

Dominant Perspectives on ICT & Higher Education

Nhlanhla B.W. Mlitwa

e-Innovation Academy
Cape Peninsula University of Technology (CPUT)
80 Roeland Street,
Multi-disciplinary Applied Research Centre (MARC) Building
Vredehoek, Cape Town, South Africa

e-mail: mlitwan@cput.ac.za

Abstract

The application of technology into teaching and learning is a fairly new phenomenon in higher education environments. While the intake trends are growing at an increasing rate in academic institutions however, the conceptual framework is lagging behind. There is a lack of consensus on conceptions of a relationship between ICT and learning processes in academia. As a result, it is difficult to understand motivations for educational technology intakes, and to make sense of ICT adoption patterns, trends, and processes within and between higher education institutions. In view of this complexity, this paper analyses the common concepts, meanings, and implications attached to the interaction of technology and education by academics, IT practitioners, institutional policy makers, and the literature in higher education institutions. The paper draws on a recent study of ICT, education, pedagogy and change - by Czerniewicz, Ravjee, and Mlitwa (2005) to discuss ICT in education, and the implications for teaching and learning. The work of Andrew Feenberg (2003) on the perspectives of technology and social contexts is used to put emerging meanings of technology into theoretical and practical contexts. The paper closes with the argument that since technology is socially-embedded and context-based, practitioners should be wary of perspectives that claim to offer “one size fits-all solutions” to every challenge. Instead of being driven by a technological hype, it is important to focus on intended objectives. Full awareness of related constraints in any given institutional context is important if maximum benefits are to be attained in an initiative.

Introduction

There has been a rising intake of teaching and learning technology solutions in academia over the recent past. Faith in the potential of ICT to improve the quality of education processes has been a significant motivation for ICT intake since 2000 (Czerniewicz, Ravjee, and Mlitwa, 2005). Despite the increase however, the understanding of how ICT enhances teaching and learning processes, and how it should be applied in higher education remains very limited among practitioners. There is hardly any consensus on meanings and implications of concepts used by various stakeholders.

The paper discusses how ICT is being understood, and how a relationship between ICT and higher education is perceived by practitioners and researchers working in higher education institutions. Various sources are used to explore dominant meanings, to analyse perspectives, and to interrogate motivations for ICT adoption and usage in educational contexts.

The paper further draws on Andrew Feenberg's (2003) perspectives on the role of technology in social contexts, to contextualise held conceptions.

Rationale

This paper is motivated by the findings of a completed part of an ongoing PhD study. The study in question was a joint project between three researchers. It was set to investigate meanings, conceptions, metaphors, and understandings of educational technology by academics, practitioners, researchers, and policy makers across higher education institutions in South Africa (Czerniewicz, Ravjee, and Mlitwa, 2005).

The study was based extensively on interview transcripts of 16 middle-management people who are at the intersection of the technology and education within university structures in South Africa. Additional data sources such as the national and institutional policies and regulations, literature on higher education and the sociology and philosophy of science, and published journal articles were further consulted.

In analysing the meanings and implications, the paper aims to improve the understanding of concepts and to make sense of the motivations behind varying patterns of technology adoption and use within and between institutions in South Africa. This will, hopefully, contribute to a

clearer, quality maximising, and effective framework of applying ICT into teaching and learning in higher education processes.

In the following section, the paper opens with an overview of the meanings that policy makers, academics and other practitioners commonly attach to ICT for education.

The Meaning of Educational ICT

Often research reports, government and higher education institutional policy documents, as well as technology practitioners discuss ICT in relation to the value it adds to the quality of higher education. The ICT for Teaching and Learning in Higher Education (HictE) project is a useful example. HictE advocates an innovative application of ICT to enhance the quality of teaching and learning among higher education institutions in the Western Cape (Mlitwa, 2004; 2005). A positive co-relationship between technology and the quality of teaching and learning is clearly implied.

Technology however, means more than just quality enhancement. Various concepts that are used when talking about a technology often reflect purposes for which a technology is used. Where the context is educational usage, references are made to *Educational Technologies* (UCT, 2003), *Learning and E-Learning Technologies* (Badenhorst and de Beer, 2004), *Online Teaching and Learning Technologies* (Van der Merwe, and Möller, 2004), *Digital Library Technologies* (Peters, 2002), and *Digital Learning Objects* (Smith, 2004), among others. Technology is largely viewed within the context of communication. It is often conceptualised as communication tools and or networks. References are usually made to *IT Networks and Communication Protocols* (University of Natal, 2003), *Electronic Information and Communication Technologies* (Van der Merwe and Pool, 2002), *Information Agent* (Razek, et al. 2003), or just *Communication Technology* (Blanchette and Kanuka, 1999), among other concepts.

Most authors however, take for granted that the meaning of these concepts is known and never bother to define them. Where defined, almost all definitions tend to link technology with knowledge. It is often presented as knowledge itself or the technical means of doing things (which implies knowledge) (Bergen.org, undated), or a tool to advance knowledge. As a tool, it can extend “*human capabilities to solve problems*”, and “*to assist students in the acquisition of knowledge*”, or to empower teachers and administrators to stimulate learning more effectively

(Sanbenito.tx, USA, undated). It is also conceptualised as a domain either of knowledge, for knowledge advancement (UCT Policy Document, 2003:1) or for underpinning innovation (*SA R&D Strategy* 2002:13).

For many practitioners in higher education according to Czerniewicz, Ravjee, and Mlitwa, (2005) using ICT implies using the web. Thus the term “web-based” is used as an equivalent to ICTs even when, technically speaking, they are not the same thing. Mention of the shift from stand-alone multimedia machines to networked web-based technologies was made, with many interviewees noting that it was only after the advent of the web that ICTs were mainstreamed into education. These statements, of course, were aimed to streamline (limit) the meaning of educational technology and e-learning to networked computers (Czerniewicz, Ravjee, and Mlitwa, 2005).

Educational technology generally encompasses computers, software, video, communications, interactive video, satellite communications, television, video, robotics, CD-ROM, and the Internet (among other things). “*It includes the knowledge and skills necessary to use technology as a tool*” (Bergen.org, undated). The way technology is conceptualised and understood, shapes expectations of the role it fulfils in teaching and learning processes. Perspectives on the role of technology in higher education processes are discussed in the following passage.

The Role of Technology in Higher Education

Leading literature on the sociology of technology describe ICT as important in enhancing teaching, learning, and research, both from the constructivist and instructivist theories of learning (Czerniewicz, Ravjee, and Mlitwa, 2005). This is a clear indication that practitioners, academics, and policy makers are divided on the status and role of technology in socio-technical processes such as education. There is a line of thought that views technology as neutral and autonomous (determinist) on the one hand, and that which views technology as neutral and human controlled - rather than autonomous (instrumentalist) (Feenberg, 2003). On the other extreme stands the view of technology as both autonomous and value-laden (substantivist), or as human controlled and value-laden (critical perspective). Where technology is seen as neutral and autonomous, the belief is that it is merely a tool and an indifferent instrument to further human goals. This is the instrumentalist perspective of ICT (Feenberg, 2003).

A study by Czerniewicz, Ravjee, and Mlitwa, (2005) found an overwhelming emphasis on the social aspect of technology by interviewees. For many, it was the “learning” part of the “e-Learning” phrase that is important. What it does (enables), rather than how it does it (enables the learning) is important, and different pedagogical methods were attached to the how aspect. The point here is that there is an obvious diversity in the understanding of how ICT is applied to teaching and learning processes in academia.

Instructivists claim that technology is too neutral to teach, but only a tool for use by teachers to instruct (transfer knowledge). Technology according to this perspective therefore, is not value-laden and has no implications on the user since it is just how you use it that matters (Czerniewicz, Ravjee, and Mlitwa, 2005). The determinist perspective on the other hand, sees technology as neutral and autonomous, but not humanly controlled. It describes technology as a determinant of progress and change in higher education Feenberg (2003).

A number of constructivist theorists who see technology as an agent for change fall under this category. In this model of thinking, *technology enhances education, it enables independent learning, it influences or drives the theory of learning, it breaches many walls created by distance and times zones; it unites people and create powerful and synergistic partnerships at local, regional and global scales; it motivates students and energises classrooms* (Czerniewicz, Ravjee, and Mlitwa, 2005).

On the other extreme, technology can both be autonomous and value laden. Feenberg (2003) calls this view the “substantivist” perspective of technology. In other words both the means and ends are linked in a system. Technology therefore, influences academic processes and change, but is also influenced by those processes.

Technology can also be human controlled and value laden. Feenberg (2003) calls this perspective, the critical theory of technology. In this case technology is used as a tool to further our goals. The only difference is that it is not a neutral but value-laden tool. So, it carries with it the context of its design, the language and cultural connotations of its location, to influence its destinations.

In their account of technology therefore, critical theorists would be wary of uncritical “technology praise-singing”. It would interrogate possible connotations that emerge out of the use of technology, and offer recommendations on how the obstacles can be addressed to

maximise ICT benefits for all. Critical theorists would appreciate advantages of efficiency that technology offers to users, but question implications for those without access. They would question the hidden profit maximising intentions of ICT manufacturing companies vs. relevance to the needs of the technology user; and they would be critical of the long term implications of proprietary software licences on students and higher education institutions relative to open source software.

Fig 1: Andrew Feenberg Theory of Technology

Technology is:	<u>Autonomous</u>	<u>Humanly Controlled</u>
<u>Neutral</u> (complete separation of means and ends)	Determinism (e.g. modernization theory)	Instrumentalism (liberal faith in progress)
<u>Value-laden</u> (means form a way of life that includes ends)	Substantivism (means and ends linked in systems)	Critical Theory (choice of alternative means-ends systems)

Source: Andrew Feenberg (2003), “What is Technology”, Lecture for the Komaba undergraduates, June, 2003, in <http://www.rohan.sdsu.edu/faculty/feenberg/komaba.htm>

Instructionists would therefore, be content with traditional technologies for knowledge transfer through content delivery. Constructivists on the other hand, would not. They would push for a technology that encourages integrative and collaborative learning and knowledge construction.

Whether knowledge is transferred (through instruction) or constructed however, both sides seem to agree on the positive effects that ICT has on the quality of teaching and learning (Czerniewicz, Ravjee, and Mlitwa, 2005).

For Brown (2002), computers enhance teaching and learning via presentations, more opportunities to practice and analyse, and more access to source material via Internet. Computers and Internet connectivity is argued to enhance communication and interaction between colleagues within faculties, between classmates, and between faculties and students.

Pedagogical perspective: “presentations” imply an instructional mode of teaching where knowledge is transferred from the presenter to the recipient (the student), and ICT can improve this method of teaching.

Technology perspective: instrumentalist.

This *is a* first world perspective of ICT (where physical access and computer literacy is not a problem). It demonstrates that ICT (computers and Internet) enhance teaching and learning through improved interaction across cultures, between students, academics and between both. Often these kinds of conclusions inform development strategies beyond the borders of developed countries, yet different socio-economic factors in developing countries could impact otherwise.

Hawkins (2003) of the *World Bank Institute* recommends an alternative that takes into account of the contexts of developing countries. Since technology, “motivates students and energizes classrooms”, and “*empowers girls*”, Hawkins (2003) argues for the development of computer labs in higher education institutions. They may take time and money, “*but they work*” well in improving access and usage. But “technical support cannot be overlooked...” he adds. Indeed the lesson of computer laboratories has been accepted and implemented by many universities in developing countries. There is a wealth of useful examples in South African universities.

Pedagogical perspective: ICT benefits are associated with higher education processes generally, without pedagogical bias. ICT enhances educational processes from any perspective, but depends on how it is applied. Technology perspective: Determinist

Constructivist perspectives tend to make most popular appraisals of the value-enhancing role of technology in learning processes. Bowen (2000: p11) for example, argues that “*Many walls created by distance, time zones, and the need to work directly with physical objects have been breached, and there is much more to come as new technologies emerge and the costs of hardware, software, and connectivity continue to fall.*” An example would be that of research – which benefits immensely from electronic journal archiving whose access defies distance, time, and space. The facility further improves library administration as manual controls are reduced, and enhances distant learning, adds Bowen (2000: p12).

Pedagogical perspective: Makes purely constructivist claims. Statement emphasises that access to ICT such as computers, Internet, and e-mail bridges the physical distance between student and online information. It enhances interaction and through its engaging character, and its ability to

promote independent learning, has a potential to enhance higher education activity. Technology perspective: Determinist

Keats (2004) substantiates the constructivist link between technology and education. He asserts that when used wisely, ICT such as Internet can help unite people and create powerful and synergistic partnerships at local, regional and global scales. The use of Internet according to Keats (2004), has enabled the formation of various forms of virtual universities within and between countries across the globe. The point here is that as a communication medium that cannot be limited by time and space, Internet is enabling new local and global education synergies on teaching and learning – for enhanced higher education to extend to unlimited audiences, beyond time and distance boundaries, easily and conveniently.

Pedagogical perspective: Makes purely constructivist claims. Technology perspective: Determinist

The rapid breakthroughs in new information and communication technologies according to UNESCO (1998) “*will further change the way knowledge is developed, acquired and delivered*”. It is also important to note therefore, “*that the new technologies offer opportunities to innovate on course content and teaching methods and to widen access to higher learning*” (UNESCO, 1998).

Pedagogy perspective: Makes a constructivist “knowledge development” statement

Technology perspective: Determinist.

While ICT improves learning experiences from any pedagogical perspective, it seems to appeal more to constructivist theorists. Roswell (1999) for example, echoes that ICT enables the effective storing/sorting of information, and can offer new fast ways of communication; It enables the reduction of information quantity towards a higher quality and better structure; It can be integrated into teaching and learning strategies – and used to support relative learning theories; and ICT (computers, Inter and Intranet) can be used to create new types of interactive learning media for improved quality, equity, and access in higher education.

Pedagogical Perspective: Makes a strong case that ICT enhances teaching and learning, and can be “integrated into teaching and learning strategies (which may be any strategy, ranging from knowledge constructivist to knowledge transfer strategies).

Technology perspective: Both determinist and instrumentalist

National policies also take a particular position on the role of technology in educational processes. The Higher Education White Paper 3 (1997), the National Plan, the National Research and Development Strategy (2002) and the Foresight ICT report (1999) tend to link ICTs in education, with economic change in an information economy. They relate the role of technology to the need for ICT-related graduate competencies (Czerniewicz, Ravjee, and Mlitwa, 2005).

Interviews in a study by Czerniewicz, Ravjee, and Mlitwa, (2005) also confirm a mixture of conceptions and the understanding of ICT in learning environments by various academics. Technology is seen as an innovator of teaching and learning processes, with emphasis largely placed on ways of “doing things differently”. ICT-enhanced change and innovation perspectives argue that ICT enables the original, the unique, and that which was not previously possible. The new media forms arising from ICTs are a useful example (Czerniewicz, Ravjee, and Mlitwa, 2005).

Most data in the study emphasise that ICT (and its inspired changes) improves higher education processes in a number of value-adding ways. Advantages range from increased access to higher education, reconfiguring of libraries and institutional management and administration, to improving the quality of teaching and learning. Key terms in this discourse include “enhance”, “improve” and “added-value”. This perspective is also expressed in metaphors used to describe e-learning. These include things such as the “door”, “horizons”, “staircase” – which suggest an improvement in the form of a movement to a better place (Czerniewicz, Ravjee, and Mlitwa, 2005).

Pedagogical Perspective: ICT enhances teaching and learning by making the new and the unknown possible. It enables innovations in a greater information economy. It is presented as a tool that enables or even determines improvements. There is a clear implication that technology is autonomous. Technology can be “integrated into teaching and learning strategies (which may be any strategy, ranging from knowledge constructivist to knowledge transfer strategies).

Technology perspective: Determinist (when autonomous) - but it can also be an instrument or tool to improve processes – hence instrumentalist.

The Critical approach

Critical theorists such as Muse Jr. (2003) feel that there is just too much hype about Web-based Learning, but less is said of technical difficulties students face, and ultimately high levels of technically motivated drop-outs. In his unpublished doctoral thesis for example, Muse Jr. (2003) had conducted interviews in North Texas - on a number of students who dropped out of Web-based courses. He found that most students could not obtain, access, or install all the required learning materials in a timely manner due to ICT literacy constraints, and had to drop the course while they still had a chance to do so.

Pedagogical perspective: No obvious link between pedagogy and technology - as there is with computer and literacy. What is obvious though is that web-based learning may be alienating to the less computer literate. It may also be alienating for those with limited or no access to resources - thereby defining itself as the privilege for the computer skilled and those with computer access and internet connection. This challenges constructivist presuppositions of the technology as an “unquestioned enabler” of collaborative learning, and calls for such statements to be qualified according to contexts. In a case of universities whose majority of students lack literacy and confidence in computers for example, additional literacy interventions and support in web-based learning would be suggested. The lesson for the constructivists then, is: beware of this limitation and think of social and literacy issues when implementing ICT interventions in teaching and learning. Technology perspective: Critical theory

A critical perspective of technology and education is further elaborated by Bowers (1998: p113) where he argues that in education, computers modify thought and communication – the development that requires huge economic outlays to put libraries online and for professors to research and to teach online. Students, in turn, *must be consumers of technology that will require an endless series of upgrades to feed the industry’s need to increase its share of the market”*.

While not disputing the benefits of technology in education, Bowers (1998) believes that there is more to technology and education than what the surface reveals. Scratching the surface therefore, may reveal the actual reality of the relationship between technology and educational processes. Since technology carries with it a particular culture and contextual influence (Vygotsky, 1978), it can also modify thought and communication of the locals either in desired or undesired fashions. It is clear for Bowers that not all ICT interventions are always appropriate for every condition. One may therefore caution educators to be wary of “*one size fits all solutions*” as most

innovations could be driven purely by the profit maximization motive on the part of their producers – rather than an added value in learning, though all are portrayed as necessities. Motivations for technology use in teaching and learning should therefore be verified against the actual value that usage would add in educational processes.

Pedagogy perspective: not obvious. Technology perspective: Substantivist theory.

Conclusion

A lack of consensus on conceptions and implications of a relationship between ICT and learning processes in academia has been highlighted in this paper. A resultant difficulty to understanding motivations for educational technology-intakes is noted. This “conceptual-stampede” further complicates the understanding of patterns, trends, and incoherent processes that are followed within and between higher education institutions.

In view of this complexity, this paper undertook to analyse common concepts, meanings, and implications attached to the interaction of technology and education by academics, IT practitioners, middle managers, policy makers, and the literature in higher education institutions. Data was drawn from a recent study of ICT, education, pedagogy and change - by Czerniewicz, Ravjee, and Mlitwa (2005) to discuss ICT and education concepts and their implications. The work of Andrew Feenberg (2003) on the perspectives of the technology and social contexts has been used to contextualise the conceptual meanings that emerged from the analysis.

The paper puts forward the position that there is an enormous increase in the use of ICT in higher education institutions, not only in South Africa but world wide. Reasons range between factors of wider economic, social, technological, and political changes globally. At the same time, universities believe in the potential of ICT to improve the quality of teaching and learning. They also use technology to reach for students in destinations beyond the traditional physical boundaries. Clearly, rationales of institutions to adopt ICT are influenced by macro and micro environments, and consequent perceptions of competition and the need for collaboration. Issues such as the *digital divide*; *literacy limitations*; *financial constraints* (largely in developing countries); *changes (increases) in student enrolment numbers* (which is a global phenomenon), *global technological developments*; and *competition between and among HE institutions and the emergent providers of higher education* (global phenomena), inform rationales for ICT adoption in higher education institutions (Middlehurst, 2003).

While different perspectives on the role of ICT in higher education are hardly concurrent, there is an agreement however, that effective use of technology adds value to educational processes.

Various conceptions and meanings analysed in this paper – show the relationship of technology and education as an ideologically contested terrain. There seem to be an agreement that technology adds value to educational processes, but a disagreement on how it does so.

Perspectives are divided on whether technology is a neutral tool, or it has some cultural and contextual factors it carries with it – to impact on the user. Constructivist educationalists believe that technology can be used to engage students and help them construct knowledge. This model of thinking has seen educators trying to replace the human educator with technology in certain distance education programmes. Instructivist educationalists on the other hand believe that technology is only as good as any other neutral tool that serves to further human ends.

Technology therefore, is a tool for transferring knowledge from a lecturer to a student, and it just can't do more.

The critical theory approach proposes a holistic approach to understanding the interaction between technology and social processes such as education. Technology is seen as a tool. Not a neutral, but value-laden tool. What is apparent from a critical theory perspective is that there are intervening issues, conditions, and situational contexts that encourage or hinder effective use of technology in different settings, and therefore the impact that technology would have on different audiences. The context in which technology is applied may lead to intended or unintended outcomes. The impact of ICT on teaching and learning would therefore vary according to circumstances of a given case. The warning then, is that educators and policy makers should be wary of “*one-size fits-all solutions*”. There is a need for openness, and increased social engagement with technology developments and interventions to ensure value-added relevance.

The conclusion of this paper is that technology as a teaching and learning medium is a new phenomenon. By the very nature of technology as an entity that influences, and is influenced by various economic, social, political, cultural, and contextual factors, it is constantly changing, and also drives change in various contexts such as education. Meanings, perceptions, and motivations of the role of technology therefore, are a contested terrain that is contextually aligned. They are hardly constant and unanimous but diverse and changing. This paper confirms a lack of unanimity in conceptual meanings of ICT use, and adopts the critical view of technology as a

contextually embedded phenomenon. The closing argument is that the relationship between technology and ICT should always be understood within a context in which it applies.

In other words, don't just move with the hype of the times, but ensure that an ICT intervention meets an educational need, and that it adds value to an educational activity. Ensure that it is the most appropriate intervention for a given context, and that it would be sustainable in the long term. As Rosenberg and Steinmueller (1982) argue in their examination of the economic impact of a development in electronics, indeed the diffusion of a technology (a VLSI diffusion in their case) depends on knowledge, costs, and its value-added capabilities. Their point is that "there has to be a strong link between social (consumer) needs, value added capacities of a technology, and its cost efficiency relative to all thought alternatives if the intervention is to be worthwhile. The same principle should apply to technologies for teaching and learning.

References

- Badenhorst, JJC and de Beer, JK (2004). *Blended Learning at the Central University of Technology, Free State*. Paper presented in the emerge 2004 conference on 29 June – 8 July 2004, in <http://emerge2004.net/connect/site/UploadWSC/emerge2004/file20/emerge2004article.doc>, accessed on 17 July 2006)
- Bergen.org, Definition of Technology, in www.bergen.org/technology/defin.html, accessed on 20 April 2006)
- Blanchette, J., & Kanuka, H. (1999). Applying constructivist learning principles in the virtual classroom. In B. Collis and R. Oliver (Eds.), *Proceedings of Ed-Media 1999: World Conference on Educational Multimedia, Hypermedia, and Telecommunications, Seattle, Washington, June 19-24, 1999*. (pp. 434-439). Charlottesville, VA: Association for the Advancement of Computing in Education.
- Bowen, W.G. (2000: p11). *At a Slight Angle to the Universe: The University in a Digitized, Commercialized Age*. The Romanes Lecture for 2000, Delivered at the Oxford University, 17 October, 2000. Published in Princeton University Press, Princeton, New Jersey, 2001 (in <http://arl.cni.org/newsltr/216/roman.html>, accessed on 20 April 2006)

- Bowers, C.A. (1998). *The Paradox of Technology: What's Gained and Lost? The NEA Higher Education Journal, Spring, 1998, p113.*
- Brown, David G.(2002). *Proven Strategies for Teaching and Learning*. Presentation in The New Educational Benefits of ICT in Higher Education Conference, Rotterdam, September 2, 2002; (in <http://www.wfu.edu/~brown>, accessed on 20 April 2006) brown@wfu.edu
- Czerniewicz, L., Ravjee, N., and Mlitwa, N. (2005). *Mapping the landscape ICTs in Higher Education in South Africa*. Report for the Council for Higher Education. December 1996 (Sub section 4.4), Pretoria, South Africa. (in <http://education.pwv.gov.za/content/documents/176.pdf>, accessed on 20 April 2006)
- Department of Arts, Culture, Science and Technology (DACST) (2002). South Africa's National Research and Development (R&D) Strategy, August 2002, Government Printers, Government of the Republic of South Africa, Pretoria.
- Department of Science and Technology (1999) Foresight ICT Report. (in www.dst.gov.za/reports/foresight_reports.htm, accessed on 22 April 2006)
- Feenberg, A. (2003). "What is Technology", Lecture for the Komaba undergraduates, June, 2003, (in <http://www.rohan.sdsu.edu/faculty/feenberg/komaba.htm>, accessed on 20 April 2006)
- Green Paper on Higher Education Transformation, Department of Education,
- Harvey, L and Green, D (1993:10): Defining Quality; Assessment and Evaluation in Higher Education 18(1) in Tam, Maureen (2001:47): *Measuring Quality and Performance in Higher Education*; Teaching and Learning Centre, Lignan University, Tuen Mun, Hong Kong, China; in Quality in Higher Education Journal, Vol. 7 No.1, 2001
- Hawkins, R.(2003: 38- 43). World Links for Development Program, World Bank, 2003, (in www.comminit.com/strategicthinking/st2003/thinking-293.html, accessed on 22 April 2006)
- Higher Education Quality Committee (HEQC) Founding Document, (2001: 10) (in www.che.org.za/documents/d000002/HEQC_Founding_Document.pdf , accessed on 17 May 2004)

Keats, Derek, *et al* (2004): *E-learning Strategy for the University of the Western Cape* (Draft, Vol 1.3), UWC, Bellville, RSA, Unpublished.

Middlehurst, R. (2003); *Competition, Collaboration and ICT: Challenges and Choices for Higher Education Institutions*; University of Surrey, UK (Unpublished)

Mlitwa, N. (2004). Evaluation of the ICT in higher education (HictE) sub-project 3. The University of the Western Cape, May 2004, Unpublished.

Mlitwa, N. (2005). Higher Education and ICT in the Information Society: A Case of UWC. In the 2nd Annual Conference of the Community Informatics Research Network (CIRN) proceedings, 24-26 August, 2005, Cape Peninsula University of Technology (CPUT), South Africa

Muse, H.E.jr. (2003). *The Web-based community college student: An examination of factors that lead to success and risk*. Internet and Higher Education Volume 6, Issue 3, 3rd Quarter 2003, Pages 241-261

National Plan for Higher Education in South Africa (2001), Department of Education. (in www.polity.org.za/html/govdocs/misc/higheredu1.htm?rebookmark=1#Section%203, accessed on 22 April 2006)

Peters, D. (2002). *Developing Digital Libraries in South Africa: Breaking out of the Bookish*; Paper presented at the CITTE 2002 Conference at the University of Natal, Durban, September 2002, (in <http://citte.nu.ac.za/papers/id48.pdf>, accessed on 22 April 2006)

Razek A.M., Frasson C., Kaltenbach M. (2003). A Context-Based Information Agent for Supporting Intelligent Distance Learning Environments. Paper presented in the Twelfth International World Wide Web Conference (WWW2003): 20-24 May, in Budapest, Hungary, 2003. (in www.iro.umontreal.ca/~abdelram/publications/www2003.PDF, accessed on 22 April, 2006).

Rosenberg, N. and Steinmueller, E. (1982). *The Economic Implications of the VLSI Revolution*. In: Inside the Black Box: Technology and Economics, Ch 9: p184-192

Roswell, T.(1999). *The role of ICT in higher education at the beginning of this new millennium*. Thomas was the Rector of the Swedish University of Agricultural Sciences during the time of writing this piece. URL <http://online.kennis.org/eva/eva06/ictslu.htm>

- Sanbenito.tx, USA (Undated), (in www.sanbenito.k12.tx.us/tech_plan/pg4.html, Accessed on 19 June 2005)
- Smith, S. (2004): The New Media Consortium (NMC). *Guidelines for Authors of Learning Objects*. Refereed in the emerge2004 online conference, 30 June – 9 July 2004, (in <http://emerge2004.net/connect/site/UploadWSC/emerge2004/file32/NMC%20LO%20Guidelines.pdf>, accessed on 20 July 2005)
- UNESCO (1998): World Declaration on Higher Education for The Twenty-First Century, Vision and Action. Article 12, 9 October 1998, Paris, (in www.unesco.org/education/educprog/wche/declaration_eng.htm, accessed on 22 April 2006)
- University of Cape Town (UCT) Educational Technology Policy Document, (2003:1).
Unpublished
- University of Natal, *Strategic Initiatives for the University of Natal*, (October 2000:8),
Unpublished
- University of Pretoria Strategic Plan: Inspiring the Innovation Generation 2002 – 2005 (2002)
[Online] in www.up.ac.za/beta/about/eng/strategic_plan.pdf , accessed on 22 April 2006)
- University of the Western Cape (UWC) e-Learning Strategy Draft (2003: p13), Unpublished.
- Van der Merwe, A. and Pool, B.(2002). *The E-Campus Initiative at the University of Stellenbosch*; University of Stellenbosch, Paper published at the www2002 Conference, RAU,(in http://general.rau.ac.za/infosci/www2002/Full_Papers/VdMerwe%20A_%20Pool%20B/VdMerwe&Pool_ECampus.pdf, accessed on 3 June 2005)
- Van der Merwe, D. and Möller, J. (2004), New Unisa; *Integration of the two home-grown Learner Management Systems of “Old Unisa” and “Old TSA” : The past, the merger and the future*. Paper presented at the emerge2004 Online Conference, 29 June – 8 July 2004, (in <http://emerge2004.net/connect/site/UploadWSC/emerge2004/file22/emergevandermerwe-moller.pdf>, accessed on 3 August 2005)
- Vygotsky, L. (1978). *Mind in society*. Cambridge, MA: M.I.T. Press.