Status Report on ICTs and Higher Education in South Africa

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Table of Contents

Introduction ...........................................................................................................1
   A note on terminology .......................................................................................2
Part 1: Implementation, experiment and absence: ....................................... 2
   Implementation ..................................................................................................3
   Experiment ..........................................................................................................8
   Absence ............................................................................................................11
   Overall Situation in SA Higher Education .....................................................11
Part 2: Broader national imperatives and limitations ......................... 12
   National ICT Infrastructure .............................................................................12
   Institutional Infrastructure ...............................................................................16
   Institutional higher education e-Learning centres .......................................18
   National e-Learning policies .........................................................................20
   Institutional e-Learning policies ....................................................................23
   South African Research on ICTs in Education .............................................25
Part 3: Higher Education Challenges in South Africa .................... 27
   Size and shape of higher education .................................................................27
   Specific challenges being faced by the higher education sector .............28
   Open source software ......................................................................................32
   The use of mobile technologies ....................................................................34
Conclusions ..........................................................................................................36
Introduction

Recently, in South Africa, there seem to be many different calls for what might be termed ‘status reports’ on the emergence of ICTs in educational contexts. The national Department of Education, having published its White Paper on E-Education in 2004, called together a ‘think-tank’ in 2006 based on an overview of research and delivery needs related to the ‘roll-out’ of e-Learning in schools. Provincial education departments are queuing to put into the public domain their local analyses of e-Learning delivery at school level (e.g. KwaZulu-Natal’s 2006 ICT in Education Indaba and Gauteng’s 2007 e-Learning ‘roadshow’, both of which seemed to cast envious eyes at the Western Cape’s perceived leadership in the area). Regulatory authorities in education, such as SAQA and the HEQC, increasingly want to understand the national ICTs landscape to inform the work they do in various institutional contexts more broadly. At a research level, there seem to be more journals interested in publishing special editions that seek to take stock of e-Learning in some way; for example, Education as Change published a special issue on ICT in Education in December 2005, Perspectives in Education published a special edition in December 2005 on “Research on ICTs and education in South Africa”, the South African Journal of Higher Education has a special edition in press of papers presented at the Nadeosa conference in 2006, concerned with the ‘myths’ and ‘miracles’ of ICTs in education, and the Journal of Education has mooted a similar special edition. Increasingly, development funding agencies seek understanding of the overall, actual state of ‘new’ technology use in education, with a view to shaping their overall interventions and funding policies.

This report is no doubt just one such piece in this contemporary context of the macro-analysis of ICTs in education, to inform the Partnership for Higher Education in Africa (PHEA) in its deliberations\(^1\). The general mood seems to be something like, “well, we’ve now got enough computer systems and connectivity in place in a critical mass of institutions, we know it should be influencing teaching and learning for the better, so now where do we go?” We think that currently there are a number of very insightful documents produced in South Africa that start to answer this question. In particular, in relation to the higher education sector, the recent CHE research document by Czerniewicz, Ravjee and Mlitwa\(^2\), provides an excellent overview of the state of ICT usage in South African universities. We draw heavily on this paper in what follows and, indeed, need to say that, as we wrote the current document, we increasingly wondered why the PHEA did not see fit simply to use this publication as its basic discussion document for purposes of understanding South African higher education. All that we are perhaps able to add here is reflection on a number of more contemporary references.

The current document is primarily a literature review, largely of South African resources, although it also draws on some telephonic and e-mail interviews conducted to ascertain institutional information. It commences with an overall account of the current state of e-Learning in higher education in South Africa. Part 1 draws on selected case studies and research papers to describe an overall picture of the e-Learning landscape. Here, differences between university approaches to the use of ICT are highlighted, in particular differences in research and implementation strategies across institutions, and also historical discrepancies in provisioning and access related to the history of apartheid. In Part 2, the paper seeks to make clear, succinct statements on specific aspects of the brief, regarding infrastructure and ICT usage in South Africa, the higher education e-Learning policy terrain, and extant South African research in the field. Part 3 deals specifically with higher education challenges in South

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1 We would like to thank the various people who made useful comments on earlier drafts of this paper, in particular colleagues at SAIDE, the Wits School of Education and CET at the University of Cape Town.

Africa, in general terms and in regard to software development and mobile technologies.

A note on terminology
For purposes of this document, and notwithstanding the importance of theoretical and conceptual debate in the field, we use terminology that follows explanations in South Africa’s White Paper on E-Education (2004):

Information and communication technologies (ICTs) represent the convergence of information technology and communication technology. ICTs are the combination of networks, hardware and software as well as the means of communication, collaboration and engagement that enable the processing, management and exchange of data, information and knowledge.

e-Learning is flexible learning using ICT resources, tools and applications, focusing on
- accessing information,
- interaction among teachers, learners, and the online environment
- collaborative learning, and
- production of materials, resources and learning experiences.

e-Learning may involve the use of Internet, CD-ROM, software, other media and telecommunications.

Online learning refers more specifically to the use of the Internet and associated web-based applications as the delivery medium for the learning experience.

We also draw on further useful distinctions regarding online learning made by the Commonwealth Department of Education and Science³:

- web-supplemented courses retain the traditional course structure and face-to-face delivery, but add computer-mediated learning elements, e.g. the provision of online course material.
- web-dependent courses involve a reduction in face-to-face encounters replaced by online, interactive learning activities. This approach necessitates a redesign of content and assessment and changes in staff skills and work patterns.
- fully online courses eliminate face-to-face learning and provide a learning resource centre for online materials and on-demand assistance. They call for new skills from students and staff and a significant commitment of resources.

These terms are often used linked to either on-campus or off-campus students.

Part 1: Implementation, experiment and absence: e-Learning in South African higher education
Available literature reveals that implementation of e-Learning at South African higher education institutions has been varied and reflects the variety in organisational culture and approaches as well as the varied learner communities served by the different institutions. South African case studies document a range of web-supplemented (perhaps the most common), web-dependent and some fully online courses in our universities. It has been pointed out frequently that the majority of research, and even straightforward documentation, of e-Learning initiatives in South African higher

education consist of case studies. These can broadly be grouped into those that are primarily operational, in that they commence with the implementation of established, widely researched (many say, proven) e-Learning tools and approaches (with greater or lesser degrees of success), and those that are research-driven, in that they involve experimentation with new or unproven technologies and approaches. The former are often top-down initiatives driven by management at a university or faculty level, while the latter are often bottom-up initiatives driven by individuals and often structured as research projects. While operational projects often include research elements and the research driven projects may go to scale as proven technologies and methods, this categorization has been useful in structuring this report. ‘Operational’ and ‘research-driven’ projects appear to address different concerns and give rise to different challenges.

**Implementation**

This section addresses case studies in the literature that describe e-Learning projects undertaken from a primarily operational perspective. Such projects tend to be based on the highly centralized deployment of technologies intended to reach across the university at large. Such projects generally involve the implementation of a Learning Management System (LMS) or other established educational technology, and associated organisational structures and procedures to ensure the successful adoption and use of the system.

Here we examine some of these implementations, at both the institutional level and, in order to understand how the infrastructure provided by the institution is used within courses, at course-level interventions that have resulted from the availability of the technology. The ways in which these implementations have played out depend on the kind of institution, the educational services they provide and the community of learners that they serve.

Larger scale e-Learning projects involving the use of well-established technology tools and approaches tend to be initiated for a mix of financial and pedagogical rationales. Projects are aimed at dealing with large student numbers where classroom size and limited staffing inhibits interaction with students. By making use of a central shared learning management system, infrastructure and support services it is possible to achieve efficiencies of scale when delivering large numbers of courses to large student bases. Students benefit from ease of access to a wider range of learning materials, opportunities to interact with a range of activities and other students and greater flexibility in their learning.

Initiated at the institutional or faculty level, these projects are usually centrally supported by technology experts. The more successful amongst them also provide support services for the development of learning materials and pedagogy experts who assist in the proper integration of technology elements into learning programmes. Academic staff either volunteer or are encouraged by policy to adopt e-Learning elements in their courses. The projects examined here tend to be large scale and run across a wide base of students. They tend to involve the purchase or development and implementation of large learning management systems and rely on an existing infrastructure of computer laboratories and networks for access by students and staff.

The University of South Africa (UNISA) presents perhaps the most prominent example an ‘operational’ initiative in higher education in South Africa. UNISA is ‘the dedicated distance education’ university in South Africa, serving around 250 000 students.

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5. Le Roux suggests this for the University of Pretoria. See Le Roux, I. (2004). The contribution of e-learning to individualisation at a residential university, Department of Telematic Learning and Education Innovation, University of Pretoria.
students within and beyond the borders of South Africa, is responsible for about 4 500
courses each of which is revised every three years. A challenge in implementing e-
Learning at UNISA has been the very diverse student base with very different ICT
skills and access to very different levels of ICT infrastructure. UNISA makes use of a
‘customized delivery system’[6] for e-Learning that comprises two areas: a web
environment used to provide general information on programmes and courses and a
secure environment that provides access for staff and students. This environment
consists of three areas, one for each of academic staff, students and support staff.
Lecturers Online is a personalized environment where lecturers can access online course
resources, learner’s details, student feedback, support and teaching tools. MyUnisa
(previously Students Online) is a learning environment which provides access to study
resources (course materials and library resources), communication facilities (e-mail and
discussion forums) and administrative tools (timetables, help desk, calendar of events,
queries’). The Institute for Curriculum and Learning Development is responsible for
course materials development, drawing on a team of instructional designers, subject
specialists and specialists in layout, editing and design elements to create and update
materials on a regular basis. Materials are produced in English and Afrikaans, with
initiatives to offer some supplemental materials in local African languages[8]. The move
to electronic learning at UNISA has made it possible to set up collaborations with
other parts of Africa and increased the reach of UNISA’s programs. This introduces
greater diversity in the student body and has created a need for academic staff to be
re-skilled – not only in terms of learning to use technology, but also in terms of their
approach to teaching. With the maturation of the online learning environment at
UNISA and the greater involvement of staff in technology-based courses, interesting
discussions have begun to emerge from UNISA about the role of academic staff in
teaching (including the need for a shift from being ‘experts’ with knowledge to impart,
towards ‘collaborators’ in flexible learning processes) and the challenges of addressing
online learning materials to a wide range of individuals with different learning styles[9].
The development of these debates shows that concerns in this environment are moving
beyond technology and towards effective learning in the electronic environment.

The University of the Free State has offered an online BCom degree in a
partnership with a private sector company, eDegree, which provides a good example of
the scale on which ‘operational’ e-Learning delivery tends to be planned and
delivered. The university is held responsible for the academic content and quality
assurance, and eDegree provides technology support and management functions. There
have been problems reported by lecturers with lack of training in online teaching and
concerns about assessment and some tensions in the partnership due to overlapping or
ill-defined roles. If these can be addressed, it offers a potential model for public-
Economics students at the University of the Free State. Taking a ‘broadly
constructivist’ approach, they set out to increase the degree to which students engaged
with the course materials. With classes of over 1000 students, it was difficult to
motivate individual students to interact with the course resources and each other or to
know to what degree they did. Online lecture notes, quizzes, tests and online

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Fourth Pan Commonwealth Forum on Open Learning, Ocho Rios, Jamaica.

7 Ibid.


10 SAIDE (2006). Four case studies of e-learning in selected South African higher education institutions. Quality
Assurance and e-Learning in South African Higher Education. Appendix 4. South African Institute for Distance
Education, Johannesburg.

on World Wide Web Applications, Bloemfontein, Cape Peninsula University of Technology.
discussions were used to supplement traditional lectures. The responses of students to
the LMS were examined in focus groups and using questionnaires over three years.
Students reported that having access to the lecture notes lessened their workload,
enabled them to prepared for lectures and improved their skills in summarizing and
note-taking. Students found it easier to concentrate in class because they were not
taking notes and that the regular quizzes forced them to consult their texts and keep
up with the work. At the University of the Free State lecturers have the option to load
materials themselves onto WebCT or to have it done for them by the e-Learning
division. Lecturers who are more familiar with the interface find it quicker to do so
themselves but many do make use of the support. Materials are sometimes
adaptations of existing printed materials and are sometimes developed specifically for
the LMS. Lecturers find the management of large classes difficult, but appoint tutors to
assist them12.

In 1996, Potchefstroom University (now merged into the University of the
Northwest) launched a Telematic Learning System to provide online access to tertiary
qualifications. They saw this as a strategy for participation in the massification of
tertiary education and supported the online facilities with 53 study centres
countrywide, some situated in very remote areas. Programme material was sourced
from universities with similar programmes in the USA and Europe, for example the
Bachelor of Business Administration was developed in consultation with California
State University, which raised questions about the local applicability of the courses.
The Potchefstroom campus also gave rise to a good example (one of the few in South
Africa) of a fully online course, in its honours programme in Pharmacology13. The
course makes use of CD-ROM, printed text and downloadable study guide, as well as
online learning materials. Assessment is done through a written assignment submitted
by e-mail, an evaluation of a student’s participation in the discussion groups, an
electronic multiple-choice and short question exam paper and an oral examination
conducted via teleconferencing. The University of the North-West believes that the
move to online learning has enhanced the quality of the course, made it more flexible
and accessible to those outside the Potchefstroom area. The course caters to a
sophisticated student base of healthcare professionals who have access to computers
which makes it a success story that is difficult to replicate in most other South African
contexts. Generally, there are currently twelve fully-online degrees offered through the
Telematic Learning System. In addition, the provision of web-supplemented and web-
dependent courses is seen as important in addressing the challenges of the historically
disadvantaged Mmabatho and Mankwe campuses (merged into the university in

Large scale delivery imperatives are often the spur for top-down, ‘operational’
e-Learning programmes. One reason the University of Johannesburg (UJ) adopted the
WebCT LMS was to deal with large classes. In courses that have up to 2500 registered
students, face-to-face lectures take place for up to 600 students at a time and tutorials
with 30 to 40 students. In order to ensure adequate attention for each student a
multimode approach is followed. Students are provided with study guides and a CD-
ROM and they access PowerPoint lecture slides and quizzes via WebCT. Tutors are
employed to assist in managing the classes via the LMS. Lecturers are supported by a
central team that assists with the construction of online course materials.15 There is
some question as to how effective these efforts have been, especially in the support of
students from disadvantaged backgrounds. UJ came into existence at the beginning of
2005 as the result of a merger between the Rand Afrikaans University (RAU) and the
Technikon Witwatersrand (TWR) and now has five campuses. A claimed benefit of the

LMS at UJ has been in standardizing courses that originated from the different institutions and ensuring uniform quality across the different campuses. Students and staff make use of the same course material and assessments although there is some contestation about who develops the materials\textsuperscript{16}.

**Stellenbosch University** exhibits possibly the strongest example of a comprehensive e-Learning process conceived in these ‘operational’ terms. Between its E-Campus Strategy, an e-Learning policy, and general IT policies, it has specifically sought to incorporate all university business in electronic ICT systems aimed at improving the quality of the core functions of the university (teaching, research, and community service). The e-Learning Strategy focused on ensuring a minimum online presence for all Stellenbosch courses by the end of 2004. This “minimum electronic presence” was defined as a module outline (with outcomes) on the Web and some form of electronic interaction or communication, e.g. e-mail or a Bulletin Board.\textsuperscript{17} In 2006, the university rolled out WebCT Vista and statistics showed that 96\% of undergraduate students had access to at least one WebCT module. There has been some resistance on the part of lecturers to including technology in their teaching, and institutional debates over the appropriate means to motivate them to do so\textsuperscript{18}. Staff at Stellenbosch University are supported in their use of technology by the Centre for Teaching and Learning, although this is not the only focus of the centre. There is a need to make more staff aware of more of the facilities available in the LMS and of ways to promote deep learning\textsuperscript{19}.

The **University of Pretoria** has in place a long-range institutional strategy related to e-Learning, which emphasises web-supported learning. At a policy level, it promotes a ‘flexible, blended learning’ model. In general, the main teaching method is traditional lectures, tutorials and practical sessions supplemented by a mix of other delivery modes including web-supported learning, interactive television, stand alone multimedia and video\textsuperscript{20}. The University has a central Department for Education Innovation (previously the Department of Telematic Learning and Education Innovation (TLEI)) with a staff of 75 organised into eleven divisions. These include three educational support teams that develop materials for specific faculties, video and graphic services, and technology divisions. Educational support teams include skills in project management, instructional design, programming, graphic design and education consultants.\textsuperscript{21} The Department for Education Innovation supports the creation and integration of learning materials and has elaborate systems in place to ensure that course material meets quality standards\textsuperscript{22}. WebCT is the LMS in use, but the Department for Education Innovation also supports a wider range of technologies including multimedia delivered on CD-ROM which provides electronic materials to students who have no or low-bandwidth access to the Internet. There is a studio for analogue and digital video and sound production, recording and editing, as well as broadcasting and video conferencing facilities. Lecturers at UP have been supportive of e-Learning - they are ‘very keen’ but have found learning new skills challenging: “it is not so much that they resist [it] as a tool, but just the learning curve...they’ve just learned the previous version...the interface has changed...and like anybody there’s resistance to relearn the software.”\textsuperscript{23} Interestingly, the push to use ICT also comes from

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\textsuperscript{17} Czerniewicz et al., *Op cit.*; see also [http://www.sun.ac.za/ekampus/indexe.htm](http://www.sun.ac.za/ekampus/indexe.htm)


\textsuperscript{19} Centre for Teaching and Learning, Stellenbosch University, *Annual Report* 2006. p. 11.


\textsuperscript{22} Fresen & Boyd (2004), *Op cit.*

\textsuperscript{23} Quoted in Kinuthia & Dagada (2006). *Op cit.*
students. As part of the extensive quality control procedures in place, the more than 17,000 students registered for WebCT modules at Pretoria are surveyed twice a year. In 2003 students showed moderate levels of frustration with the system— including problems with the availability of facilities, technical difficulties and inadequate training. Students also reported feelings of annoyance or stress and complained about the medium being impersonal and of slow responses from classmates. On the other hand students felt comfortable using online tools, experienced greater freedom of expression, learned from each other and had to develop skills in planning and working as a team.

The University of the Witwatersrand (Wits) presents an interesting case-study of another kind of ‘operational’ approach to e-Learning, concerned primarily with technology and minimally with pedagogy. Wits has settled, apparently more by accident than design, for a blended learning approach in which ICTs are used to supplement traditional face-to-face interactions. Overall, computer-mediated learning is not very widespread in the university. Wits does however provide a rich ICT environment for students— including computer laboratories and access to the Internet, online Library resources and to relevant software. Some student residences have computer facilities and online computer literacy training is available. The Oracle Student System provides all students with an e-mail address and calendar software. Students across all faculties make extensive use of the Internet and online Library resources in the course of their studies. The WebCT LMS is available and is used to supplement learning in some courses, including those in Health Sciences, Commerce, Education and the Biological Sciences with varying levels of success. The department of Statistics has been using WebCT to provide supplementary materials and quizzes for students and has found it useful in dealing with large classes. Staff has found it time-consuming to learn to manage WebCT and there is no support and no recognition for this work. In spite of the absence of incentives and support, an increasing number of faculty members opt to use WebCT in their teaching. Those that have used the LMS report that most students are enthusiastic about on-line learning, although they need a lot of initial training since many have no prior exposure to computers. Where e-Learning is used at Wits, it is on the initiative of individual staff members who have sought to address specific teaching problems. Apart from technical support for the LMS which is provided by CNS (Central Networking Services), there is minimal support for academic staff, beyond a basic orientation to WebCT, in the developing of materials or their integration into teaching. Wits did appoint one ICT expert responsible for driving the e-Learning process in the university - initially within CNS but later within the Centre for Learning and Teaching Development (CLTD) which offers professional support to academic staff. The person eventually left and was not replaced.

The model of e-Learning delivery established in this account of Wits seems to be the bottom line starting point for the development of ICT infrastructures for learning at South African institutions. So, for example, the University of Limpopo, Central University of Technology, the University of Zululand, the Vaal University of Technology and the University of Fort Hare (to name but some examples) all commenced their institutional engagement with ICTs in teaching and learning by seeking to provide good technological infrastructure and support for lecturers to be able to use a Learning Management System (LMS) if they wished to in delivering their courses.

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Experiment

Perhaps the more interesting developments in e-Learning are those taking place outside the frame of ‘proven’ LMSs and more established e-Learning technologies. These tend to be research-driven projects, not highly centralized in their original conception, often run by individual lecturers, which seek to address specific problems they have encountered in their teaching. There are in South Africa a wide range of initiatives that fall into this category, spread across a range of institutions. They tend to display the potential of new technologies, when combined in developing practice with the deep understanding that academic staff have of the specific skills and learning processes needed by students in the different disciplines.

The rationale for initiating the projects reported in this section appears to be uniformly pedagogic. Projects are aimed at addressing specific learning goals relating to skills that students need to develop in a particular discipline, although some address more generic skills. Initiated by individual academic staff or small groups of colleagues, these projects make use of technical experts when they are available or they are initiated by academics who already possess some level of technical expertise. Significantly, in that it points to the poor understanding of ICTs amongst many academics, two of the institutions examined in this section make use of technical experts to raise the awareness of academic staff of the potential of new technologies. Academic staff identify areas in which pedagogic interventions are required and the technical experts suggest ways in which technology could assist. The projects examined here are often small-scale and run with a particular class of students. They tend to be based on existing, general resources available in the institutions – like the Internet, existing computer laboratories, existing technical support and available software but also frequently make use of new software or learning materials specifically purchased, developed or adapted for the project.

At Rhodes University there have been experiments with computer science students developing material in a variety of languages to support students in a bridging course for science students whose first language is not English. A web interface allows students to access materials developed by volunteer students and to participate in online chat sessions in a mixture of languages. The system comprises a chat room, online glossary and a knowledge base / newsgroup. Students make use of the chat feature during lectures – each contribution is identified by student number and students can thus ask their peers for help with concepts. A shared canvas (controlled by the lecturer) adds a visual component to explanations. The glossary displays explanations in technical English, simple English or one of ten African languages and an audio version is available. New descriptions are added using a variety of processes – including student volunteers. These volunteers also translate key course texts into their own languages.

Despite University of Pretoria’s commitment to WebCT and the central support provided for the use of the LMS, extensive experimentation with other technologies does take place. De Villiers and Cronje describe an immersive Master’s level courses in Internet-based learning that forms part of the M.Ed. programme. The course teaches theoretical and practical skills in using the Internet to present and manage teaching. While the MEd is taught face to face, this module is only offered online so that students have to experience being a student in this mode of learning. The course makes use of common software like Dreamweaver and Frontpage and makes use of e-mail and Yahoogroups for communication. Students create web pages using tools of their choice. The main web page makes use of the metaphor of a junior


schoolroom with a blackboard, poster wall and learner’s desks. Learners are able to personalize their desks. The course does not explicitly teach web development skills, but provides links to online tutorials. In another case, the University has explored the use of interactive television to supplement face-to-face teacher training at a rural community centre. Teacher training is usually conducted at such centres by university staff, but there is no follow-up once training is completed. Use of interactive television allows for “an active network for collaboration, support, reflection and motivation between educators and lecturers”. Two issues proved important – instructional design of materials appropriate to interactive television and the management of technology in inaccessible areas. The process included distributing materials to learners before the workshop, interaction with learners during the workshop and follow up activities. Learners were taught computer skills and were expected to complete assignments using word processors. A keypad that revealed a photo and details about each responding teacher was used by the facilitator (but could be substituted with a classroom layout) and an open telephone line facilitated communication (but was confusing and needed careful management).

The Multimedia Education Group (MEG) at the University of Cape Town (UCT) was established in 1997 through a research grant from the Mellon Foundation with the goals of researching and implementing interactive computer based technologies and approaches to learning and teaching, particularly in support of the increasingly diverse student body. In 2005, MEG became the Centre for Educational Technology (CET), charged with the development of and support for e-Learning across the university. The centre works in partnership with educators to develop curricula and supporting materials, develops and supports online learning environments, develops staff capacity in the use of ICTs in learning and teaching and conducts research. By 2005, CET had been involved in more than 40 e-Learning projects within the university. In developing educational interventions, the approach has been to make use of the existing technology infrastructure and skills, keeping interventions simple, flexible and appropriate to the context. By being creative, CET has found it possible to produce less resource-intensive solutions that are flexible and less likely to become obsolete. For example, they made use of the powerful features of Microsoft Office to develop a range of tutorial activities in Mathematics, Writing and Economics courses (MOVES). Staff and students are familiar with the software and it is installed and supported across the university. The Isiseko project focused on improving academic skills among first year history students from ‘disadvantaged’ backgrounds. The project provided tutorials to develop skills in constructing an argument which made use of the metaphor of building a house, and citation and referencing practices that drew on examples of gossip and debate. Examples of teaching interventions include a tutorial which simulates the experiences of a ship’s engineer using ultrasonic checking equipment to examine flaws in the hull of a ship for mechanical engineering students and the use of an online environment to simulate the process of editing a film by selecting from a set of clips to understand theoretical concepts in film directing. In general, lecturers draw on technology experts to show them the potential of new technologies and to undertake the time-consuming and technically challenging task of creating multi-media materials. The interaction with CET staff challenges lecturers to

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28 Ibid. p.41
30 Ibid. p.206.
rethink their teaching approaches. The growth of CET provides a salutary example of how a ‘research-driven’ programme, originally not conceived as an overall institutional initiative, can develop into a mainstream university service agent. CET is now responsible for university-wide support and development of e-Learning; it operates an e-learning platform for the university, built on an open content software base, extended for local needs. The centre has become an acknowledged node of expertise at both research and higher education policy levels in South Africa.

At the University of KwaZulu-Natal, similar institutional developments have created a situation in which bottom-up, ‘research driven’ course delivery online has led to the development of a home-grown, open source learning management system increasingly adapted to the needs of academic users across the university. One example of this in recent literature is the use of Reason!Able software in Philosophy I critical reasoning courses in an attempt to address the learning needs of students across a range of different courses. This software teaches the “precise analytic skills of argument and critical reasoning” which are important to students in the Humanities and Social Sciences. Spurrett is of the view that the e-Learning modality is better able to maintain attention to the salient features of an argument than is a lecturer or tutor in a face-to-face learning situation. The interface provides cognitively helpful representations – those that “make the right sorts of information salient”, whereas bad representations are “an impediment to learning” because they “clutter the visual field with irrelevant distractions”. Although evaluation research on the programme has not been concluded, initial impressions are that the level of detail and clarity in the written assignments of students increased steadily throughout the course and improvements were observed in the abilities of the tutors.

The Durban University of Technology is a result of a merger between the Natal Technikon and ML Sultan Technikon. The ‘Pioneers Online’ project drew its staff from both of the two technikons, and has benefited from their combined expertise and cross-fertilization of ideas. The project is located within the Centre for Higher Education Development (CHED), which provides it with a unique nurturing environment. The aim of the Centre is to assist ‘academics in the development of teaching and learning’ strategies while the ‘Pioneers Online’ project supports lecturers in developing online learning spaces and materials. In this way it resembles CET at UCT, but the emphasis is on professional development. Pioneers online arose from in ‘DIT’ online a student-run news website which provides a voice for students and offers a training ground for student journalists. Lecturers were able to spot opportunities for interdisciplinary projects for their students. For example a project in which journalism students conducted a campus wide opinion survey was supported by students in statistics who completed the statistical analysis. Lecturers are encouraged not just to use technology for the sake of it, but to find relevant and appropriate technologies that complement the special features of the subject.

The University of the Western Cape have experimented with the development of an open-source home-grown LMS, known as KewlNG. A new version of this, under development since 2004, was launched in 2005. An e-Learning Division was established in May 2005 with responsibility to ensure that academics understand the importance of ICT in education and how it can be used to enhance their face-to-face


34 Ibid, p.165


36 The Durban Institute of Technology (DIT) was formed out of a merger between M L Sultan Technikon and Technikon Natal in April 2003, with numerous allusions to MIT. However, it seems the subtlety of the move was lost on the broader South African higher education community and public, and it has since changed its name to the Durban University of Technology (DUT).
teaching and learning. The E-Learning team offer training and support to academic staff in the use of ICTs in their learning and teaching37.

These examples provide some instances of how initiatives developed ‘on the ground’ can lead to innovative, larger scale e-Learning programmes in higher education teaching and learning contexts. There are a number of other examples reflected in the literature which we have not mentioned here38.

Absence
It is easier to report on what has been done because this is written about and analysed. It is more difficult to report on the absence of ICTs in higher education institutions, and yet this is an important aspect of e-Learning. To some extent one has to report here on what is palpably absent in the literature. Cases of institutions or departments within institutions where e-Learning has not been adopted provide insight into the contexts in which barriers to e-Learning exist.

While many of the historically disadvantaged universities and technikons have benefited by mergers or collaborations with better equipped universities, many do not feature in the case studies and research reported. For example, e-Learning at the University of Limpopo extends to online courses in computer literacy using the MS Office suite and Groupwise, based on the development of the Batlhami Online Programme in collaboration with Massey University in New Zealand39. However, this is to our knowledge not reported in any publicly available literature. Similar initiatives in the use of LMSs, notably one at the Vaal University of Technology where the VUTOnline programme has been built on a Moodle open content software platform, are not reported in the literature. So it is difficult to know what substance there is in these initiatives that might contribute to broader national debates on ICTs in higher education. The contexts which result in an absence of ICTs in higher education are well illustrated by the distance learning programme for teachers in the Eastern Cape run by the University of Fort Hare40. In this programme materials are paper based and computers are only used for administration. There is little scope for introducing online materials since most of the learners do not have access to computers although the possibility is discussed of introducing audio materials (using cassette tapes) as has been done in similar programmes in sub-Saharan Africa.

Overall Situation in SA Higher Education
It is clear from the case studies presented here that e-Learning in South African higher education is represented by a wide range of scenarios from large and sophisticated implementations of learning management systems to a complete absence of technology in learning. In between these extremes is an exciting and active bricolage of projects of varying sizes and complexity that are experimenting with innovative applications of technology to specific learning contexts.


In situations where large groups of students are being addressed who have access to technology, many of the established learning technologies can be usefully applied. Although students and staff may lack skills in the area, this obstacle can be overcome by providing training and support. In such scenarios there are operational efficiency and pedagogy benefits to be had. The costs associated with such implementations, including the cost of the technology infrastructure, of developing or adapting learning materials and of ongoing support should not be underestimated.

Where smaller numbers of students are involved, where there are challenges in access to technology, or where resources do not permit the implementation of large-scale solutions, e-Learning can still be beneficial. By making use of technology that is available and with the support of technical experts who understand the potential of technology, it is possible to design specific interventions that address specific learning goals. In many cases it has been shown that these interventions address pedagogical problems in ways that cannot be addressed without technology.

What does appear to emerge strongly from the case studies is that in all cases institutions benefit by making available a central pool of technical skills – in both ICTs and pedagogy – that can be accessed by academic staff to provide ideas and insights into the technologies and to work on the development of e-Learning materials. It is clear that academic staff are overburdened and (in most cases) lack the skills to effectively implement e-Learning without support. e-Learning often involves significant changes in the work patterns of academics and they need to be supported through the process of making those changes. Where such central support is not provided, achievements in e-Learning have been the results of exceptional effort by individuals (or small groups) with vision and an unusually wide range of skills. Strengthening of central support for e-Learning at all institutions would be beneficial.

And finally, large tracts of the higher education landscape remain unexplored in terms of the potential for e-Learning. These include institutions that lack resources and that serve student populations with no access to ICTs. There is the potential to make use of these institutions to provide access to technologies and build the ICT skills of the communities they serve. Greater access to computer laboratories and Internet with the improved support for the infrastructure and basic training in ICTs for staff and students would be an important first step in bringing these institutions to a position where they could explore e-Learning further.

Part 2: Broader national imperatives and limitations
In this section, we seek to provide succinct accounts of the overall situation in South African higher education with regard to the provision, support and development of ICTs in teaching and learning in South African universities.

There are 22 universities in South Africa (see Table 4 on pages 22-23), which have come into being after a long period of rationalization of the higher education sector in the aftermath of apartheid and the transition to a unified educational dispensation. Most are the product of mergers of various institutions, with uneven histories and academic reputations.

National ICT Infrastructure
Uptake of ICTs by higher education institutions are to a large extent dependent on how enabling the national environment is, particularly in terms of national policies and the general ICT infrastructure available. This section deals with infrastructural provision at national level in South Africa as a way of understanding the broad context within which higher education initiatives on ICTs are located. Key forms of ICT infrastructure considered include fixed telephone lines, mobile phones, personal computers, and Internet connectivity.
Compared to other countries within the Sub-Saharan region, South Africa generally has more access to telecommunication infrastructure. With a network index of 104.7, the country is by far above any other country on the continent in terms of its communication network system, with the exception of Mauritius (with a network index of 141.6). As reported by the International Telecommunication Union, the Network index is composed of the following indicators: fixed telephone lines per 100 inhabitants, mobile cellular subscribers per 100 inhabitants, and international internet bandwidth (kbps per inhabitant). By 2001, there was an average 112 fixed lines per 1000 people and this was by far above the average of 14 lines in Sub-Saharan Africa, but below the average for lower middle income countries which had an average 146 lines per 1000 people.

Table 1 shows percentages of households with access to fixed telephone line as well as cell phones. It reflects a picture of low levels of access to fixed line even in Gauteng which is the industrial powerhouse and richest province of South Africa.

<table>
<thead>
<tr>
<th>Province</th>
<th>Percentage households with cell phone</th>
<th>Percentage households with landline</th>
<th>Percentage households with access to PCs</th>
<th>Percentage households with access to Internet</th>
</tr>
</thead>
<tbody>
<tr>
<td>Western Cape</td>
<td>46.7</td>
<td>55.3</td>
<td>33.8</td>
<td>23.4</td>
</tr>
<tr>
<td>Gauteng</td>
<td>48.7</td>
<td>28.5</td>
<td>25.2</td>
<td>20.0</td>
</tr>
<tr>
<td>KwaZulu-Natal</td>
<td>35.2</td>
<td>31.7</td>
<td>13.3</td>
<td>8.2</td>
</tr>
<tr>
<td>Free State</td>
<td>33.9</td>
<td>21.8</td>
<td>10.3</td>
<td>7.3</td>
</tr>
<tr>
<td>North West</td>
<td>35.3</td>
<td>15.0</td>
<td>9.9</td>
<td>5.0</td>
</tr>
<tr>
<td>Northern Cape</td>
<td>20.1</td>
<td>20.0</td>
<td>9.8</td>
<td>3.9</td>
</tr>
<tr>
<td>Eastern Cape</td>
<td>25.7</td>
<td>15.9</td>
<td>7.9</td>
<td>5.5</td>
</tr>
<tr>
<td>Mpumalanga</td>
<td>26.3</td>
<td>17.6</td>
<td>7.6</td>
<td>5.5</td>
</tr>
<tr>
<td>Limpopo</td>
<td>26.1</td>
<td>7.1</td>
<td>4.4</td>
<td>3.0</td>
</tr>
<tr>
<td>National average</td>
<td>33.1</td>
<td>23.6</td>
<td>13.6</td>
<td>9.1</td>
</tr>
</tbody>
</table>

Most of the fixed lines are in larger cities which had 415 lines per 1000 people by 2001. Telkom South Africa Annual Report for 2003 shows that South Africa’s fixed line network stood at 4.84 million users. However the Household Survey of 1999 shows that while Telkom had managed to provide access to telephone for 90 per cent of the population within 30 minutes walk, the restructuring process within Telkom had resulted in tariffs becoming too expensive, thus making the services unaffordable to many people. About 500 000 households were said to be no longer

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42 Ibid.


connected. Figure 1 below confirms that penetration of fixed lines in South Africa increased during 2000 and then decreased again. While in 2003 there were approximately 10 per 100 fixed line users in South Africa, there were nearly 40 per 100 mobile users by 2004. Clearly, this increase was at the expense of fixed lines as can be seen in Figure 1 below, which shows growth of mobile teledensity compared to fixed lines.

Table 1 shows striking provincial variations in terms of households’ access to computers, with poor provinces like Limpopo having only 4.4% of households having access to such technology. The national average household’s access of 13.6% is reportedly very low, compared to middle income countries. This low level of accessibility to personal computers by households in South Africa is corroborated by Czerniewicz and Brown who report an estimated personal computer density of 7.2 per 100 people in the country. Like telephone connectivity, most of the personal computers are also concentrated in urban areas.

Figure 1: Total Telephone Density in South Africa between 1997 and 2004

By early 2004, overall Internet penetration in Africa was around 1.5 per cent, with the highest penetration recorded in Réunion (over 20 per cent) followed by the Seychelles (around 14 per cent). South Africa and Tunisia were next in line with between 6 and 7 per cent. This compared with over 50 per cent Internet penetration in developed countries. Relatively speaking, household accessibility to Internet is still very limited in South Africa, with the Western Cape recording the highest accessibility of 23.4% and Northern Cape and Limpopo provinces recording the lowest accessibility of only 3.9% and 3.0% respectively. Immense disparities from

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45 Freedom of Expression Institute (no date). Telecommunications – a right or a privilege? Pamphlet.
province to province are discernible in terms of internet accessibility. These statistics clearly show that Internet connectivity is still one of the biggest stumbling blocks in South Africa and will continue to be so until stronger emphasis is placed on universal service in underserved areas, particularly amongst the rural communities.

Several handicaps such as poor communications infrastructure, inadequate and unreliable electricity and telephone networks, and high telecommunication costs constrain the spread of Internet connectivity. The cost of dialup service is a significant factor limiting use of Internet in the country. It is generally known that dial up access in Africa is high when compared to developing countries in general; in South Africa it remains relatively high compared to other countries on the continent.\(^{49}\) Average dial up costs for 20 hours of connectivity per month for the continent as a whole are reported to be at $67.00; South Africa (along with Nigeria, Namibia and the Cameroun) is at $40.00, with Tunisia at $30.00, Egypt at $60.00 and Kenya at $123.00.\(^{50}\)

The amount of bandwidth a country has determines how much information can quickly travel from one country to another. By late 2000 the bulk of Internet connectivity linked the US with Europe (56 Gigabytes per second) and, to a lesser extent, the US with the Asia-Pacific region (18 Gb/s). Africa had extremely little bandwidth reaching Europe (0.2 Gb/s) and the USA (0.5 Gb/s). The latest figures indicate that the total international incoming Internet bandwidth is now well over 1 Gb/s, while outgoing traffic is estimated at about 800 Mb/s.

At the beginning of 2004, South Africa’s broadband penetration as a percentage of residential lines sat at 0.008 per cent and this was significantly behind the average of 1.96 per cent in other comparable countries in lower middle-income countries.\(^{51}\) Figure 2 shows South Africa, amongst other African countries with access to the Internet and the applicable International Bandwidth links by 2001.

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\(^{50}\) Ibid.


Although it would seem that the entire South Africa has access to the Internet, this remains well below middle income countries such as Hong Kong, Singapore, and Mauritius, both in terms of the total bandwidth feeding the country and from an Internet penetration perspective. However, there are indications that there have been a growing number of Internet access points for individuals in the country. These include Internet cybercafés, schools, community centres, universities etc. Excluding schools and universities, there are about 941 access points including cybercafés, Multipurpose Community Centres (MPCC), post offices, digital villages and telecentres in South Africa. These developments provide great potential for improving access to Internet, especially by the young population in the country. In 2004, the Minister of Communications in South Africa launched 35 ICT Telecentres, E-Schools, Cyberlabs, and Multi-media Resource Centres in the rural nodal points of South Africa. The technology installed in these facilities normally includes computer with connectivity, printer, photocopier, scanner, fax machine, a TV set, video recorder and Internet connectivity. It is worth noting that due to such developments in Internet infrastructure, there were 3 523 000 Internet users by August 2004, which represented 7.4% of the national population.

Recent studies have shown that access is a complex and multifaceted aspect that needs a lot more resources and effort than just providing computers. A study done on Real Access by Bridges.org showed that real access criteria should include the following categories: physical access, appropriate technology, affordability, capacity, relevant content, integration into daily routines, socio-cultural factors, trust, legal and regulatory framework, local economic environment, macroeconomic environment and political will. The criteria show how issues of access to communication technologies pose challenges in attempts at bridging the divide between rural and urban, rich and poor, and literate and illiterate communities in the South African context. Having the infrastructure available is a necessary but not sufficient condition for access.

In particular, we should note here that an important element in the use of ICTs in higher education is the need to build the ‘human infrastructure’ of institutions at the same pace as connectivity. Use of computers generally, and for accessing Internet in particular requires requisite knowledge and skills which are evidently lacking on the part of most academic staff.

**Institutional Infrastructure**

At this stage, there is not much substantive, published research on ICT infrastructure at higher education institutions in South Africa; this makes availability of such data difficult. The exception is a recent study of the five higher education institutions in the Western Cape province of South Africa. While not necessarily typical of the whole of South Africa, the study gives an indication of infrastructural issues that are likely to be found across the diverse higher education institutions in the country.

For purposes of this review, we boil down the issue of on-campus ICT infrastructure to the basic issue of how much access to computers students have for purposes of learning.

The first general point that the literature seems to indicate is that there is a discrepancy in access to computers along the lines of the older inequalities of South African higher education institutions. The historically disadvantaged institutions, as determined earlier, seem that they have less robust ICT infrastructures in place than do their more advantaged counterparts. While the now well-documented situation in the Western Cape suggests the discrepancies are not stark, comparison of their situation with that of the University of Limpopo points to an issue which may well

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be replicated more deeply across the whole of South Africa. Table 2 indicates student:computer ratios at the Western Cape institutions. That the University of Cape Town and the Cape Technikon have much lower ratios than do the University of the Western Cape and the Peninsula Technikon is not unrelated to the inequalities of provisioning of the past, although it may also relate to other differences in policy and teaching strategy. When considered alongside another set of statistics related to computer access, this picture deepens. Table 3 overleaf provides an indication of the points on campus at which students can use computers. In the historically disadvantaged institutions, access to computers is more centralized, whereas in the others access tends to be more distributed across faculties and even residences. An important observation is that, while at Stellenbosch University and University of Cape Town, there is significant provision of computer facilities in student residences, the tendency at the Cape Peninsula University of Technology and University of the Western Cape seems to be for computer access to be much more centralized.

Table 2: Student:computer ratios at higher education institutions in the Western Cape55

<table>
<thead>
<tr>
<th>Institution</th>
<th>2005 student enrolment</th>
<th>Number of student computers</th>
<th>Student:computer ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>*Cape Technikon</td>
<td>18 523</td>
<td>1588</td>
<td>11:1</td>
</tr>
<tr>
<td>*Peninsula Technikon</td>
<td>10 040</td>
<td>1654</td>
<td>6:1</td>
</tr>
<tr>
<td>University of Cape Town</td>
<td>21 716</td>
<td>3042</td>
<td>7:1</td>
</tr>
<tr>
<td>University of the Western Cape</td>
<td>14 873</td>
<td>1455</td>
<td>10:1</td>
</tr>
<tr>
<td>Stellenbosch University</td>
<td>22 082</td>
<td>1631</td>
<td>12:1</td>
</tr>
</tbody>
</table>

*Note: The Cape and Peninsula Technikons merged to become the Cape Peninsula University of Technology

Table 3: Location of where students access computers on campus56

<table>
<thead>
<tr>
<th></th>
<th>Cape Technikon</th>
<th>Peninsula Technikon</th>
<th>University of Cape Town</th>
<th>University of the Western Cape</th>
<th>Stellenbosch University</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Faculty</td>
<td>53%</td>
<td>16%</td>
<td>63%</td>
<td>36%</td>
<td>52%</td>
<td>49%</td>
</tr>
<tr>
<td>Central</td>
<td>27%</td>
<td>80%</td>
<td>7%</td>
<td>39%</td>
<td>16%</td>
<td>28%</td>
</tr>
<tr>
<td>Residence</td>
<td>1%</td>
<td>10%</td>
<td>2%</td>
<td>24%</td>
<td>7%</td>
<td>7%</td>
</tr>
<tr>
<td>Library</td>
<td>11%</td>
<td>11%</td>
<td>6%</td>
<td>11%</td>
<td>7%</td>
<td>10%</td>
</tr>
<tr>
<td>Other</td>
<td>5%</td>
<td>1%</td>
<td>6%</td>
<td>9%</td>
<td>6%</td>
<td>6%</td>
</tr>
<tr>
<td>(N)</td>
<td>1451</td>
<td>751</td>
<td>213</td>
<td>1128</td>
<td>638</td>
<td>6105</td>
</tr>
</tbody>
</table>

56 Ibid.
When statistics available for the University of Limpopo are brought into the picture, this trend seems even starker. On 2005 statistics, there are some 17 500 students at the university (see Table 7 on page 32), some three quarters of whom are based on the Turfloop campus in Polokwane. There are five computer laboratories available on that campus for the use of students, containing total of 220 computers. Moreover, three of these laboratories are in a single building, the one housing information systems and mathematics functions, and all are centralized. As the university itself puts it, reflecting on what is apparently a student:computer ratio of approximately 55:1, “computer laboratories are heavily over-subscribed and the ICT Division is looking at ways of ensuring that students with legitimate academic work receive preference”57.

Now this points to a possible trend which requires further careful empirical research and commentary in South Africa: with regard to basic provisioning of ICTs in higher education institutions, there seem still to be historical backlogs related to apartheid that need to be overcome.

Institutional higher education e-Learning centres

Given the hype around the importance of e-Learning in higher education, at least at the level of provision of ICT infrastructure, all South African universities seem to have some form of dedicated information technology department. Most also appear to have a centre concerned with the support of e-Learning in some way or another, although there are relatively few dedicated individuals doing this work. Such centres range from those which seem simply to work with basic ICT training for lecturers (e.g. Walter Sisulu University, University of Venda) to those which have relatively sophisticated research operations integrated with systematic support programmes for lecturers in the development of e-Learning (e.g. University of Cape Town, University of Pretoria). As Czerniewicz and her colleagues point out, the form and location of these organisational structures reveals something about how the institution in question views the nature and role of educational technologies in relation to teaching and learning58.

Table 4 sets out the dedicated centres in the various South African universities which are dedicated to the ‘function’ of e-Learning. It is apparent that the predominant tendency in the emergence of these sections within universities is for expertise to be located in teaching and learning support structures, rather than for ICTs to be conceived as merely a technological matter. In some cases, there is a more specific focus of the section, on teaching and learning in higher education per se.

The important point that needs to be noted here is that there appears to be a general recognition across the board in South African universities that teaching and learning issues are to be placed at the forefront of the establishment and support of e-Learning on campuses.

Table 4: SA University Centres Responsible for Supporting ICTs in Teaching and Learning

<table>
<thead>
<tr>
<th>Traditional Universities</th>
<th>Centre for Educational Technology, Centre for Higher Education Development</th>
</tr>
</thead>
<tbody>
<tr>
<td>University of Cape Town</td>
<td></td>
</tr>
</tbody>
</table>

### University of Fort Hare
- e-Learning Section, Teaching and Learning Centre

### University of the Free State
- Centre for Higher Education Studies and Development

### University of KwaZulu-Natal
- Centre for Information Technology in Higher Education

### University of Limpopo
- Academic Computing Support Section

### North-West University
- Academic Support Services

### University of Pretoria
- Department of Telematic Learning and Education Innovation

### Rhodes University
- Academic Development Centre

### University of Stellenbosch
- Centre for Teaching and Learning

### University of the Western Cape
- 1. Teaching and Learning Technologies Unit
- 2. E-Learning Division

### University of the Witwatersrand
- Centre for Learning and Teaching Development

### Comprehensive Universities

<table>
<thead>
<tr>
<th>University</th>
<th>Centre Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>University of Johannesburg</td>
<td>Centre for Teaching, Learning and Assessment</td>
</tr>
<tr>
<td>Nelson Mandela Metropolitan</td>
<td>Centre for Teaching, Learning and Media</td>
</tr>
<tr>
<td>University of South Africa</td>
<td>Institute for Curriculum &amp; Learning Development</td>
</tr>
<tr>
<td>University of Venda</td>
<td>Department of Information Technology Services</td>
</tr>
<tr>
<td>Walter Sisulu University for</td>
<td>Situation unclear in current merger context. An</td>
</tr>
<tr>
<td>Technology and Science</td>
<td>academic development unit at Border Technikon (one of the merging institutions) seems to facilitate web-supplemented courses.</td>
</tr>
<tr>
<td>University of Zululand</td>
<td>ICT Department (includes an “electronic classroom” for training lecturers in online applications)</td>
</tr>
</tbody>
</table>

### Universities of Technology

<table>
<thead>
<tr>
<th>University</th>
<th>Centre Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cape Peninsula University of Technology</td>
<td>1. Fundani Centre (teaching, learning &amp; academic support)</td>
</tr>
<tr>
<td></td>
<td>2. Centre for e-Learning</td>
</tr>
<tr>
<td>Central University of Technology</td>
<td>Centre for e-Learning and Educational Technology</td>
</tr>
<tr>
<td>Durban University of Technology</td>
<td>Centre for Higher Educational Development</td>
</tr>
<tr>
<td>Tshwane University of Technology</td>
<td>Department of Telematic Education</td>
</tr>
<tr>
<td>Vaal University of Technology</td>
<td>Department of Teaching and Learning, Centre for Institutional Development</td>
</tr>
</tbody>
</table>

However, as one commentator notes, this does not mean that priority concern with ICTs in teaching and learning is necessarily at the centre of university agendas, either in research terms or in terms of institutional governance:

“The location of such centres in learning and teaching structures represents a significant shift from the past, and signals an emphasis on the educational part of educational technology. However despite this, a supportive champion is an important
element in the power play of legitimacy and growth. … 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.”

National e-Learning policies
This section is a literature review of national ICT policy discussions and debates in the SA context. The literature review raises two key issues about ICT policy discussions in the country:

1. There seems to be a lack of discussion and debate to inform ICT policy issues with respect to the higher education sector.
2. Policy documents on higher education, such as they are, offer a very loose framework for implementing ICTs in the sector, suggesting that ICTs are not viewed as fundamental to the transformation of the sector.

The international literature suggests that higher education, across the globe, is significantly influenced by the advent of ICT, which is regarded as the main driver of the knowledge economy and a key ingredient for achieving global competitiveness

Thus ICTs have given rise to an economy, in which knowledge is the driving force of innovation and business growth. This economy is dependent on “innovation through the production of knowledge (mainly through scientific research), its transmission through education and training, its dissemination through ICT technologies and its use in technological innovation”, making higher education a critical player in this process

The dominant claim is that ICT impacts on higher education curriculum in two significant ways. The first is to serve as a catalyst of new knowledge conception and production processes, resulting in demands for particular forms of ‘high’ knowledge and skills. The second is to offer fundamentally new ways of organising and delivering knowledge (e-Learning). Thus the “potential to offer flexible, custom based education available to anybody, anywhere and anytime paves the way for a different kind of learning environment i.e. e-learning”, which changes the higher education landscape in important ways

- it changes the nature of its student body to include working students, as well as students from across the globe
- it has the potential to scale up education provision substantially i.e. massification
- it provides opportunities for a variety of institutions or organisations to offer education programmes through the internet, therefore increasing competition from a wider group of providers
- it offers new ways in which students and teachers interact and communicate, impacting on pedagogical strategies and teaching and learning outcomes.

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At one level, the predominant policy impetus in South Africa seems to accept these notions. e-Learning is viewed as offering flexible and inexpensive delivery that has the potential to respond to manpower shortages by increasing access to education and serving as an equaliser in economic development and transformation\textsuperscript{63}.

The South African government views e-Education as a crucial strategy in becoming globally competitive and locally responsive\textsuperscript{64}. It is seen as providing the foundation upon which an e-society can be built. This is reflected in the setting up of the PNC (Presidential National Commission on ICT) and also the PIAC (Presidential Information Advisory Committee on IT), both of which prioritise the relationship between education and ICT. It is further supported by the development of the White Paper on e-Education (......) which sets out a comprehensive framework for implementing ICT in schools\textsuperscript{65}. Accordingly, e-education is necessary for effective participation in the information society, has the potential to enhance teaching and learning, promote access, create new opportunities for learners and teachers and, therefore, transform education. For the Minister of Education it is not “whether we ... introduce ICT in teaching and learning” but “how we can successfully introduce ICT in schools”\textsuperscript{66}.

However, while it is evident that ICT is viewed by government as an important factor in the economic growth and development of South Africa, the higher education policy framework suggests that it is not viewed as being critical to transforming the sector. The 1997 White Paper on Higher Education represents a comprehensive strategy and programme for transforming the sector. This includes ensuring high quality relevant education, high skills output, efficiency, and access and redress. Yet it makes references to ICT only in very broad and unspecific ways. There are statements about ICT as critical in the global economy and in changing the nature of knowledge and skills required to function effectively in this era, but few references are made directly with respect to e-learning, which is generally linked to distance education provision. For instance the White Paper indicates that:

“It will promote the development of a flexible learning system, progressively encompassing the entire higher education sector, with a diversity of institutional missions and programme mixes, a range of distant and face-to-face deliver mechanisms and support systems, using appropriate, cost-effective combinations of resource-based learning and teaching technologies … expanding the range of programmes and increasing enrolments based on open learning and distance education, especially for young and older adults, with particular emphasis on women.”\textsuperscript{67}

Clearly the White Paper makes no specific statements about possible strategies to use ICTs to support teaching and learning as well as implications for new cognitive research and pedagogical practices concerning the use of technology as a tool in teaching and learning. Instead the focus is on supplementing distance education.

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\textsuperscript{66} Foreword by Minister of Education, in Departments of Education and Communication (2001). Op cit., p.3.

Regarding the issue of massification, it is not clear what the policy stance is on increasing access to higher education through the use of technology. In this regard the White Paper supports the provision of higher education through using technology to support working students, as these students generally have access to the required technologies. However, it cautions against the proliferation of poor quality higher education:

“The risk the Ministry wishes to avoid is a laissez-faire proliferation of higher education programmes by an increasing range of providers, without benefit of a planning framework and without adequate safeguards to ensure the quality of provision. This would almost certainly result in the unplanned blurring of institutional roles and functions, and, given resource constraints, a strong tendency to over-provide low-cost programmes in low-priority curriculum areas.”

All of this has led some commentators to suggest that the policy on ICT in higher education is not far reaching. Cross and Adam⁶⁹, for example, suggest that, while South Africa has gone a long way in adopting an exemplary approach to integration of ICTs in schools, it lacks a national framework and vision concerning the role of ICTs in higher education. This means that institutions have to rely on a series of fragmented statements scattered through policy documents which provide little direction (e.g. the Report of National Commission on Higher Education, the White Paper on Higher Education and the National Plan for Higher Education) to develop institutional frameworks and strategies. This in turn results in the proliferation of approaches to integrating ICTs in curriculum design and delivery, with attendant difficulties in extracting “common denominators that could be applied across the system”⁷⁰. While the literature indicates that policy and implementation trends throughout the world tend to respond to global drivers (the knowledge economy and ICT growth) at the expense of national and institutional interests, the South African experience shows how local imperatives do indeed shape policy contexts. Cross and Adam suggest that the SA case reflects the fact that ICT use is ad hoc, fragmented and uncoordinated and that in most instances, this is what is reflected in the formal policy positions. The White Paper’s strategies for e-learning are framed within existing paradigms and do not look at ICT as radically changing the nature of higher education in SA. This echoes a widely held view in South African higher education institutions that the less restrictive national strategies on ICT are, the better the possibilities are that institutions can be innovative in seeking models of implementing ICT in higher education⁷¹.

It is apparent that there is no national ICT policy or regulatory framework for higher education. Whether this is desirable or not has been the subject of much recent debate in South Africa. In a recent engagement with key academic players in e-Learning in higher education, conducted on behalf of the Higher Education Quality Council, SAIDE reached the conclusion that it would not be desirable to develop a specific regulatory framework focused on this area in South Africa⁷². Rather, the matter of e-Learning in higher education should more appropriately be dealt with in the context of existing regulatory principles and frameworks. Of course, this is not to say that a national policy framework would be undesirable, since such a document might establish positive, open-ended principles to be striving for in the long term rather than minimum standards or criteria, which is what a regulatory

⁶⁹ Ibid. Cl. 2.38. p.22.
⁷¹ Ibid. p. 74.
framework tends to reflect. There are a number of voices in South Africa arguing for a national policy framework to be seriously considered for ICTs in higher education, not least in relation to the uneven implementation of e-Learning across the sector.

Clearly the higher education policy environment does not promote a comprehensive strategy or programme for the use of ICTs in higher education. This perception is supported by Czerniewicz and colleagues\(^\text{73}\), who suggest that there is neither a framework nor monitoring and evaluation of ICT implementation in higher education, and that policy documents reflect the *ad hoc*, limited focus on ICT. In fact the focus of policy is on ensuring that students develop the necessary skills required by the knowledge economy and not on the use of ICT to support teaching and learning.

The dominant approach of government and regulatory authorities thus seems to be focused on using ICT to support existing education programmes and paradigms, and is not aimed at using ICT to fundamentally change education practices in the sector. It appears to be informed primarily by the access challenges that underpin demands for more prescribed ICT implementation and use. The result is that there is substantial room for institutionally informed choices, which can be creative but also can raise serious issues concerning access and equity imperatives that divide the South African terrain so starkly. In this context a search for that which is possible within the macroeconomic context is critical.

### Institutional e-Learning policies

There are indeed a number of comprehensive strategies that have been developed by some higher education institutions. Others have only broad position statements with implementation being left up to individual departments or lecturers. The continuum represented here, of policy statements on ICTs in higher education, can be usefully employed to describe some of the positions adopted by institutions.

By the late 1990s, a number of universities had already put in place extensive policy frameworks governing the use of ICTs in education and in institutional governance and administration, which they continued to develop into the 2000s. The universities of *Stellenbosch* (an integrated strategy incorporating “e-Learning, e-Information, e-Student administration, e-Research, and e-Services”) and *Pretoria* (Telematic Learning and Education Innovation Strategic Plan) are notable in this regard. More recently, *Tshwane University of Technology*, and the universities of the *Free State, Limpopo, Cape Town and Western Cape*, have developed similarly comprehensive policy statements.

However, there is still a range of emphases contained in these documents: the 2004 ICT Policy Document of the *University of Limpopo*\(^\text{74}\) makes no mention of teaching and learning issues, other than insofar as they are part of the mission statement of the institution. The *University of Cape Town*’s 2003 Education Technology Policy, on the other hand, prioritises the articulation of technology in pedagogy, treating ICTs as a “knowledge domain” linking education, information and ICTs. This reflects our earlier observation that the policies that universities have adopted in this regard are closely aligned to the predominant ideas that are carried in the institution about the nature of teaching and learning. Where there is a belief that ICTs are merely a neutral medium to carry any kind of pedagogic principles, then the tendency is not to write principles related to teaching and learning into (or link them to) an ICT policy. Where, however, there is a fundamental recognition that the manner in which ICTs are deployed carries with it implications for pedagogy, then policies tend to integrate the two in some manner.

\(^{73}\) Czerniewicz et al. (2006). *Op cit.*

At the other end of the spectrum, there are institutions that appear to have no policy framework related to ICTs in education. The University of the Witwatersrand, for example, is practically silent on the issue, apart from a statement in the strategic plan that the university will implement e-Learning where applicable75. And then there are institutions which have formulated principles about teaching and learning that refer to the importance of ICT usage, but which do not necessarily have core institutional polices on ICT usage in place. These range from systematic teaching and learning strategy documents (Durban University of Technology) to looser collections of documents that guide university processes (Rhodes University)76.

In a survey of universities conducted early in 2006, in which official university responses to a questionnaire were obtained, SAIDE produced the description of ICT policies in place in South African higher education institutions contained in the table overleaf77. The categories used here were guided by those sent out earlier by Czerniewicz, Ravjee and Mlitwa78, and the purpose of the survey was to verify and possibly extend the work done by these authors. Only four universities did not respond to the questionnaire.

Table 5: Survey of ICT Policies at SA Higher Education Institutions (June 2006)

| Institutions with formal polices complete with strategic plans and regulatory frameworks, as well as statements of policy principles | University of Pretoria  
University of Stellenbosch  
University of the Western Cape |
| --- | --- |
| Institutions with formal policies or strategic documents with clear principles and intentions but no operational implementation documents as yet | University of Cape Town  
Tshwane University of Technology |
| Institutions with Draft Polices | University of Fort Hare  
University of the Free State |
| Institutions where ICT policy is incorporated into related policy documents | Durban University of Technology |
| Merged institutions where it is not clear if policy from one institution applies across the new institution | University of Johannesburg  
University of KwaZulu-Natal |
| Institutions with no frameworks (although they may have relevant institutional structures) | Cape Peninsula of technology  
Nelson Mandela Metropolitan University  
Rhodes University  
University of the Northwest  
University of Venda |

75 See the case study by Mhlanga (2005). Op cit.
South African Research on ICTs in Education

Czerniewicz, Ravjee and Mlitwa pose the question as to whether or not ICTs and learning can be considered an emerging domain of research inquiry in South Africa. While not wanting here to tackle the philosophical issues at stake, which (if one is a realist) have to do with ontological questions concerning different strata of reality and the sciences associated with them or (if one is a post-modernist) with definitions of discursive communities of practice, the answer that they suggest is that “this field of research is in the process of defining itself and clarifying its boundaries”. This is as true, they suggest, of international research trends as it is of debates and developments in a specific South African literature.

What then can be said of this process of definition in South African literature? A recent analysis of South African higher degree research output on the pedagogical integration of ICTs suggests that only a tiny proportion of dissertations and research reports in the area are concerned with actual teaching and learning processes in ICT-borne learning environments. From 1990 – 2005, well over 200 funded higher degrees awarded by South African universities related to the study of ICTs in education: approximately 50% of these were on management of ICTs in education; and 50% related to pedagogical use. This sounds promising as an indication of some kind of serious research trends related to the latter category, until a further breakdown is examined, along the following lines:

Table 6: Funded Higher Degrees on ICTs in Education, 1990 - 2005

<table>
<thead>
<tr>
<th>80% of studies related to pedagogical use of ICTs</th>
<th>20% of studies related to pedagogical use of ICTs</th>
</tr>
</thead>
<tbody>
<tr>
<td>evaluation</td>
<td>research on teaching &amp; learning processes</td>
</tr>
<tr>
<td>monitoring</td>
<td></td>
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<tr>
<td>impact studies</td>
<td>virtual communities of practice</td>
</tr>
<tr>
<td>policy research</td>
<td>peer-group learning around computers</td>
</tr>
<tr>
<td>e.g. quasi-experimental studies</td>
<td>individual learning processes</td>
</tr>
<tr>
<td>e.g. case studies</td>
<td>e.g. review of best practice</td>
</tr>
<tr>
<td>e.g. illuminative evaluation</td>
<td>e.g. comparative research</td>
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<tr>
<td></td>
<td>e.g. ethnography</td>
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<tr>
<td></td>
<td>e.g. discourse analysis</td>
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<tr>
<td></td>
<td>e.g. modeling</td>
</tr>
<tr>
<td></td>
<td>“mind-machine” relations</td>
</tr>
</tbody>
</table>

80 Ibid. p. 33.
In other words, only 1 in 10 dissertations over a period of 15 years seems to have been focused on actual processes of teaching and learning using ICTs. While these studies were not confined to higher education, the trend is unlikely to be very different.

Another interesting trend that emerged from this study is worth noting here: of the over 200 higher degrees awarded in this period, approx. 80% were produced at five universities – Pretoria, Johannesburg (RAU, as it was), Witwatersrand (all Gauteng) Cape Town and Stellenbosch (both Western Cape). This seems to indicate that, if there is a “field of research still defining itself” in South Africa, it is concentrated in the traditional, previously white universities.

Are these patterns equally evident in published research by academics in the field? Czerniewicz and her colleagues analyse recent articles on ICTs in higher education in the South African Journal of Higher Education:

“in 2001 there was one article …. However, there were three in 2002 and six in 2003. In 2004 there were three. The articles that have been published in SAJHE come from several different institutions. Two were from University of Cape Town, two from Rand Afrikaans University, two from University of Pretoria, and one each from the University of Witwatersrand, Cape Technikon, University of South Africa, University of Natal and the University of Stellenbosch.”

Certainly, the impression of an emergent research tradition still concentrated in a handful of universities is borne out. But there is perhaps evidence of more direct concern with teaching and learning issues. Their categorization of the types of research represented in these articles - “five were “big picture” articles on challenges, imperatives, change and critique. … seven 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.) – is not quite the same as that adduced above in relation to postgraduate outputs. The articles in the latter reference are concerned with pedagogies in ICT environments. These patterns are borne out by the contents of the more recent special editions of Education as Change (Vol 9, no2, December 2005) and Perspectives in Education (Vol 23, no4, December 2005) referred to earlier. In the former publication, there is a healthy balance between articles concerned with aspects of pedagogy (assessment, narrative strategies, mediation, training) and articles related to access and technological infrastructure. In the latter publication, of nine articles, all are focussed on pedagogical issues. Even if an outcome of editorial design, this is a good indication of increasingly focused research on such matters in South Africa. However, not unexpectedly, most of the articles are by authors from the kinds of universities mentioned immediately above.

The patterns that emerge here are suggestive of a number of important issues that need to be engaged in the South African context. Only relatively recently has the issue of the primacy of pedagogy in the use of ICTs been put on the national higher education agenda; previously the bulk of research on ICTs in education can still be said to have been trapped in the old mistake of allowing “the technological tail to wag the pedagogical dog”. A principled national research agenda focused on the pedagogic integration of ICTs seems to be required. Part of this agenda must tackle the question of the continuing marginalisation of institutions and individuals previously disadvantaged by apartheid. Questions of pedagogical access to ICTs, and the epistemological access that this might entail, seem to suggest certain kinds of priorities in research direction and development that may be distinctive of South Africa. On the basis of the preliminary analyses of the published literature that we have offered above, there is clearly a need to analyse more carefully theoretical and research developments in South Africa, and about South Africa, of the past two decades or so.

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Part 3: Higher Education Challenges in South Africa

Size and shape of higher education

The major transformational issue in South African higher education of the past decade has been the normalization of student intakes relative to the demographic composition of South Africa at large. It is widely acknowledged that dramatic progress has been made in this regard at the previously white universities of the apartheid era, although this is not to say that the process is complete. The same cannot be said for previously black universities, whose student demographics remain largely unchanged. Table 7 sets out the most recent statistics for all South African universities.

Table 7: Overview of South African Public Higher Education Institutions in 2005\textsuperscript{84}

Notably, the table indicates that with regard to gender equity, South African student enrolments are sound. However, with regard to the academic staffing of higher education institutions, progress with regard to racial and gender equity has not been as dramatic. Debates rage as to whether or not institutions, particularly previously white institutions, have made sufficient efforts to change the inherited imbalances of the past. Whatever one’s views are on these debates, statistics indicate steady changes towards equity on a year-by-year basis.

### Specific challenges being faced by the higher education sector

Higher education in South Africa is currently experiencing significant changes as a result of a number of contending forces and competing interests. These include:

- global pressure to ensure that education supports the global economy. This is often translated into market driven programmes underpinned by a utility...
model of higher education with an emphasis on skills and applications based research as well as demands to increase higher education throughput. This manifests in efforts towards reconciling the efficiency and fiscal discipline concerns that underpin the macro-economic policy framework with the principles of equity, access, redress and nation-building.

institutional pressure underpinned by the mission, values and historical context of institutions. Organisational factors such as how the institution defines knowledge production, what is viewed as the purpose of education as well as the historical context of institutions impact on the curriculum reform process.

Thus the process of change in institutions is mediated by multiple factors within a highly differentiated higher education sector. This results in a variety of responses by institutions depending on their histories, cultures, missions and resources.

The impact of these changes is telling in regard to teaching and learning, as market driven models of education assume precedence. One of three things seems to have happened to subjects or disciplines that have no direct bearing on the needs of the economy: they have been adapted, removed from the curriculum structure or reduced to the periphery. This has particular implications for the humanities, which tend to be positioned as subordinate to the all important science and technology. Accompanying these trends is the overall tendency to privilege particular conceptions and modes of production of knowledge driven by immediate economic concerns.

South Africa recently underwent a significant policy and legislative transformation process in higher education aimed at increasing access, efficiency, accountability and quality. This comprised a lengthy and highly participatory policy process, followed by the setting up of structures to support implementation. Critical milestones included the setting up of the National Commission on Higher Education in 1995, aimed at exploring possible models for South African higher education, followed by the Green Paper of 1996 and finally the White Paper of 1997 which set out the framework for higher education. Government played a significant role in the process and this is reflective of a highly active ‘state supervision’ model. The Ministries of Education and Labour were involved and through them a number of structures were set up to deal with quality, monitoring and accreditation. Key issues dealt with included:

- Institutional restructuring, institutional mergers and the creation of a single and no longer fragmented higher education system.
- New funding strategies based on efficiency and redress.

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89 This type of knowledge is sometimes referred to as Mode 2 knowledge and is characterised by an emphasis on skills, practical knowledge and applications based research. See Kraak, Op cit. p. 32.
• Articulation between qualifications through the National Qualifications Framework.
• Cooperative governance and partnership strategies.
• Access targets.
• Curriculum restructuring towards relevance and flexibility92

The South African policy environment thus reflects a dynamic tension between global and national priorities. While most agree that this is the case, many disagree on the extent of focus and emphasis of global versus national imperatives. According to Kraak, South African policy provides a reasonable combination of imperatives for both globalisation and democratisation93. The White Paper refers to several roles for higher education, including: support for the labour market; development of individual aspirations; creation, transmission and evaluation of knowledge; and socialisation of citizens. However, for Jansen and Kishun, South African policy is more strongly influenced by global pressures than national pressures94.

Clearly there are tensions between the democratic agenda of redress, equity and access and the global economic agenda of skills, efficiency and effectiveness and these are reflected in the debates on both policy and implementation. For instance, the National Qualifications Framework is at the nexus of the debates and tensions between education and training or education and the world of work. The National Qualifications Framework is aimed at ensuring articulation between different qualifications, creating a relationship between education and the world of work. Thus, it is viewed as a means to improve the skills and output of education and to steer higher education towards a relevant curriculum that supports the needs of society. However, for other commentators it is viewed as an attempt by the state to impose curriculum change in higher education95 and capitulation to market forces96.

Four issues seem to present challenges to the implementation of global trends in national curriculum reform:

1. ideology and culture;
2. historical context of higher education in South Africa;
3. massification and access;
4. the critical role of ICT.

Here we shall briefly discuss the first three, and then concentrate more on the fourth issue by way of refocusing our attention of ICTs and learning in higher education institutions.

The first issue on implementation of curriculum concerns the extent to which it may undermine local culture, values and the nurturing of a young democracy. Many programmes are underpinned by perceived notions of neutral technical education97. Some authors suggest that universalising of curriculum could destroy local culture and local patterns of life, impacting on democracy and human rights. They often

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advise that South Africa should develop its own responses by conducting an analysis of the needs and priorities of the South African society. The second challenge for curriculum reform is the historical context of institutions and associated lack of capacity and resources to transform. A number of commentators suggest that historical inequalities that underpin cultural and organisational arrangements in institutions cannot be underestimated and this impacts on the ability of institutions to respond to global pressures.

The third, perhaps most significant, challenge in the higher education system is to ensure increased access as well as throughput. While access is a significant driver of curriculum reform in the South African context both at policy and implementation levels, strategies for creating access are undermined by the financial challenges faced by the higher education sector and the drive for efficiency associated with it. Access is reflected at two levels in the literature – physical and epistemological. As mentioned above, there has been significant progress on physical access for previously denied communities, but the issue of epistemological access and success in higher education remains a challenge. However, this requires more intensive teaching and learning strategies in order to ensure success and throughput.

The literature suggests that attempts to support students to succeed has manifested in a range of strategies and responses. Firstly, pedagogical strategies dominate curriculum reform in relation to access. There are many examples in the literature of developing and testing new pedagogical approaches to support student access. Secondly, a range of bridging programmes have been developed to offer scaffolded learning and skills development to underprepared students. This includes offering students more face to face contact and more tutorials in smaller teacher student ratios. It is clear that dealing with issues of access require extensive resources which are not necessarily available, as government funding is not commensurate with the increased student numbers i.e. there is a discrepancy between the increased student numbers versus the government subsidy 20% versus 7%.

It is here where the fourth challenge adduced above comes into the picture with regard to teaching and learning. Claims are frequently made that the deployment of ICTs in higher education contexts will provide a platform for the proper delivery of and access to additional learning and teaching support that students require because of historical legacies of poor schooling. However, the challenges related to perceiving ICTs as enabling global higher education are significant. Most South African institutions do not have the required infrastructure, skills or access to operate at this level. This constraint must be considered in

proposed solutions for the country. There are also strong suggestions in the literature that access in the South Africa context cannot be provided through ICTs, as is the case in some developed countries\(^{105}\). Gillwald suggests that the centrality of information and communication technology as an enabler of access to higher education is not viable as most South African institutions do not have the required infrastructure, skills or access to operate at this level\(^{106}\). On the other hand, there is considerable evidence that substantial provision of computer technology and infrastructures in many South African universities are not being used to their fullest extent by students, from the point of view of teaching and learning. The imperative here seems to be much more considered academic support programmes (in the classical sense of the term), but centred on the development of properly scaffolded learning programmes in online environments. The task entails both research and teaching of fundamental importance for South African education.

This challenge, we would suggest, has particularly significant implications for current understandings of access in the light of post-apartheid imperatives for universities to be responsive to the learning needs of students: for example, the experience at the University of Cape Town seems to be that considered implementation of computer-supported learning in context helps to deepen the disciplinary understanding of students\(^{107}\) (sometimes termed “epistemological access”\(^{108}\)). However, at the same time, “because the digital domain has become so dominant and is changing how the world works, it is creating new realms of exclusion for students without access to computers and lecturers who are grounded in pre-digital print culture. In a context of increasing inequalities, it adds another layer of complexity to the challenge of social inclusion”\(^{109}\).

Open source software

There is a mix of proprietary and home-grown LMSs in use in South Africa, some based on an open source philosophy, with institutions aligning with particular products according for pragmatic, institutional or ideological reasons. Czerniewicz et al argue that the broader issues of open source and open content must be understood against the political imperatives of change in higher education:

“the choice of a specific online learning environment in terms of proprietary versus open source options [expresses concepts of change in practice]. . . . Such decisions may challenge or support dominant intellectual property relations”\(^{110}\)

They go on in the research report to show how debates about open source technology are deeply embedded in both political and pedagogical issues, and as such are pivotal to questions about higher education institutional transformation as a whole. While advocates of whatever position in the debate might argue only the advantages and disadvantages of using open source or proprietary software options in relation to cost, software development, and other technical issues, it seems that broader questions such as whether or not public funds can legitimately be spent on proprietary software for use in public institutions are germane to this terrain. The choices made certainly give a sense of these debates, even at face value.

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Table 8 overleaf indicates current usage of LMS systems at South African universities, insofar as we could establish it. Published literature is sketchy on the subject. We therefore utilized university websites and conducted telephonic interviews where necessary with apparently informed officials in the relevant institutions. This included an interview with Eiffel Corporation, the official suppliers of WebCT products in South Africa.

The table indicates that there is increasing use of LMSs in South African higher education institutions. In general, there seems to be universal acceptance that some form of online learning is necessary to the future of all universities, although the degree to which this should be web supported learning or fully online is still a matter for considerable debate and development in the future. Broadly, institutions can make one (or more) of three choices: (i) use licensed, proprietary (commercially sourced) software; (ii) develop a system on an open source software platform; and/or (iii) develop their own home-grown software (which may then be put into either a commercial or open source trajectory).

When one examines different levels of institutions, it seems that there may be many in which a range of LMSs is being utilised, with ownership resting at Department or Faculty level rather than at the institutional level\textsuperscript{111}. However, as the use of ICTs for multiple functions becomes more institutionalized, the number of available choices will no doubt tend to be reduced by management decisions. Thus the debate is likely to deepen regarding the choice between proprietary software and open source software. Many institutions that have relied on proprietary software in the past have found the experience restrictive, and have started exploring open source alternatives. At the same time, although a number of institutions have developed home-grown solutions, they have found them to be 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\textsuperscript{112}.

### Table 8: Use of Learning Management Systems by South African Universities\textsuperscript{113}

<table>
<thead>
<tr>
<th>Traditional Universities</th>
<th>LMS</th>
<th>Source</th>
<th>comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>University of Cape Town</td>
<td>Sakai</td>
<td>Open</td>
<td>Originally used WebCT, but migrated from it progressively for principled reasons; built its “Vula” platform on Sakai. Member of SA Sakai assoc.</td>
</tr>
<tr>
<td>University of Fort Hare</td>
<td>WebCT</td>
<td>Commercial</td>
<td>Has indicated an interest in moving to open source platform, possibly KEWL or Moodle based.</td>
</tr>
<tr>
<td>University of the Free State</td>
<td>WebCT</td>
<td>Commercial</td>
<td>Has expressed intention and is preparing to move to open source; member of SA Sakai association.</td>
</tr>
<tr>
<td>University of KwaZulu-Natal</td>
<td>OLS</td>
<td>Home grown Open</td>
<td>Open source product, developed in house.</td>
</tr>
<tr>
<td>University of Limpopo</td>
<td>WebCT</td>
<td>Commercial</td>
<td>Developed the “Batlihmi Online” programme on</td>
</tr>
</tbody>
</table>


\textsuperscript{112} Ibid.

\textsuperscript{113} Note: following merger of WebCT & Blackboard in Feb 2006, both these LMSs are classified above as WebCT.
The use of mobile technologies

The phenomenon of ‘m-Learning’ – learning enhanced by the use of mobile, wireless technologies – is receiving increased attention in South Africa in recent times. Engagements with this phenomenon range from primarily administrative uses of cell phones at Universities such as Pretoria and South Africa, through examining the optimal utilization of wireless computer connectivity at the University of Cape Town115, to complex utilization of such technologies in supporting content in teacher development programmes at the University of Fort Hare116. They incorporate work with a range of mobile ICTs, such as pod casting using MP3 players at the Central

### The use of mobile technologies

- **North-West University**: Varit, Home-grown Commercial; Has expressed intention to move to Sakai platform in future. Part of SA Sakai association.
- **University of Pretoria**: WebCT, Commercial; Strong public commitment to WebCT.
- **Rhodes University**: Moodle, Open; Used WebCT briefly, now migrated onto Moodle-based platform, largely for reasons of affordability.
- **University of Stellenbosch**: WebCT, Commercial; Strong public commitment to partnership with WebCT.
- **University of the Western Cape**: KEWL NG, Home-grown Open (with partners); Core development institution for KEWL; strong advocate of open source software.
- **University of the Witwatersrand**: WebCT, Commercial.

### Comprehensive Universities

- **University of Johannesburg**: WebCT, Commercial; Strong public commitment to partnership with WebCT.
- **Nelson Mandela Metropolitan University**: None; Limited in house LMS used at old PE Technikon (now merged into NMMU), now discontinued. At the moment institution currently using videoconferencing across 7 sites to deliver limited no. of courses (e.g. MBA) – no further use of ICTs at this stage114. Extensive planning taking place.
- **University of South Africa**: Sakai, Open; Previously used home grown software and WebCT; Migrated entire institution to Sakai platform from 2006; member of SA Sakai association.
- **University of Venda**: WebCT, Commercial.
- **Walter Sisulu University for Technology and Science**: WebCT, Commercial; Have received verbal reports of use of LMS; no other evidence from institution; Eiffel SA indicates the institution uses WebCT.
- **University of Zululand**: ?, ?; Information not available.

### Universities of Technology

- **Cape Peninsula University of Technology**: WebCT, Commercial.
- **Central University of Technology**: WebCT, Commercial.
- **Durban University of Technology**: WebCT, Commercial.
- **Tshwane University of Technology**: WebCT, Commercial.
- **Vaal University of Technology**: Moodle, Open; Has developed “VUTOnline” on Moodle base; minimal use in teaching and learning at this stage.

University of Technology\textsuperscript{117} and the development of pervasive computing systems across a range of mobile devices in support of learning at Rhodes University\textsuperscript{118}.

The potential for much of this work lies in the apparently high incidence of cell phone communication amongst South African higher education students. Although teledensity rates for the country appear to be low – “the situation in South Africa is uneven nationally and lagging internationally. … [only]11 in 100 people have fixed lines and 36 in 100 people have mobile phones”\textsuperscript{119} – there is much higher usage amongst university students. At the University of Pretoria, for example, in 2003, it seems that less than 10\% of students had off-campus access to the Internet, but more than 90\% had cell phones\textsuperscript{120}. There is thus widespread advocacy of the potential of this latter technology for teaching, learning and administrative purposes at universities.

Evidence available to us suggests that cell phone communication (particularly SMS communications) is used in two universities in the administration of courses, rather than for teaching and learning per se. At the University of South Africa, some use has been made of cellular phones to deliver exam results and reminders via SMS, but there have been problems with networks unable to support the high volumes of messages\textsuperscript{121}.

The University of Pretoria has also experimented with using text messaging on cellular phones to communicate marks and deadlines to students\textsuperscript{122}. Viljoen and colleagues, for example, describe the use of the cell phone short message service (SMS) for learning support for rural distance learners\textsuperscript{123}. Students were sent instructions about the SMS project which included abbreviations to be used. SMSs were used to give hints about readings and assignments; an interactive quiz; an invitation to submit questions on a specific part of the course; specific hints in response to student questions and an invitation to call and listen to a pre-recorded mini-lecture. Students found the hints helpful and 63\% called in to hear the mini-lectures.

There are also a number of examples of innovative research work on using mobile technologies to enhance teaching and learning in higher education. Ng’ambi, at the University of Cape Town, describes a project in which the “seamless integration of the SMS and the web interface” brought about by encouraging the use of SMS texting by students has had at least four positive implications for students’ learning:

1. “exposure to other students’ questions mirrored their own understandings and misunderstandings;
2. “anonymity created a feeling of a safe environment which empowered students to ask and respond to questions;
3. “students were able to monitor their own growth and development through observing their own changes in the way they asked questions;

\textsuperscript{118} Barker, A., Krull, G. & Mallinson, B. (2005). A proposed theoretical model for mLearning adoption in developing countries. Paper presented to the 4\textsuperscript{th} World Conference on mLearning, Cape Town, October 2005.
\textsuperscript{121} See Nonyongo, E., Mabusela, K. & Monene, V. (2005). Effectiveness of SMS communication between university and students. Paper presented to the 4\textsuperscript{th} World Conference on mLearning, Cape Town, October 2005; Madiope, M., Monyela, H. et al. (2005). The implementation of mobile communication at the University of South Africa. Poster presentation to the 4\textsuperscript{th} World Conference on mLearning, Cape Town, October 2005.
4. “the educator received feedback on where the students learning difficulties lay and was able to quickly respond.”

Related work at the **Tshwane University of Technology** has sought to examine the relationship between emergent SMS languages and formal academic languages in higher education learning spaces, with a view to better understanding how the former may support or undermine the latter.

## Conclusions

The literature review offered above suggests that, with regard to the deployment of ICTs for teaching and learning purposes in higher education institutions in South Africa, there is a proliferation of various models and approaches across the sector. Underpinning this is a relatively loose policy context, in which there is little determination and regulation of ICT practices in higher education from the centre. This situation is encouraging in that it encourages widespread experimentation with e-Learning, and has led to innovative and contextually appropriate projects in a number of institutions. However, some of the literature suggests that, because the level of infrastructure that exists in the country and also within higher education institutions varies considerably between haves and have nots, there is a need to consider enforcing stronger ICT in education imperatives. Many commentators thus advocate more stringent policy and regulatory frameworks related to access and equity in the area. Nonetheless, despite the broad policy framework, there is evidence of increasing efforts to secure infrastructure and increasing use and implementation of ICT in the sector.

Evidently, the use of ICTs is seriously on the higher education agenda in South Africa. At the administrative and technological infrastructure levels, all universities in the country have committed substantial amounts of resources to providing appropriate hardware and software in order to get information systems up and running. There is also an increasing amount of attention being paid to the pedagogic integration of ICTs into university courses, sometimes with too much sense of the “technological tail wagging the pedagogic dog”, but often with an appropriate caution about the potentials of ICTs to provide solutions in regard to the improvement of South African higher education. Most importantly, there is an emerging research community which looks increasingly like it will make a critical and contextualised contribution to central academic debates in the area internationally. What is clear is that ICTs are now very much part of the higher education landscape in the country, and it is incumbent on all of us to make sure they work in ways that are educationally sound, and not simply for their own sake.

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