like to see deployment of e-Learning you like to see that holistic approach. (I.A.)

It is of note that there is a growing interest in the possibilities of wireless technologies across higher education institutions. The cellular telephone phenomenon, which burst upon South Africa less than a decade ago, offers an opportunity for innovation in a country where 5 million landlines exist in locations which have electricity, yet 18.7 million mobile telephone users are spread across the population at large. Of these, 84% are prepaid users, possibly an indication that they are less wealthy. By 2006, there are expected to be at least 19 million cellphone users.<sup>18</sup>

While the growth in cellular telephone use and ownership is consistent with world trends, this is a particularly promising opportunity to bridge the digital divide. Unlike other kinds of access (computers, Internet, connectivity etc.), cellular telephones are as much in use among students from disadvantaged backgrounds as among their more privileged counterparts. It was noted by one Eastern Cape institution that a larger percentage of students had stable cellular access than outside Internet access. In a survey at the University of Cape Town, 96% of students reported owning a cellular telephone (Czerniewicz and Brown, 2004a), while in answer to a similar question, a survey at the University of the Western Cape found that 88% of students reported owning a functional cellular telephone (Barnes, 2004).<sup>19</sup>

#### 6.4.2 Resources of personal agency

In order for individual students or academics to use ICTs meaningfully for teaching and learning, they need access to personal, collective and contextual resources. While contextualized use is essential, it is important to acknowledge the specific resources, which need be accessed by individuals in order to give them agency. An actor in a social structure is more likely to become an agent when able to use or generate knowledge ability, power, commitment, and consciousness (Etzioni in Lehman, 2003). Access to personal resources allows an individual to exercise agency, to act with intent and give meaning to objects and events. (Drislane, n.d.). Such personal resources include a person's interest in and attitude to using computers (generally and specifically for learning) as well as their knowledge and skills in using a computer. Indicators include interest, purpose, experience, knowledge, training, and skills.

Respondents for this project empathized with the relevance of attitudes in particular:

I think it is a mindset, either you explore these new things and you enjoy them or else you just don't go near them. (A.B.)

Yes and you know as well as I do some people are just techno phobic; they just don't want to do it ... some students will come back to you and say "I like it, I like it, the colours and I like the fact that I could contact you every day" and then the others will say to you, "I think I will rather sit in a room and discuss the topic" so there are not any absolutes in this game, but I am hesitant of anybody that says there are. (I.L.)

.... in one faculty there is a lot of resentment towards e-Learning because it was badly managed and now you have to change that and there is a whole paradigm shift, so there is a lot of stuff involved, there is a lot of challenges, but it is a challenge in a positive way. (I.O.)

<sup>18</sup> Figures are from [http://www.cellular.co.za/stats/statistics\\_south\\_africa.htm](http://www.cellular.co.za/stats/statistics_south_africa.htm)

<sup>19</sup> This contrasts with the 45 % of students who report using their students email accounts.

An interesting dimension that emerged was the difference between students and staff: “I think the students are more ready for it than staff are. And I think it’s due to the fact that it’s something new for staff members” (I.O.). This introduces an additional complicating divide, based on age and expectations emerging from the cultural context in which the younger ‘digital’ generation grew up.

### 6.4.3 Contextual resources

In order to use ICTs, 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, 1992:19). These resources determine how conducive the environment is to using ICTs; and how enabling the context is to the integration of ICTs for teaching and learning, specifically in a higher education institution. Two sets of contextual resources have been found to be essential. The first is community social networks (Carvin, 2000; Di Maggio & Hargittai, 2001; Jarboe, 2001; Ganett & Rudd, 2002; Kvasny, 2002; Murdoch, 2002; Warschauer, 2003 a,b,c).

The second set of contextual resources is institutional resources (Government of Japan, 2000; Bridges, 2001; Jarboe, 2001; van Dijk & Hacker, 2003; Warschauer, 2003c) that have affected technology use. This includes extent of integration, existence of relevant policies, extent of support and the intentions of institutional leadership.

For some, ICTs are threatening:

the use of ICT tends to threaten certain individuals and I think they feel threatened due to the fact that they know they will not have an appropriate support structure in place. And I think that is fundamentally where most of the problems reside. We need to have the right support structure, or system in place to assist the academics in their use of ICT. (I.A.)

### 6.4.4 Online content resources

Given the interest in ICTs for teaching and learning, an interest in online content is essential. Content can potentially play several roles. It may be a mediational means (to use Wertch’s term, 1991); it may be the outcome of, for example, a collaborative effort; it may be the agreed discourse of a discipline community; it may be a knowledge domain; or 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 Teacher (or expert or facilitator) and the S being Student (or learner, or apprentice) Laurillard, 2001; Garrison & Anderson, 2003).

While researchers studying ICT use in developed countries may not identify content as critical, it cannot be ignored in the local 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). In fact, globally, only 35% of people online are native English users, accessing Web content which is 65% English (according to <http://global-reach.biz/globstats/refs.php3>). Certainly, the lack of local content has been identified by senior South African leaders as an essential issue to increase access to ICTs for the majority of South Africans. They 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).

This may be an issue for local students and academics. In particular, it has been observed that digital content relates closely to literacy, and literacy develops most effectively when it involves content that speaks to the needs and social conditions of the learner (Freire, in Warschauer, 2003c). It is safe to assume that this applies equally to digital literacy as 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, people's notions of themselves as computer users, or not (Murdoch, 2002).

And 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).

Despite these concerns, during interviews for this [CHE] study, none of the respondents mentioned content in responses to open ended questions. And the Western Cape research data reveals that, at a regional level, an astonishingly high percentage of students and staff feel confident that they can find relevant content, with 76% of students and 89% of staff reporting that they can find content relevant to the courses they are studying/teaching.

Surprisingly too, 68% of students and 84% of staff report that they can find Internet content relevant to South Africa. However, fewer say they can find locally produced content – only 56% of students and 74% of staff report that they can.

Language too yielded interesting results: 69% of students and 88% of staff report that they can find computer resources in the language they want, perhaps because English is the accepted language of higher education. There was an extremely varied response to the question of multilingual content with 32% of students reporting that they did not know if they could; 29% reporting that they could; and 23% reporting that they could not. Staff responded quite differently here: 18% did not know if they could; 60% report that they could find content; and 16% report that they could not.

These findings about online content in one South African region are so unexpected that the recommendation is that detailed attention be paid specifically to explaining these discrepancies.

This section on key issues has highlighted four clusters of issues. Many more issues have been flagged in this report and these, and others, need further investigation. As mentioned earlier, ICTs and change specifically need to be explored in the context of dedicated distance education institutions, and in that increasingly blurred space between contact and distance education. Other issues which emerged relate to ownership of content and the related matters of open content, open archiving and open access with all the implications the resolutions of these debates have for teaching and learning. Attention also needs to be paid to parallel developments in ICTs and the market leading to increases in for-profit initiatives, outsourcing and other forms of commodification of teaching and learning processes. Finally, while this research report has focused on access to ICTs, attention also needs to be paid to the role of ICTs in increasing access to higher education, in terms of quality, delivery and redress.



## SECTION 7: CONCLUSION

This paper has reviewed the current state of play in regards to the conceptualization and utilization of ICTs in South African higher education. It has been noted that, in all senses, this is a new and developing field. There is, as yet, no unanimity in the conceptualization, visualization or utilization of ICTs at institutional level. There has been a great deal of growth in the take-up of ICTs – but it has been uneven growth, largely dependent on individual energy, expertise and on conflicting visions. This diversity was illustrated by the metaphors used by ICT practitioners who were interviewed for this project. They have a variety of titles, work in a variety of organizational structures and forms, report through a variety of institutional channels, and use a set of metaphors to describe ICTs that are, to some extent mutually exclusive. ICTs – are they neutral, or value-laden tools? Are they stand-alone implements, or parts of larger, complex systems? There is currently no consensus on these fundamental issues in South African higher education.

This lack of consensus could be seen as an opportunity – or as a threat. An optimistic view might be that ICT use is growing organically, where and as required. And in a field where, internationally, the hardware and software are literally changing on an hourly basis, it would be dangerous to try to impose frameworks and understandings on those individuals who have been with this field, at the different institutions, since its inception. From this point of view, the lack of a well-defined national educational technology policy – or indeed, of any substantive national policy at all – could be seen as enabling. On the other hand, the lack of coordination among policy makers leads to contradictory and conflicting decisions being taken, and unintended consequences on the ground. The lack of consensus amongst practitioners could also be leading to situations where national resources are being lost in institutionally-based enterprises that duplicate each other, or that find scarce funding to go off on the intellectual equivalents of wild goose chases. It also leaves some institutions carrying greater burdens to fall farther and farther behind in a race, which is, by definition, dependent on resource allocation.

What was noted too, is that research into ICTs in South African higher education also reflects the relative youth of this growing field. There are many crucial aspects still to be defined, and many important details still to be filled in.

With regard to the relationship of ICTs to higher education transformation, three different notions of change – as improvement, as innovation and as transformation – were observed in the data, with the overarching globalization discourse cutting across these meanings. This discourse forms part of others playing out in different forms internationally. Also, a strong view of ICTs across these three meanings is in terms of its function or role in higher education. It is possible to identify other discourses on higher education change, which ask different kinds of questions, and which do not examine ICTs in terms of their function. For example, the decolonization and democratization projects in higher education may be seen as examples of alternative discourses on change that are being submerged or displaced by the hegemonic globalization discourse (Ravjee, 2004). These debates did not appear in the data assembled. Grasping the relation between ICT and higher education transformation in South Africa is complicated by numerous interpretations of transformation in the literature. Given that there is also little consensus in the literature about the relation between ICTs and higher education transformation, it is hardly surprising that the intersection of these debates is fraught with contradictions, ambiguities, and contentious issues.

At the same time, it is also possible to identify various intersections and overlaps in meanings as discourses interact and co-exist in contradictory practices claiming to support efficiency and improvement on the one hand, and equity and redress, on the other. These tensions are most clearly evident in the policy tensions on higher education change in South Africa. For example, recent work in alternative pedagogies draws from both critiques of the commercialization of higher education literature, and the debates around power and knowledge, and the recognition of difference in decolonization discourses.

It is important to problematize technology, which should not be viewed as an automatic advantage that will unproblematically enhance teaching and learning in higher education, or change historical patterns of access to higher education. Contextual factors play a crucial role in determining the democratic potential of ICTs in contributing to higher education transformation. South Africa is finding its way to understanding how best this can be done. What is certain, however, is that the intersection of ICTs and teaching and learning in South African higher education has put down roots – some shallow, and some deep.

## BIBLIOGRAPHY

- Agre, P. (2002) in William H. Dutton and Brian D. Loader, eds, *Digital Academy: The New Media and Institutions of Higher Education and Learning*, London: Routledge, 2002.
- Alant, E. & Mophosho, M. (2003) Early Childhood Intervention: Web-based Training for Transformation. *South African Journal of Higher Education*. 17(1): 185-199.
- Amory, A. & Seagram, R. (2003) Educational Game Models: Conceptualization and Evaluation: The Practice of Higher Education. *South African Journal of Higher Education*. 17(2): 206-217.
- Armitage, S., Bryson, M., Creanor, L., Higgison, C., Jenkins, M., Ringan, N., Newland, B., Prescott, D. & Yip, H. (2004) Supporting Learning Technology: Relationships with Research and Theory, presented at the networked learning conference 2004, a research-based conference on networked learning, University of Sheffield and Lancaster University. Available: <http://www.shef.ac.uk/nlc2004/home.htm>.
- Baldwin, R. (1998) Technology's impact on faculty life and work. *New Directions for Teaching and Learning*. 76: 7-21.
- Ball, S. (1994) What is policy? Texts, trajectories and toolboxes, in Ball, S. *Education reform: a critical and post-structural approach*. Philadelphia: Open University Press.
- Barnes, T. (2004) UWC student perceptions and experiences of aspects of academic and student development services. Unpublished report, Centre for the Study of Higher Education, UWC, Dec. 2004.
- Beck, U. (1996) *World Risk Society*. Polity Press: Malden.
- Beebe, M., Magloire, K., Banji, K., Oyeyinka, O. & Rao, M. (2003) Africa dot edu. *IT Opportunities and higher education in Africa*. New Delhi: Tata McGraw-Hill.
- Beetham, H., Jones, S. & Gornall, N. (2001) *Career Development of Learning Technology Staff: Scoping Study, Final Report*. Joint Information Systems Committee, London.
- Bell, D. (1976) *The Coming of the Post-Industrial Society*. New York: Basic Books.
- Bell, B. (ed.). (2000) *Strategic Initiatives*. University of Natal. [Online] Available: <http://www.nu.ac.za/strategic/>.
- Bernstein, B. (2001) *Official knowledge and Pedagogic Identities: the politics of recontextualisation in Pedagogic Symbolic Control and Identity – Theory, Research, Critique*, Revised Edition, New York: Rownman and Littlefield.
- Blignaut, S. (2003) Matching Computer Competencies with Education Competencies in Preservice Teacher Training. *South African Journal of Higher Education*. 16(3): 109-126.
- Boldi, et al. (2002) Structural Content of the African Web. *Eleventh International World Wide Web Conference*, Budapest, Hungary.
- Bolter, J. (2003) Theory and practice in New Media Studies, in Liestol, G. Morrison, A. & Rasmussen, T. (eds). *Digital Media Revisited*. Cambridge: MIT Press. 15-33.
- Brey, P. (2003) Theorising Technology and Modernity in *Modernity and Technology*, Misa, P; Brey P and Feenberg, A (Eds), MIT Press.
- Brey, P. (2003) *Feenberg on Modernity and Technology*. [Electronic] Available: <http://www.rohan.sdsu.edu/faculty/feenberg/brey.htm> [6 August 2004].
- Bridges.org. (2001) *Spanning the Digital Divide: Understanding and Tackling the Issues* [Online] Available: <http://www.bridges.org> [17 June 2004].
- Bridges.org. (2002) Taking stock and looking ahead: Digital divide assessment of the City of Cape Town, [Online] Available: <http://www.bridges.org> [17 June 2004].
- Bridges.org (2003); Digital Divide Assessment of the city of Cape Town, <http://www.bridges.org/capetown> [Accessed on 13 August 2004].

- Broekman, I., Enslin, P. & Pendlebury, S. (2002) Distributive Justice and Information Communication Technologies in Higher Education in South Africa. *South African Journal of Higher Education*. 16(1): 29-35.
- Broere, I., Geysers, H. & Kruger, M. (2002) Technology Development: Imperatives for Higher Education. *South African Journal of Higher Education*. 16(3): 5-12.
- Brown, J. S., Collins, A. & Duguid, P. (1989) Situated Cognition and the Culture of Learning. *Educational Research*, 18(1), 32-42.
- Brown, J.S. (2002) Growing Up Digital, How the Web Changes Work, Education, and the Ways People Learn. *USDL A Journal*. 6(2): [Online].
- Burbules, N. & Callister, C. (2000) *Watch IT: The risks and promises of information technologies for education*. Boulder, Colorado: Westview Press.
- Carnoy, M., Castells, M., Cohen, S. & Cardoso, F. (1996) *The New Global Economy in the Information Age* University Park, PA: University of Pennsylvania Press.
- Carr, T., Cox, G., Eden, A. & Hanslo, M. (2004) Peripheral participation in a Blended Trade Bargaining Simulation. *British Journal of Educational Technology*. 35(2): 197-212.
- Carvin, A. (2000) *Beyond Access: Understanding the Digital Divide*. Benton Foundation.
- Castells, M. (1996) *The rise of the network society, the Information Age Economy, society and culture*. Vol. 1. Oxford: Blackwell.
- Castells, M. (2001) Information technology and global development, in Muller, J., Cloete, N. & Badat, S. (eds). *Challenges of globalization, South African debates with Manuel Castells*. Centre for Higher Education Transformation, Cape Town: Maskew Miller Longman.
- Chisenga, J. (1999) Global information infrastructure and the question of African content, paper presented at *International Federation of Library Associations 65th Annual Conference* [Online]. Available: [www.ifla.org/IV/ifla65/papers/118-116e.htm](http://www.ifla.org/IV/ifla65/papers/118-116e.htm) [17 June 2004].
- Christie, P. (1996) The RDP's culture of learning programme: perspectives on policy analysis and research. *Journal of Education*. 21: 61-82.
- Clancey, W. (1997) *Situated cognition: on human knowledge and computer representations*. Cambridge: CUP.
- Codd, J. (1988) The construction and deconstruction of education policy documents. *Journal of Educational Policy*. 3 (3): 235-247.
- Coetzee, G. & Du Bruyn, R. (2003) The Benefit of Introducing Audit Software into Curricula for Computer Auditing Students: A Student Perspective from the University of Pretoria. *South African Journal of Higher Education*. 17(2): 21-30.
- Conole, G. (2004) The Role Of Learning Technology Practitioners And Researchers in Understanding Networked Learning, paper presented at the Networked Learning Conference, University of Sheffield and Lancaster University, 2004. Available: <http://www.shf.ac.uk/nlc2004/home.htm>.
- Coombs, N. (2000) Transcending distances and differences. *AAHE Bulletin*. 53(2): 3-5.
- Cope, B. & Kalantzis, M. (eds). (2000) *Multiliteracies: Literacy Learning and the Design of Social Futures*. London: Routledge.
- Corbitt, B. (1997) Implementing policy for homeless kids in schools: reassessing the micro and macro levels in the policy debate in Australia. *Journal of Education Policy*. 12 (3): 165-176.
- Council on Higher Education. (2004) *Policy Advice Report: Advice to the Minister of Education on Aspects of Distance Education Provision in South African Higher Education*.
- Cox, G., Carr, T. & Hall, M. (2004) Evaluating the use of synchronous communication in two blended courses. *Journal of Computer Assisted Learning*. 20:183-193.

- Cronje, J. (1997) Interactive Internet: Using the Internet to Facilitate Co-operative Distance Learning. *South African Journal of Higher Education*. 11(2): 149-156.
- Cronje, J. (2004) Education for Technology, Technology for Education. *University of Pretoria Technology Plan*. Pretoria: University of Pretoria.
- Crump, S. & White, C. (1993) Education and the Three Ps: Policy, Politics and Practice. A Review of the Work of S.J. Ball. *British Journal of Sociology of Education*. 14(4): 415-429.
- Czerniewicz, L. (2001) Reflections on learning online – the hype and the reality. *South African Journal of Higher Education*. 15(3): 17-23.
- Czerniewicz, L. (2004) Cape of Storms or Cape of Good Hope? Educational Technology in a Changing Environment. *British Journal of Educational Technology*. 35(2):145-159.
- Czerniewicz, L. & Brown, C. (2004) Access to ICTs for Teaching and Learning – From Single Artefact to Inter-related Resources, paper presented at *Emerge Conference*, Cape Town. <http://emerge2004.net>
- de Clercq, F. (1997) Policy intervention and power shifts: an evaluation of South African education restructuring policies. *Journal of Education Policy*. 12(3): 127-146.
- Deacon, A. (2005) e-mail communication.
- Department of Arts, Culture, Science and Technology. (2002) Foresight Synthesis Report: *Dawn of the African Century*. [Online] Available: [http://www.dst.gov.za/reports/foresight\\_reports/FORESIGHT%20SYNTHESIS%20REPORT.doc](http://www.dst.gov.za/reports/foresight_reports/FORESIGHT%20SYNTHESIS%20REPORT.doc).
- Department of Arts, Culture, Science and Technology (DACST). (2002) *South Africa's National Research and Development (R&D) Strategy*. August. Pretoria: Government Printers.
- Department of Education. (1997) *Education White Paper 3: A programme for the transformation of higher education*. Pretoria: Government Printers.
- Department of Education & Department of Communication. (2001) A strategy for information and communication technology in education. Available: <http://www.gov.za/documents/combsub.htm> [25 July 2003].
- Department of Education. (2001) The National Plan for Higher Education *Online* [Available]: <http://www.polity.org.za/html/govdocs/misc/higheredu1.htm?rebookmark=1> [Accessed on 13 May 2004].
- Department of Education. (2003) *Education Statistics at a Glance*. Pretoria: Government Printers.
- Di Maggio, P. & Hargittai, E. (2001) *From the 'Digital Divide' to 'Digital Inequality': Studying Internet Use as Penetration Increases*. Princeton University Centre for Arts and Cultural Policies. Working Paper Series Number 15. Princeton.
- Drislane, R. (n.d.) *Online Dictionary of the Social Sciences*. Athabasca University and The International Consortium for the Advancement of Academic Publication. Available: <http://bitbucket.icaap.org/dict.pl> [17 June 2004].
- Dutton, W.H. & Loader, B.D. (eds). (2002) New Media and Institutions of Higher Education and Learning. *Digital Academe: The New Media and Institutions of Higher Education and Learning*. London and New York: Routledge.
- Engestrom, Y. (1999) Activity Theory and Individual and Social Transformation, in Engestrom, Y., Miettinen, R. & Punamaki, R. (eds). *Perspectives on Activity Theory*. New York: CUP.
- Feenberg, A. (1996) *Summary Remarks on My Approach to the Philosophical Study of Technology*. [Electronic] Available: <http://www-rohan.sdsu.edu/faculty/feenberg/Method1.htm>.
- Feenberg, A. (1991) *Critical Theory of Technology*. New York, USA and Oxford, England: Oxford University Press.

- Fish, quoted in Menand, L. (2001) Undisciplined – the making of the public mind *Wilson Quarterly*. 25(4): 51.
- Frielick, S. (2004) Beyond constructivism: An ecological approach to e-learning, paper presented at Ascilite Conference, Perth 2004 <http://www.ascilite.org.au/conferences/perth04/procs/pdf/frielick.pdf>.
- Foucault, M. (1974) *The Archaeology of Knowledge*. London, Tavistock.
- Fregona, C & Pete, M. (2004) *Re-derivars, Scaffolders and Explicators: the Role of WebCT in Knowledge Design for 21st Century Learners*, at WebCT Innovative Impact Conference 5-6 April 2004, University of Stellenbosch.
- Frith, V. Jaftha, J. & Prince, R. 2004 Evaluating the Effectiveness of Interactive Computer Tutorials for an Undergraduate Mathematical Literacy Course. in *British Journal of Educational Technology*. 35(2): 159-173.
- Garnett, F. & Rudd, T. (2002) Developing a ‘Headline’ Digital Divide Metric and Resource: Initial Conceptual Ideas, in *The Digital Divide Day Seminar*. British Educational Communications and Technology Agency. Coventry.
- Garrison, R. & Anderson, T. (2003) *E-Learning in the 21st Century: A Framework for Research and Practice*. London: Routledge Falmer.
- Gee, J. (1999) *An Introduction to Discourse Analysis: Theory and method*. London: Routledge.
- Giddens, A. (1979) *Central Problems in Social Theory: Action, Structure and Contradiction in Social Analysis*. Berkeley and Los Angeles: University of California Press.
- Gillwald, A. & Esselaar, S. (2004) *South African 2004 ICT Sector Performance Review*, LINK Centre Public Policy Research Paper No. 7, December 2004.
- Global Reach. Global Internet Statistics. [Online] Available: <http://global-reach.biz/globstats/refs.php3> [22/05/2005].
- Government of Japan. (2000) Okinawa Charter on Global Information Society [Online] Available: <http://www.dotforce.org/reports/it1.html>. [17 June 2004].
- Greaves, D. (2005) e-mail communication.
- Gilbert, S.W. (1995) Great expectations: Content, communications, productivity, and the role of information technology in higher education. *Change*. 27(2): 24-27.
- Haberle, N. (2002) Developing a Theoretical Evaluative Framework for Information Literacy Interventions: a South African Initiative. *South African Journal of Higher Education*. 16(3): 21-30.
- Hall, S. (1992) The west and the rest: discourse and power, in Hall, S. & Gieben, B. (eds) *Formations of modernity*. Cambridge: Polity Press in association with the Open University.
- Hardman, J. (2005) Activity Theory as a Potential Framework for Technology Research in an Unequal Terrain, presented at *Emerge 2004 Conference* [Online] Available: <http://emerge2004.net/profile/abstract.php?resid=10> [28/04/2005].
- Hardman, J. & Ng’ambi, D. (2003) A Questioning Environment for Scaffolding Learners’ Questioning Engagement with Academic Text: A University Case Study: Research in Higher Education. *South African Journal of Higher Education*. 17(2): 139-146.
- Harrison, L. (2003) *Learning, Teaching and Assessment Strategy Document*. Centre for Higher Education Development, Durban Institute of Technology.
- Henning, E. & van der Westhuizen, D. (2004) Crossing the digital divide safely and trustingly: how ecologies of learning scaffold the journey. *Computers & Education*. 42(4): 333-352.
- Heydenrych, J. (2000a) A Critical Appraisal of the Implementation of Online Learning Technologies: Society, Higher Education and Business. *Progressio*. 22(2): 58-68.

- Hodgkinson, C. & Mostert, M. (2004) Online Debating to Encourage Student Participation in Online Learning Communities: A Case Study in the Education Department of Rhodes University, presented at *Emerge* 2004. Cape Town. [Online] Available: <http://emerge2004.net/profile/abstract.php?resid=26> [28/04/2005].
- Howe, S. Muller, A. & Patterson, A. (2005) *Information and Communication Technologies in South African Secondary Schools*. Pretoria: HSRC Press.
- International Telecommunication Union (ITU) (2003.) *Africa, ICT Indicators* [Online] Available: <http://www.itu.int/ITU-D/ict/statistics/> [17 June 2004].
- ISC Internet Domain Survey (2004) Internet Systems Consortium, available at <http://www.isc.org/index.pl?ops/ds/>.
- Jarboe, K. (2001) *Inclusion in the information age: Reframing the debate* [Online] Available: <http://www.athenaalliance.org/inclusion.html> [15/12/2001].
- Jensen, M. (2002) Information and Communication Technologies (ICTs) in Africa, A Status Report, presented to Third Task Force Meeting, United Nation Headquarters. 30 September – 1 October. [Online] Available: [www.uniccttaskforce.org/third meeting/documents/Jensenzov.doc](http://www.uniccttaskforce.org/third%20meeting/documents/Jensenzov.doc)
- Jensen, M. (2003) Network Connectivity in Africa – The Current Status. 2003 *Round Table on Developing Countries Access to Scientific Knowledge*. The Abdus Salam, ICTP, Trieste, Italy.
- Johnson, J. L. (2003) *Distance Education: The complete guide to design, delivery and improvement*, New York: Teachers College Press.
- Jones, C. (2004) Theory and the Practices of Learning Technology, presented at the networked learning conference 2004. A research based conference on networked learning University of Sheffield and Lancaster University 2004 found at <http://www.shef.ac.uk/nlc2004/home.htm>.
- Keats, D. *et al.* (2002) *The Integrated Information Strategy (IIS) of the University of the Western Cape*. 1(1), 26 March 2002, UWC, Bellville, RSA, in [http://www.uwc.ac.za/ics/strategy/iis\\_strategy-1\\_1.pdf](http://www.uwc.ac.za/ics/strategy/iis_strategy-1_1.pdf) [Accessed on 26 July 2004].
- Kiernan, V. (2004) Online. *Chronicle of Higher Education*. Dec. 17, 2004.
- King, A. (1993) Making the transition from “sage on stage” to “guide on the side”. *College Teaching*. 41: 30-35.
- Kizito, R. (2002) Barriers to the Adoption of Computer-Mediated Collaborative Learning Practices in Open and Distance Education. *Progressio*. 24(2): 10-17.
- Kress, G. (2000) The Futures of Literacy. *Rapal Bulletin*. 42:1-19.
- Kvasny, L. (2002) A conceptual framework for examining digital inequality, at *Eighth America's conference on Information Systems*. 1798 –1805.
- Lankshear, C., Snyder, I. and Green, G. (2000) *Teachers and Technoliteracy: Managing literacy, technology and learning in school*, Allen and Unwin, Sydney.
- Lankshear, C., Peters, M. and Knobel, M. (2002) Information, knowledge and learning: some issues facing epistemology in a digital age in Lea M and Nicoll K (eds) *Distributed Learning: Social and cultural approaches to learning* Routledge Falmer and the Open University, London.
- Laurillard, D. (2002) *Rethinking University Teaching*. 2nd ed.: Routledge Falmer Taylor & Francis Group London.
- Le Grange, L. (2004) E-Learning, Some Critical Thoughts: Perspectives on Higher Education. *South African Journal of Higher Education*. 18(1): 87-97.
- Lea, M. & Nicoll, K. (2002) *Distributed Learning: Social and Cultural Approaches to Practice*. London & New York: Routledge.

- Lehman, E.W. (2003) Culture, Social Structure and Agency: A Strong Approach. *15th Annual meeting of the Society for the Advancement of Socio- Economics*, Aix-en-Provence, France, June 26, 2003. [Online] Available: [www.sase.org/conf2003/papers/lehman\\_edward.pdf](http://www.sase.org/conf2003/papers/lehman_edward.pdf) [17 June 2004].
- Lelliott, A, Pendlebury, S, Enslin, P. (2000) Online education in Africa – Promises and Pitfalls paper presented at Second Annual Conference on World Wide Web applications, September 2000.
- Lockwood, F. (2003) Foreword, in Naidu, S, (ed.) *Learning and Teaching with Technology: Principles and Practices*. London: Kogan Page.
- Lundall, P. & Howell, C. (2000) *Computers in Schools, A National Survey of Information Communication Technology in South African Schools*, Education Policy Unit, University of the Western Cape.
- Lusted, D. (1986) “Why Pedagogy?” *Screen*. 27 (Sept.-Oct.):4-5. accessed at <http://www2.newpaltz.edu/~kaufmanp/>.
- Mashile, E. & Pretorius, F. (2003) Challenges of Online Education in a Developing Country. *South African Journal of Higher Education*. 17(1): 132-139.
- Matsepe-Casaburri, I. (2003) *Address to the First Phase of the World Summit on the Information Society*. Geneva, Switzerland.
- Mbeki, T. (2001) Bridging the Digital and Development Divide *ANC Today*. 1(39) [Online] Available: <http://www.anc.org.za/ancdocs/anctoday/2001/at39.htm> [17 June 2004].
- McCalla, G. (2004) The Ecological Approach to the Design of E-Learning Environments: Purpose-based Capture and Use of Information about Learners. *Journal of Interactive Media in Education*. (7), 1-23.
- Menand L. (2001) Undisciplined – the making of the public mind *Wilson Quarterly*. 25(4): 51.
- Misa, T., Brey, P. & Feenberg, A. (2004) *Modernity and Technology*. Cambridge: MIT Press.
- Mkhize, S. (2005) Students access to and use of ICTs in laboratories at the University of the Western Cape. Unpublished Master’s dissertation.
- Murdoch, G. (2002) Rethinking Communication Exclusion, in *Digital Divide: A Collection of Papers from the Toshiba/Becta Digital Divide Seminar*: 19 February 2002. British Educational Communications and Technology Agency, Coventry.
- Naidoo, J. (1998) Minister of Posts, Telecommunications and Broadcasting, South Africa speaking at the OECD Ministerial Conference on Electronic Commerce, Ottawa.
- Naidu, S. (ed.) (2003) *Learning and Teaching with Technology: Principles and Practices*. London: Kogan Page.
- Nardi, B. (ed.) (1996) *Context and Consciousness: Activity Theory and Human-Computer Interaction*. Cambridge, Massachusetts: MIT Press.
- Nardi, B. & O’Day, V. (1999) *Information Ecologies: Using Technology with Heart*. Boston: MIT Press.
- Noble, David F. (2002) *Digital Diploma Mills: The Automation of higher education*. New York: Monthly Review Press.
- Offe, C. (1996) State theory: continuities and reorientation, in *Modernity and the state: East and West*. Cambridge: Polity Press.
- Organisation for Economic Cooperation and Development (OECD). (2002) *OECD Information Technology Outlook*. [Online] Available: <http://www.oecd.org/dataoecd/63/60/1933354.pdf> [22/04/05].
- Paterson, A. (2004) Information Systems and Institutional Mergers in South African Higher Education, paper presented at *Emerge 2004 Cape Town*. [Online] Available: <http://emerge2004.net/profile/abstract.php?resid=25> [28/04/2005].
- Ranson, S. (1995) Theorising education policy. *Journal of Education Policy*. 10(4).

- Ravjee, N. (2002) Neither Ivory Towers Nor Corporate Universities: Moving Public universities beyond the 'Mode 2' logic. *In South African Journal of Higher Education*. 16(3): 82-88.
- Ravjee, N. (2004a) *Problematising the Relation of ICTs to Higher Education transformation in South Africa*. Paper presented at the HICTE mini conference, UWC, Cape Town, unpublished.
- Ravjee, N. (2004b) *Competing Perspectives on ICTs and Higher Education change*, Unpublished paper. Centre for the study of Higher Education, UWC, Cape Town.
- Rogers, P.L. (2000) A Paradigm Shift: Technology integration for higher education in the new millennium. *Educational Technology Review*. Spring/Summer. 19-33.
- Ruthven, K. (2000) The future of disciplines: A report on ignorance. *Knowing ourselves - the humanities in Australia in the 21st century* Australian Academy of the Humanities. Available at: [http://www.asap.unimelb.edu.au/aah/research/review/c6\\_ruthven.html](http://www.asap.unimelb.edu.au/aah/research/review/c6_ruthven.html) [30 January 2002].
- Samoff, J. (ed.) (1994) *Coping with Crisis. Austerity, Adjustment and Human Resources*. London: Cassell; and Paris: UNESCO.
- Seely Brown, J. (2002) Growing Up Digital, How the Web Changes Work, Education, and the Ways People Learn. *USDL A Journal*. 6(2): [Online].
- Sewell, W.H. (1992) A theory of structure: Duality, agency and transformation. *American Journal of Sociology*. 98 (1):1-29.
- Surry, D.W. & Robinson, M. A. (2001) A Taxonomy of Instructional Technology Service Positions in higher education. *Innovations in Educational & Teaching International*. 38(3): 231-238.
- Spurrett, D. 2004. Computer-supported Development of Critical Reasoning Skills, presented at *Emerge 2004*. Cape Town. [Online] Available: <http://emerge2004.net/profile/abstract.php?resid=16> [29/04/2005].
- Tomaselli, K. & Shepperson, A. (2003) Gearing up the humanities for the digital era. *Perspectives in Education*. 21(2): 31-45.
- Toohy, S. (1999) *Designing Courses in higher education* SRHE and Open University, Buckingham.
- University of Cape Town. (2003) UCT Educational Technology Policy Document. November 2003, (Unpublished).
- University of Pretoria Strategic Plan: Inspiring the Innovation Generation 2002 – 2005 (2002) [Online] Available: [http://www.up.ac.za/beta/about/eng/strategic\\_plan.pdf](http://www.up.ac.za/beta/about/eng/strategic_plan.pdf) [5/62004].
- Van der Merwe, D. & Moller, J. (2004) Integration of the two home-grown Learner Management Systems of "Old Unisa" and "Old TSA: the past, the merger and the future, paper presented at *Emerge 2004*. Available at <http://emerge2004.net>.
- Van der Merwe, A. & Pool, B. (2002) The E-Campus Initiative at the University of Stellenbosch; University of Stellenbosch, paper published at the *www2002.Conference*, RAU, See URL: [http://general.rau.ac.za/infosci/www2002/Full\\_Papers/VdMerwe%20A\\_%20Pool%20B/VdMerwe&Pool\\_ECampus.pdf](http://general.rau.ac.za/infosci/www2002/Full_Papers/VdMerwe%20A_%20Pool%20B/VdMerwe&Pool_ECampus.pdf) [Accessed on 3 June 2004].
- Van der Westhuizen, D. (2002) Online learning in the South African context: A meta-analysis of research trends, issues and topics, published in proceedings of *SASE conference 2002*, South African Society for Education, Pretoria.
- Van der Westhuizen, D. & Henning, E. (2004) Research towards a theory of online learning. *Diskoers*. 32 (1): 7-15.
- Van Dijk, J and Hacker, K. (2003) The digital divide as a complex and dynamic phenomenon. *The Information Society*. 19: 315-326.
- Vorster, D. (2003) Discussion Document: *A Multi-Modal Teaching and Learning Strategy for RAU*. Core Teaching and Learning Committee, Rand Afrikaans University.

- Walton, M. & Archer, A. (2004) The Web and Information Literacy: Scaffolding the use of Web Sources in a Project-based Curriculum. *British Journal of Educational Technology*. 35(2): 137-187.
- Warschauer, M. (2003). *Technology and Social Inclusion: Rethinking the Digital Divide*. Cambridge, Massachusetts: MIT Press.
- Warschauer, M. (2003a) Demystifying the digital divide. *Scientific American*. 289(2): 42-47.
- Warschauer, M. (2003b). The allures and illusions of modernity: Technology and educational reform in Egypt. *Educational Policy Analysis Archives* 11(38): [Online].
- Warschauer, M. (2003c) Dissecting the “digital divide”: A case study in Egypt. *The Information Society*, 19(4), 297-304.
- Watermeyer, H. (2004) An ICT Policy Model for Universities, A Re-think on the Structure and Development of Policies for ICTs in Universities. *Conference on Information Technology in Tertiary Education*, Cape Town.
- Wentzel, A. & Jacobs, G. (2004) How the Internet Necessitates a Rethink of Multimodal Education: Research in Higher Education. *South African Journal of Higher Education*. 18(1): 32.
- Wertsch, J. V. (1991) *Voices of the mind: A Sociocultural Approach to Mediated Action*. Cambridge, MA: Harvard University Press.