Information and Communication Technologies Access by Students and Staff at the University of Zululand between 2002, 2009 and 2013

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Abstract

The use of information and communication technologies (ICTs) in institutions of higher education has significantly influenced teaching and learning. Academics have adopted new methods, with the chalkboard a thing of the past in most institutions, their information behaviour changed from traditional visits to the library to electronic (office) access while communication with publishers has also been influenced. Students have not been left behind, and terms such as Google, Facebook, Skype, Twitter and newer social network terminologies, downloading and e-mail are now standard vocabulary to them. Although the library still retains its role as the epicenter of information services within universities, students and staff are increasingly turning to other sources and services for information. Even libraries' acquisition policies are being influenced by the "just in time" policy compared to the "just in case" acquisition approach. E-learning is a new phenomenon brought about by the introduction of ICTs in higher education. Students and lecturers now communicate electronically to access notes, submit assignments, provide lecture notices, etc. All these developments have been made possible because of the Internet. The purpose of this paper is to explore changes in ICT access at the University of Zululand in light of the important role they play in teaching and learning and research. It is based largely on two studies carried out separately for the submission of MA theses in Library and Information Science (Mugwisi 2002 and Nkomo 2009) as well as presenting what the situation is currently in 2013.

Keywords: Information and communication technologies, information seeking, information access, information use, University of Zululand

1. Introduction and Background

The recognition of the role of Information and Communication Technology (ICT) in education has led to a large pool of studies. In this study, we compare two such studies conducted at the University of Zululand but also provide data about the situation at present. The first study by Mugwisi (2002), "The Internet as a resource for research, teaching and learning: a comparative study between the University of Zululand and the University of Zimbabwe" investigated how students and staff use the Internet as an information source while also evaluating their computer and Internet skills. It also explored the ICT facilities of both institutions in order to establish levels of computer and Internet access, among other variables. The second part of the study looked at Internet use by librarians in institutions and as information providers, and how they were helping the students and staff in facilitating access to electronic resources. The second study by Nkomo (2009), "A comparative analysis of the web information seeking behaviour of students and staff at the University of Zululand and the Durban University of Technology" examined the web information seeking behaviour of students and academics. Both studies addressed the issue of access by students and staff. Using data related to the University of Zululand only, this paper looks at what changes there have been in terms of access from the period cited in the first study in 2002 and the second study in 2009 through to 2013.

The University of Zululand (hereinafter referred to as Unizulu) is located in Kwa-Dlangezwa, 20 kilometers outside the small town of Empangeni and 30 km outside South Africa's fastest growing industrial hub, Richards Bay. It is classified as a comprehensive institution with a theoretical and practical teaching focus. Programmes are offered in four faculties, namely the Faculties of Arts, Commerce and Law, Education, and Science and Agriculture. The structure of this paper is as follows: it begins with an introduction and description of the study background above. In the subsequent sections literature is reviewed, the research methodology explained, findings presented and finally discussions and conclusions offered.

2. Literature review

As ICTs permeate education and society in general, there has been a growing body of literature. It can be stated that although the use and application of ICTs in higher education is an established area of research, continually new ICTs are invented, adopted in education and broader sections of society and consequently new research is undertaken. Today, many categories can be identified into which existing research can be grouped. Lazinger, Bar-llan and Paritz cited in Mugwisi (2002, p.2), group such studies into three categories: those on Internet use by information professionals; those on Internet use by the general population; and Internet use among college and university faculty members. This paper highlights two categories: students and academic staff. Examples of studies about students and staff cited by Mugwisi (2002, p.2) include [Applebee et al. (2000) who focus on academic use in Australia; Bell (1997) and Harter (1998) focusing on the use of electronic journals; and Johnston (2001), looking at the implications of e-learning as it applies to the custodians of the information resources required to support teaching and learning].

A current take on the subject reveals sustained penetration of ICTs in higher education and in particular, their impact on students and academics and the role of libraries in information delivery. We can cite specifically Resnis et al. (2010) who examined students' information literacy practices, including information search processes, preparation, and differences among students' information literacy levels. The study revealed high preferences for online resources such as Google and Wikipedia albeit with no profound impact on print library resources. This is a consistent observation of similar studies among them Tella; 2007, Selwyn; 2008, Al-Aufi and Genoni; 2010, etc.

Other key observations on ICT's access and use in education as revealed by surveyed literature are that:

- The Internet and associated technologies have been rigorously embraced because of the potential they can bring to the quality of education, economic efficiency, and wide access to higher education institutions. Web-assisted instruction and learning have become strong teaching methods, replacing traditional methods with more attention paid to the role and effect of web technology within academic settings (Woo Park, 2009).
- The Internet is used to support instruction and research needs in addition to extensive communication using e-mail and access to databases and other sources of information
- E-learning, e-lectures, e-campus, e-research, blended learning, e-science and e-studies are some of the emerging terminologies increasingly encountered(Woo Park, 2009; Mutula, 2002; Ketterl, Mertens and Vonberger, 2009)
- Increasingly students come into university with more technology backgrounds (Adogbeji and Akporhonor, 2005) and are one of the most Internet and Web connected demographic groups.
- Use of the internet has consequences on academia including changing the learning environment by allowing students to broaden their academic experience, access to important information, and communicate with others within the academic community (Tella, 2007). There are significant difference in the academic performances of students with Internet access and those without (Osunade, 2003).
- Use of the Internet is patterned by a range of influences such as gender, subject specialism and or disciplinary differences, access and expertise (Selwyn, 2008; Al-Aufi and Genoni, 2010).
- At the heart of any university's development and implementation of digital information services is the library (Obeidat and Genoni2010, p.385). Some of the noted developments include e-libraries which has broadened the amount and diversity of resources for clients (e-books, courseware material, lectures, lesson plans, educational software, access to remote scientific material, research articles, images and videos, to name a few), increased utilization of electronic resources, increased use of mobile devices for offering library services, etc. Lippincott (2010, p.208) libraries have loan programmes for mobile devices such as laptops, cameras, video cameras, MP3 or similar audio player devices, and headphones, with a smaller number of libraries loaning Internet-capable devices such as the iPod Touch. E-Books and e-readers may be purchased or downloaded for free in formats compatible with users' mobile or other devices.
- New research issues arise which are of concern to institutions of higher education in terms of pedagogy, library services, infrastructure provision, etc.

Conceptualizing New Technologies

The increased use of traditional, new and mobile technologies has given rise to new concepts in academia and in society in general. Lippincott (2010, p.205) asserts that technological changes such as the introduction of web browsers have a major some would say revolutionary impact on higher education as well as on broader society. Highlighted below are some concepts that have arisen and are affiliated to academia.

E-learning

A growing demand for lecture content to be made available online by students and lecturers is driving the shift to e-learning in universities. In this regard, using several (web-based) systems for exchanging information, for example learning management systems, students blogs, group wikis, instant messages, chat rooms, and others thought to be fast and convenient are now common (Ketterl, Mertens and Vonberger, 2009; Mutula, 2002). Hey et al. in Lippincott (2010, p.211), claim that using multiple forms capturing data, for example supporting photographs with audio recordings and student notes, can assist students and lecturers by creating a 'surround sound' learning experience. Kane, Robinson-Combre and Berge (2010) observe that e-learning is convenient for students and facilitators as it allows them to access material in different locations and time zones, and fosters research and writing skills because written communication is the primary mode of communication. Other benefits would include such issues as witnessed in China where the introduction of e-learning has largely been a response to students' failure to secure admission in traditional universities. The University of South Africa (UNISA) is modeled along similar lines (Mutula, 2002).

Blended learning

This is a method of learning which combines classroom learning with web-based instruction (knowledge media), offering the convenience and flexibility of online courses while retaining the face to face interactive approach of traditional courses (Demetriadis and Pamborstis, 2007; Adam and Nel, 2009).

M-learning

Mobile learning (commonly referred to as m-learning) is the ability to learn independently and irrespective of place and time, facilitated by a range of mobile devices such as the iPod, mobile phone, Personal Digital Assistant (PDA), and MP3 players(Donnely, 2009). M-learning cuts across the divide in both academia and industry. M-learning complements electronic learning (e-learning) by creating an additional access channel for mobile users while providing them with access to learning materials (Huang, Lin and Chuang, 2007).

Flexible learning

Flexible learning is an innovative approach to delivering well-designed, learner-centre, interactive learning environments to anyone, anyplace and anytime by utilizing the attributes and resources of the Internet, digital technologies and other modes of learning in line with instructional design principles (Khan, 2007). Flexible learning offers learners a variety of options to tailor the learning experience to suit their specific needs and preferences (Demetriadis and Pamborstis, 2007; Shurville, O'Grady and Mayall, 2008). From these definitions, we note that flexible learning could incorporate the other methods of learning outlined above. The 'anyone, anyplace, anytime' attribute mentioned by Khan above can be made possible through m-learning (use of mobile devices which we carry with us all the time) and distance learning (one does not necessarily have to be in a school environment to learn).

3. Methodology

This research is a cross- sectional comparison of empirical data collected in a 2002 study by Mugwisi, 2009 study by Nkomo and sources new literature and current data for 2013. Most of the discussions are conceptual and based on observation (applying our advantage of presence onsite). Where the two or any one of the compared studies do not provide a detailed analysis of technical facilities such as hardware, laboratories, campus-wide networking and Internet connectivity leading to lack of empirical data, approximates are provided. Such approximations are based on statistics provided by relevant bodies at Unizulu among them NSU (Networking Services Unit). Table 1 below outlines the research methodology applied in the base studies (2002 and 2009) and presently for this paper.

Methodological limitations

We acknowledge limitations to the study at hand among them comparing two studies that are related but not the same ("goats and cows"). Although both studies compare Unizulu with other institutions, the motivations for each comparison differ and there are noted differences in target populations (populations do not match).

Mugwisi (2002) focused on students, academics and librarians' use of the Internet, Nkomo (2009) looked at students and academics, but the focus was web information seeking behaviour, which is only one aspect of the Internet. The above challenges however did not negatively affect the outcome of the paper.

Table 1: Methods Applied in 2002, 2009 and 2013

	2002 (Mugwisi)	2009 (Nkomo)	2013(Mugwisi and Nkomo)
Methodology	Mixed	Mixed	Mixed
Research design	Survey	Survey	Historical(from the two existing studies) supported by an empirical survey of the current situation
Instruments	Questionnaire, interviews, content analysis & existing statistics/ records	Questionnaire, interviews and systematic observation	Questionnaire, observation and existing statistics/records
Areas of investigation	University of Zimbabwe (ZIM) vs. University of Zululand (SA)	University of Zululand (SA) vs. Durban University of Technology (SA)	University of Zululand (SA)
Target populations	Students (undergraduates and postgraduates), librarians and academics (cross cut)	Students (undergraduates and postgraduates) and academics (cross cut)	ICT/network service providers
Sampling methods and size	Non probability (stratified)	Non probability (quota and convenience)	Non probability (purposive)
Pilot studies	Conducted	Conducted	None
Data collection procedures	Two sets of questionnaires (1 for library personnel the other students and academics) Interview schedule with library IT personnel Content analysis of usage statistics in the library	Questionnaire for both students and staff Interview schedule for both groups Observation guide for both groups	Retrieving content from earlier studies and locating new literature. Obtaining new data through questionnaires from network service senior staff. Access and review available documents
Data analysis	Qualitative and quantitative (Statistical Analysis Software - SAS, Excel & content analysis)	Qualitative and quantitative (Statistical Programme for Social Sciences – SPSS, & content analysis)	Descriptive statistics, Qualitative (content analysis)

4. Findings

Presented below are the findings with respect to ICT facilities, network status and Internet connectivity at the University of Zululand. The identified factors have a bearing on access to computers and the Internet by students and staff. Discussions follow thereafter.

4.1 Computer and Internet Access

Computer access precedes and is a prerequisite to Internet access. The latest developments make it possible for one to have access to the Internet from other largely portable devices. Academia has become Internet reliant. So much so that some are paralysed when there is no Internet or when they don't have a computer. How then has access and connectivity evolved over time at Unizulu? Table 2 below presents what facilities were available in 2002, 2009 and are available at present in 2013 to students helping us to ascertain the changes occurring in the selected period.

4.1.1 Student Access to Computers and Internet

Table 2: Student lab seating in 2002, 2009 and 2013

Student labs & seating for 4510 student (2002)				**Student labs & seating for 8613 students (2009)**				**Student labs & seating for 16000+ students (2013)**			
Location/ Studio	Seats& PC	Configuration	Other facilities	Location/ Studio	Seats& PC	Configuration	Other facilities	Location/ Studio	Seats &PC	Configura on	Other facilities
New PC Lab Room 1	152	Celeron 300, 32 MB Ram, 2.1 GB HD, 14''SVGA monitor, Windows NT4.0	Projectors on two projection screens, white board	HP Academy (3 rooms)	Approx. 500	Pentium 4s	Projector, white board	HP LAB has HP1 HP2 HP3	162 60 52	HP6200 HP8200 HP8200	3 podium PCs, 3 smart board, 2 Ricoh Aficio SP C820DN & MP171 SPF copier
New PC Lab Room 2	40	HP Vectra PIII500, 64 MB RAM, 6.4 GB HD, 19'' monitor, Windows NT 4.0	Projector, whiteboard	B-Block) with 4 laboratory rooms		Pentium 4s	Projector, white board	B LAB has B1 B2 B3 B4	119 20 32 30	HP6200 HP8200 HP8200 HP8200	3 podium PCs, 4 mart board, 1 Ricoh Aficio SP C820DN & 1 Aficio 2075 Multifunction
New PC Lab Room 3	52	HP Vectra PIII500, 64 MB RAM, 6.4 GB HD, 19'' monitor, Windows NT 4.0	Projector, whiteboard	Other facilities in the library (LIS Dept.& Library Lab), D-Block (computer science) & other departmental facilities	Each 20- 50 seats	Pentium 4s	Projectors& white board	Multimedia staff lab	31	HP8200	1 podium PC, 1 smart board
Library basement	64	Pentium 133, 32MB RAM, 2.1 GB HD, 14''SVGA monitor, Windows NT4.0	Projector, whiteboard	The Richard's Bay campus (opened in January 2010) has 6 labs	250 incl. presentation PCs in classes &conference venues	Pentium 4s	Projector, white board	City campus has Lab A0-12 Lab A1-12 Lab A1-13 Lab A1-16 Lab A2-76 Lab A2-77 Lab A2-78	21 27 92 42 12 18 23	HP Compaq 500 HP Compaq 7400 HP Compaq 500 HP Compaq 500 Empty Empty Empty	7 smart board
								Department labs			

D-Block	20	Celeron 300, 32MB RAM, 2.1 GB HD, 14''SVGA monitor, Windows NT4.0	Whiteboard only					Computer Science D3-D4 D1 D2	45 21 (9) 8 (3	HP 6200 HP dx2009 HP Pro 313(	2 podium, 3 smart board
								Physics	35	HP 7400	Smart board
								Commerce	14	HP Compaq 500	
								Tourism	12 (9)	Compaq dx7500	
								Education NE20	21	Compaq dx7500	Podium& smart board
								Agriculture H10	8 (3)	2 HP6120 DX7400	
								German	17 (16)	HP Compaq 500	Smart board
								Academic development	7	HP Compaq 7400	
								Library & Info Science Lib lab1 Lib lab2	30(1) 31 (1)	HP7300 (29) 6120 (1) HP7500 (3) HP6120 (11) Proline white (7)	Smart board
								Chemistry A227	3	Dx7400(2) Dx2000	
								Hydrology SC117D SC117C SC117E SC117F 114	2(1) 2(0) 2(0) 2(0) 3(1)	HP6120 Compaq D5105	
								Human Movement Science	10(	HP6120	Printer
								Other developments: reconverting TV rooms for labs to increase access E-learning lab			

Table 2 above provides an indication of the access facilities available to students over the three time periods. This includes physical locations, seating capacity, and machine configuration, including operating systems and additional facilities available for both research and teaching. Italso indicates locations that were added since 2002 minus those that are no longer available, for example the library basement.

What has changed? In summary:

- The library basement facility closed in 2004
- The Richard's Bay campus opened in January 2010
- In 2002, Unizul had 350 workstations in 5 student laboratories ranging in size from 20 to 150 serving 4510 students; to date, it has added 2 main laboratories, a couple of laboratory (lab) rooms (7), and about a dozen (12)departmental labs with workstations estimated at over 1000 serving over 1600 students.

Estimation of Growth: For the 4510 students enrolled in 2002 there were 350 workstations a ratio of one computer for thirteen students (1:13). This figure was halved by 2009 when a population of 8613 was now served by 1500 computers a ratio of one computer for six students (1:13). In 2013, statistics show a seating capacity of over 1000 in the various labs (central and departmental) and a number of related support ICTs (printers, smart boards, projectors) but also significant wireless access perhaps allowing the institution to increase access without increasing the computers/ workstations. On the above argument student access has markedly improved and the ratio of access significantly lowered.

4.1.2 Staff Access to Computers and Internet

Today, access to a computer for an academic is no longer an option but a necessity. With the data obtained, we can gauge the change in computer availability and access for staff.

Table 3: Staff Access

Population in 2002 wa 239	**Population in 2009 was 281**	**Population in2013 is 1000+**
Approximately 500 workstations	Above 1500 workstations	• Approximately 850 machines mainly desktops (Approx. 70/30 split desktops vs. laptops) but being replaced by laptops for academics • 890 user accounts in Active Directory out of a full staff compliment of 1000+ • Few shared logins or machines but in some instances there are different users vs. device counts.
Capacity - 486 to current	-DX6120/7300/7400/2400	LAPTOPS (CPU Intel i5 processor, Speed 3GHz or better, Ram 6GB upgradeable to 8 GB or better, HDD 1TB Sata3,O/S Windows 7 Professional, Display 15.6 inch LCD or LED anti-glare, LAN 10/100/1000 integrated LAN preferred Intel or 3Com WLAN Integrated, Warrantee 3 years DESKTOPS: CPU Intel i5 processor, Speed 3.0 GHz or better, Ram 6 GB or better upgradeable to 8 GB or better, HDD 1 Tb Sata 3, O/S Windows 7 Professional, LAN 10/100/1000 integrated LAN preferred Intel or 3Com,Warrantee 3 years
Brands varied	Standardised on HQ Compa	Moving from HP to Dell
• Beginning 2006, the ICT department standardized desktop hardware on HP/Compaq machines (DX6120/7300/7400/2400) • Staff desktops are replaced every 4 years Increasingly, staff have dual access (desktop and laptop) Projected computer allocation for 2010, including the new Richards Bay campus, stood at 1750 computers (UZ ICT Department, 2009).		• To replace all approximately 300 academic staff machines with laptops to allow use in teaching venues with the deployed audio-visual equipment • Approx. 50/50 split between Windows XP &windows 7 O/S. XP deployed to machines that are not of sufficient specification to warrant upgrading to Windows 7. • All new machines are deployed with Windows 7. Presently XP machines are being replaced with new Dell equipment. Eventually all staff should have Windows 7 • Office 2010 is the productivity suite along with a number of other licensed software packages (mainly academic or specialised teaching software) dependant on need and/or request.

Table 3 above reveals a general increase in computer availability and access for staff in terms of capacity, quantity, and standardization or policy.

4.2 Networks and Internet Connectivity

Effective connection to the Internet is dependent on a sound network. Talk of connection often always refers to how much bandwidth an institution has; however, there is more to connectivity than broadband. By networks, we refer to the platform that makes connections possible (e.g. Intranet, broadband, wireless, etc.). Presented in the table below, is the network and connectivity status of Unizulu (2002, 2009 and 2013).

Table 4: Networks and Internet Connectivity

2002	2009	2013
128Kbps access via the TENET/Uninet hub router at the University of Natal (now UKZN), later replaced with a 786Kbps access to the TENEX/SAIX backbone.	Switched from Telkom Internet to a dark fiber connection with the South African National Research &Educational Network (SANReN), February 2010	• SANReN 10 Gig link, Telkom is voice service provider • Fiber connectivity even a direct link to City Campus • Wireless in all residence halls, guest houses and Bhekuzulu Hall, recreational areas (All you need & behind ALs),connection to external student residences (Kingston in Richards Bay) & Felixton at signal strength of 100mbps (actual 54mbps) • Labs connect at 1000mbps, offices 100mbps (most offices connect through landlines) • connection to staff houses is underway • Microwave connection to the Science Centre (Richards bay)
Connection subject to usage quotas (an amount allocated for internet access, once exhausted access was "pay as you go")	Access always depending on availability of venues	• Internet connectivity all most always guaranteed (Currently students can sit forever on the PC without being automatically logged off)
Network-standard fast Ethernet switched backbone feeding to departmental level 10 base-T hub, running on fiber optic cables	Cisco three-tier campus backbone network. Provides switched 100Mbps connections to the desktop, with a layer 3 Gigabit fiber optic backbone - has the capacity to host Voice over Internet Protocol (VoIP)	• Moving to single mode fiber connection, VOIP/ video conferencing, video calling, IP faxing, ATA, Voice gateways including a clinical video conferencing unit which allows for a connection to hospitals for live demonstrations • Single e-mail system accessible outside the university even on mobile devices- plans to integrate email and phone system to allow for calling through laptops

Table 4 reveals what networks and Internet connectivity options were available to the university in 2002 and indicate upgrades that have since taken place (until 2013). The changes in connection have been particularly notable, for instance a significant rise in terms of network connection is noted from128Kbps which was later replaced by a 786Kbps connection in 2002 to 3 Gigabit in 2009 and now 10 Gigabit in 2013. From a dominant cable connection in 2002 and 2009 we note widespread wireless in 2013 thus extending access to student residence halls and other recreational areas. Also high-end facilities such as the clinical video conferencing unit indicate the strength of connections that now exist.

4.4 Challenges Affecting ICT Access

ICT access and as a consequence utilization at Unizulu is laden with challenges. Challenges tend to take many forms, and in this discussion we highlight problems with access, connectivity, skills and support.

- **Access**

There were a number challenges identified that hindered effective access. These include inadequate facilities, such as the computer to student ratio. While in 2002 there were no more than 500 computers (328 give or take), there were 4510 students, meaning a ratio of one machine for 14 students. The quota system that was in place in 2002 had a significant impact on whom and how facilities were accessed: "You exhaust your quota you pay." It also favored postgraduates at the expense of undergraduates, and those deemed to use the Internet more in their studies were allocated a higher share than others, leading to discrepancies and anomalies in utilization. In 2009 - 2010, the student population grew to over 13000, with approximately 1500 available computers. This means 9 students for every one machine. If we build into these ratios factors such as the classes conducted in laboratories, restrictive opening and closing times, and incessant breakdowns, the ratio goes up.

Student volume has also affected access as student numbers continue to climb standing at 16000+ in 2013 while laboratories do not grow/ expand at a similar rate. Relief to access limitations is noticeable in 2013 due to the increased access options students have notable wireless connection. It still remains though that wireless access has peculiar problems. For instance if a student is connecting at recreational parks (e.g. All you need and outside ALs) they do not have a place to recharge if their batteries go flat thus forcing students to flood labs again.

- **Connectivity**

A cursory look at connectivity as a layman points to improvements (see 4.2 above). Connectivity options have grown to include broadband, 3G, 4G, fiber and wireless. This suggests a certain level of network expansion. Institutionally supported growth of these new networks and connectivity include the wide rollout of wireless access.

- **Skills**

No empirical evidence was sought to determine the skill levels of users of ICTs. As lecturers in ICT course we note that overall the skills levels of students and staff are much better. A lot of factors could be contributing to these improved skills among them the incorporation of ICT into many modules, e-learning and the introduction of computers in high schools.

- **Support**

Support is in two forms, namely hardware and software. We recognize that there are support-related problems which include poor virus management, lack of dedicated hardware repair, delayed software upgrades, and perpetual Internet interruptions.

5. Discussions and conclusions

The review of literature and findings pointed to positive issues such as: physical and technical infrastructure growth (expansion in laboratories, more computers), improved connectivity - migration to SANReN and Seacom, concerted effort to provide relevant ICT (e.g. library subscription to databases, replacement of old ICT with new ICT programmes and services) and printing services. It also noted the following negative issues: human element in ICT (lack of or poor attendance to the IT challenges facing users), access restrictions (library and computer laboratories' opening hours, web filters), software management (upgrades, virus management), wireless connections, which are still limited.

5.1. Physical and Technical Infrastructure Growth

A look at the facilities available at the University of Zululand paints a picture of verifiable positives and a few let-downs. The availability of physical and technical ICT infrastructure is vital for information seeking. Fortunately, as a priority area for implementation, the physical/ technical side receives a lot of attention, perhaps because it is one of the most obvious factors to consider. In the period spanning 2002 to 2013, Unizul has seen a lot of positives in technical infrastructure growth (see Tables 2, 3 and 4). Perhaps the most notable is the increase in computer seating capacity from 328 in 5 labs to over 1000 seating to date in two main labs and a couple of laboratory rooms, while computer quality has also greatly improved from a capacity of 486 to the current minimum specification (Pentium 4 , Windows 7). With increased student populations and constant computer upgrades our institution has been forced to live up to the times, which is a welcome positive. Correlating the fluctuating student intakes between 2002, 2009 and 2013against the number of facilities, one generally comes to the conclusion there is some semblance of progress. The question is, could the situation have been even better?

5.2. Connectivity

One area of unanimity and where calls for improvement ring loudest in the separate studies by Nkomo and Mugwisi is connectivity which was noted to be insufficient for reliable connection to the Internet. Although this has been the Achilles heel of the University of Zululand (e.g. a talking point in many of our conferences), we must admit that remarkable improvements have been made (see Table 4). Concern still remains that despite these improvements; our local support remains poor, leaving us liable to many breakdowns (reports of server floods and constant blackouts on weekends).

5.3 Concerted effort to provide relevant ICT

We recognize a concerted effort to provide relevant ICTs. The one characteristic of ICTs is that as they become ubiquitous, they become unavoidable, particularly in higher education. The recent social media conundrum bears testimony to this - while first received with skepticism, forward thinkers quickly adopted it for education.

It takes a meaningful effort to provide relevant ICTs without falling into the trap of most institutions that waste lots of financial resources in purchasing and maintaining technologies that are irrelevant to the needs of patrons (Students and staff). It is commended that the institution has maintained subscription to a number of databases in order to continue providing the academic community with access to scholarly information.

5.4 Human element in ICT

Intermediaries who act as the link between technology and the user need to be well trained, particularly in people handling skills, as their unfriendliness can possibly turn away potential clients.

The human element in the provision of ICTs at Unizul is noted to have received little attention. Attitudes of ICT personnel are seen to be one of the biggest hindrances to the effective use of ICTs. For instance, lab assistants have gained notoriety among students as some of the most pompous individuals on campus. It is noted as well that there is generally poor attendance to the information technology problems afflicting users, such as broken down machines in labs and technical challenges that take forever to be addressed.

5.5 Access restrictions

While the availability of infrastructure has greatly improved access, restrictions still persist with respect to many of the facilities' opening hours. It is lamented that computer labs do not open 24 hours to accommodate students, particularly seeing as classes are held in them during the day. Postgraduate students in particular have voiced their displeasure. At present, the library opens from 8:30 am to 11:00pm; the opening hours are not extended, even during exams. Another restriction to access is web filtering. Governing Internet use is a noble measure and sometimes one that is necessary given the importance of ethical access to and use of information. Viewing pornography and other unsuitable material is thus rightfully banned in computer laboratories. However, there are problems with banning social networking media. Some course material is made available through Facebook and students fail to access it because of the restrictions. The recent pedagogical direction is that teaching has become flexible and different platforms are used for delivery. We notice a tension in that while some are embracing this new direction IT views it to be mainly entertainment oriented. We are of the opinion this is reactionary rather than proactive and such decisions are a result of a problem rather than proper planning. This is because Facebook was allowed before and it is blocked now, "What else are they going to block next?"

5.6 Software management

Earlier discussions showed that the human element in ICT at the institution is ineffective; an area where this is evident is in software management. We believe that although viruses and computer malfunctions cause all computer users problems, they can be effectively managed. It is felt that our institution's IT support has done little to solve these problems and perhaps also lacks policy and regulatory mechanisms to effectively deal with software issues. In computer laboratories, the grand scale of virus attacks is ample proof that all is not in order.

5.7 Impact of ICTs (Internet and network infrastructure) on teaching and information sources

Information and communication technologies are increasingly indispensable in higher education, both as aids to teaching and learning, and in the provision of information resources. In keeping with the momentum of expansion, universities should continuously upgrade their infrastructure, including libraries and computer and Internet access, to bring them to levels that are acceptable in the digital environment. Academics can enhance the process by integrating online resources and pointing students to these sources of information. Open source or open book policies have been enhanced through institutional repositories. The Massachusetts Institute of Technology (MIT), for example, has uploaded its teaching material onto the Web and recorded classroom lectures for everyone to see free of charge (Guha and Maji, 2008, p.298). The implementation of such initiatives could bear fruitful results for Unizulu and the idea of hiding lecture materials for easy access should be a thing of the past.

5.8 Conclusions

This study has revealed that there have been a number of significant changes between 2002, when the first study was conducted by Mugwisi, and 2009, when the second study was concluded by Nkomo. These changes are mainly positive. The most obvious changes are infrastructural: the institution added to the 5 available student computer laboratories in 2002, 2 main public access computer laboratory venues (HP Academy and B-Block), and an additional 12 departmental facilities. The computer laboratories have various seating capacities, ranging from small labs with 20 - 30 seats, to large labs with 500 seats. The new Richard's Bay campus (which opened in January 2010) presently has 6 labs. The quality of the computer facilities has also improved with the purchase of high capacity computers and workstations. Connectivity has also improved tremendously; the 128Kbps access to the Internet via the TENET/Uninet in 2002 has been replaced with a 10 gig fiber connection with the South African National Research and Educational Network (SANReN) from the beginning of February 2010.

This welcome addition has gone a long way in improving bandwidth. Significantly higher volumes of Internet traffic can now be handled. With the Internet and the web becoming indispensable in education, familiarity, the need for access and utilization correspondingly grow.

The negatives noted include growing student populations which impacts on access to facilities present and often leads to overcrowding a situation further compounded by the use of the same labs for classes. We conclude that the influence of ICTs especially the Internet and World Wide Web on information seeking in higher education is considerable, continues to increase and must be sufficiently planned for.

Measures must be put up to curb the strain the network bears at critical times during the term when traffic loads are huge, such as during the end of semester exams when multitudes browse at the same time to submit assignments and tests through e-learning courses.

Despite these problems, there have been verifiable attempts to overcome quite a few challenges, as demonstrated by the positive factors mentioned earlier with respect to infrastructure development and connectivity options. There is conformity as well in that it has influenced how students and staff access information. Its influence extends to various areas, including research, teaching, and communication, acquisition, and collection development, among others. Lastly, with student and staff populations steadily growing, it is important to plan ahead and prepare before our networks suffer strain, through human, infrastructural and technological investment.

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