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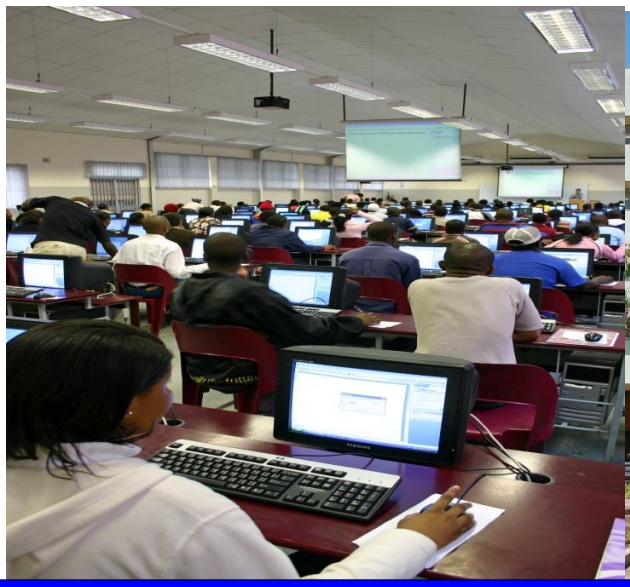

Theme

"Demystifying and Popularizing LIS Research in Modern Times"

Editors
Dennis N. Ocholla and Neil Evans

Proceedings of DIS 11th Annual Conference 2010

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The role of Library and Information Science in Research in the Humanities and Social Sciences

Introduction

Talking about the contribution of a department or a unit within an institution to an important field is a noble opportunity. I would like in my speech to highlight what the humanities and social sciences mean to me, and what I understand by library and information science (LIS) and the role this discipline and department plays in the Faculty of Arts.

Milestones such as the 11th DIS annual conference are moments to savour and celebrate in an academic environment where conferences make sense. I will begin by noting that many people do not understand the disciplines of librarianship, information science, information studies and knowledge management – where this unit falls – well. In a cursory review of Library and Information Science/Studies Departments/Schools in South Africa, the tendency is for it to be housed in various departments, and this seems to be the trend across the world. Some group it with computing in the sciences, while others accommodate it in education and at times in the arts, humanities and social sciences. I intend not to divert from my agenda but to help us all picture how important it is to view the contribution of information science to the humanities, considering that it can be housed elsewhere. My opinion is that it is a social science.

Having laid this background, I will briefly speak about what the humanities and social sciences are. The social sciences are the fields of academic scholarship that explore aspects of human society.[1] "Social science" is commonly used as an umbrella term to refer to a plurality of fields outside of the natural sciences. These include: anthropology, archaeology, economics, geography, history, linguistics, political science, international studies and, in some contexts, [2] psychology. One wonders therefore where information science fits in. The debates perhaps stem from it not being one of the older, more established academic disciplines (anthropology, history, linguistics, etc.). In turn, the increasing diversity of library and information science research lends itself to others in the sciences, social sciences and humanities.

With the following quote from 'The Virtual Knowledge Studio for the Humanities and Social Sciences', "The humanities and social sciences are no backwater with respect to research". I want to succinctly capture the spirit with which the Department of Information Studies has conducted itself in research matters. This indomitable spirit has led to its development into one of the shining lights of the faculty, and indeed the university at large as I will highlight below.

Highlights

- **Teaching and learning**

At present, seven qualification programmes are on offer with new programmes on the way. Postgraduate student enrolment figures are impressive; the department takes pride in producing students of a high calibre, as indicated by the quality of the alumni present. Some of the students produced by the department have gone on to make waves in the public and private sector, including the current Minister of Transport and Chancellor of the University of Zululand, Dr Sbusiso Ndebele. Among our rising recent PhD graduates are: Prof Robert Ikoja-Idongo, Dean of the School of Psychology at Makerere University, Uganda; Prof Mabel Minishi Majanja, Head of the Department of Information Science, UNISA, Pretoria; Prof Joseph Kiplanga't, Head of Moi University Nairobi Campus, Kenya; and Prof. Omwoyo Bosire Onyancha, who still stands out as the only student during his tenure of study at this university to have published 18 peer refereed papers, including 9 SAPSE publications and a host of others littered across the academic sector locally and internationally.

- **Research and publications**

The department has a remarkable research achievement record. In four consecutive years, it has occupied the top three spots among 48 academic departments at the university in terms of research output. In 2007, it came first in the university and was awarded the certificate of recognition for research endeavour by the institution, and in 2009 it came first in the Faculty of Arts(of 18 departments) and second to the Department of Chemistry in the entire university in terms of research publication output. Those who read *Inkanyiso* (Ocholla and Mostert, 2010:32-43, http//www.inkanyiso.uzulu.ac.za) will notice that the Department of Information Studies (then Library and Information Science) has recorded outstanding research achievements in terms of research publications and the registration of new research projects, both departmental and for Masters and Doctorates, over the last 10 years. I would also like to mention that research publications in SAPSE accredited journals from the department over the past three years have generated well over half a million rand annually, with an approximated R 1 million expected in payouts from DoE to the university early in 2011. As a result, the department has around half a million rand in its departmental research generated funds, currently the highest in the university. This research endeavour has given the humanities and social sciences - particularly the Faculty of Arts and the university - strong visibility and contributed significantly to capacity building, which both South Africa and Africa seriously need.

- **Conference participation and presentation**

The department has set a minimum requirement for staff and postgraduate Masters and Doctoral students of at least one conference paper a year, either locally or internationally. The DIS conference affords the department's students and staff this opportunity. We are currently benefiting a great deal as a faculty from the department by way of the Faculty of Arts Annual Conference, facilitation of research workshops, development of the faculty website, publication

of *Inkanyiso*, support to the faculty research committee, and in mentoring novice researchers. I must say that the research visibility and capacity building in the faculty is strongly supported by conferences where staff and students develop their research publication and dissemination skills.

- **Community engagement**

The department offers a range of professional services to the information community, such as: external examining and moderation of examinations for other universities; peer review for journals and research councils; membership of editorial boards of scholarly journals in the subject field; membership of conference programme committees; facilitation of workshops; chairing of conferences; membership of university academic committees and task groups; and recent engagement with the Department of Education, KwaZulu Natal, to support their school librarianship and information literacy training programme, which has the potential to bring library services to numerous school-going children in the province.

- **Service department**

As a service department, information science/studies lends services to other departments in the faculty, e.g. computer literacy, information literacy, and teaching research methods. Members of staff also lend their skills to the faculty and the university as a whole, for instance Prof Ocholla is the Editor-in-chief of *Inkanyiso*, while Mr. Evans designed the Faculty of Arts website.

Conclusions

With the above, I conclude that the Department of Information Studies has made a substantial and lasting contribution to research at the University of Zululand and that its various activities have improved the visibility of the humanities and social sciences.

I would like to commend the department and its leader for making this conference possible and for supporting the faculty's and university's vision and mission in the best possible way.

Prof. N. Makunga
Executive Dean Faculty of Arts

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A Proposal for the Adoption and use of Cloud Computing in Secondary Education in South Africa

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ABSTRACT
Cloud computing is a relatively new concept that holds significant promises for the future development and delivery of computer resources to K-12, also referred to as secondary or basic education in South Africa, especially in schools most affected by the digital divide. In view of the recent announcement by the Minister of Basic Education, Angie Motshekga, that Outcomes Based Education (OBE) will finally be scrapped, it seems advisable to investigate global benchmarks to discover how Internet resources such as cloud computing can be used to avert many of the information delivery problems that crippled OBE in the new education plan referred to as "Schooling 2025" (Mahlungu, 2010). Although details of the new education plan are still to be announced, it will suffer the same fate as OBE if the role and future of information and communication technologies (ICTs) such as cloud computing in secondary education, are not recognised and made part of the revised curriculum.
The aim of this paper is to briefly review the extent to which cloud computing applications and services currently used by secondary education systems in developed countries around the world can be used to help breach the digital divide that currently exists in the secondary (basic) education sector in South Africa.

Keywords: Cloud computing, secondary education, K12, Google docs, digital divide

INTRODUCTION

The use of the Internet and Information and Communication Technologies (ICTs) to deliver educational resources is considered to be mainstream practice in the 21st century, yet in secondary education in developing countries it is often viewed as a luxury. This has far-reaching effects on teachers, learners and educational institutions in countries that lack basic ICT infrastructure and limited or no support for the training of teachers and learners in the use of digital online information sources. It is increasingly accepted that in the future, most information

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[2] Neil Evans is a Lecturer in the Department of Information Studies as well as a PhD student in the same Department.

sources and desktop applications currently used will be accessed through the Internet or "cloud" applications. This means that at secondary school level, ICTs should be adopted as a matter of urgency to enable teachers and learners to access these new directions in Internet technology and application delivery. Teachers and learners will no longer have to physically carry their documents and data around with them; the "cloud" will enable them to access documents and data anywhere, from any connected device. This blending of traditional teaching and learning with online applications and tools for collaborated learning via the Internet is a fundamental concept of cloud computing.

The term "cloud computing", which has been described as an Internet computing model that offers unparalleled access to computing resources, was introduced into the public domain around 2006 when Amazon announced a limited public beta version of its Amazon Elastic Computing Cloud (EC2) system. By this time, Google's Gmail (first released as Google Mail in Germany in 2004) application was already more than two years old, but many did not at the time associate the application with the concept of cloud computing. It was only in 2006 when Eric Schmidt (Bogatin, 2006), Google's CEO, described his company's commitment to a new mode or model of computing called "cloud computing" - different from the "old client/server" computing business model invented (mainly) by Oracle - that the term "cloud computing" as a data service architecture on servers in a "cloud somewhere" began to take off. This new type of web service would allow anyone with a web browser and a connection to the Internet to access services in the cloud irrespective of the kind of digital device they used, from PCs to Mac, mobile phones or devices that have yet to be developed (Bogatin, 2006).

Because cloud computing is Internet-based, reliable Internet access over high-speed broadband connections constitutes the most significant component in its future development, marketing and delivery to secondary education. While some cloud services may not require users to have fast Internet connections or use large amounts of bandwidth to access web applications, such as text messages through Facebook or GMail, others, such as downloading a streaming video file through Youtube or uploading large quantities of data to Amazon for storage (S3) or processing (EC2), do. In the limited broadband/ bandwidth environment of the "digital divide", this presents a significant obstacle to overcome in order for cloud computing to substantially contribute to breaching the digital divide (LeRoux and Evans, 2010).

Cloud computing, like the web, is the evolution of a variety of technologies that have come together over the last decade or more to alter an organisation's approach to building its information technology (IT) infrastructure and hosting its information systems (IS) (Reese, 2009). According to Reese (2009), there is nothing fundamentally new about any of the technologies that make up cloud computing. Just as Netscape came to harness the different web technologies into its suite of Internet tools late in 1999, Amazon in 2003 began to harness existing web technologies, web-services and protocols to deliver remote computing services collectively referred to as Amazon Web Services (AWS). The best known of these cloud

computing platform services are the organization's off-site Simple Storage Service (S3) and its Elastic Cloud (EC2), launched in 2006.

While cloud computing services, especially software-as-a-service (SaaS), is rapidly becoming a reputable concept among businesses that have fast and reliable access to the Internet (which, as mentioned before, is perhaps the most crucial requirement for cloud computing), its uses and virtues in K-12 (secondary education) are poorly utilized in developing countries around the world.

1. Cloud computing service models

Cloud computing is currently delivered in three main service models, namely cloud-based applications know as software-as-a-service or SaaS, development platforms known as platform-as-a-service or PaaS, and computing resources for storage and processing commonly referred to as infrastructure-as-a-service or IaaS.

SaaS applications are currently the most widely used in K-12 (secondary education). Popular applications include Google's Gmail, Google Docs, Zoho Office Suite, Microsoft Office web apps (Office Live), Quicken Mint, Adobe Buzzword, WriteRoom, Facebook, eLearning, (Microsoft) Docs for Facebook, Creatly.Com for online diagramming and collaboration, Yahoo Calendar, Sales Force Automation, and Business Intelligence (Adobe Developers Connection - ADC, n.d.).

PaaS services, on the other hand, provide the infrastructure on which SaaS applications are built and run, which can be Windows, Unix or open-source (OS) systems such as Linux or Ubuntu. Examples here include Google's App Engine, Heroku (a 'ruby on rails' platform), Joyent, which can host applications developed in various computer languages, and SmartPlatform. The latter is a Joyent, OS, JavaScript cloud platform that provides users with a single unified web application development platform with infinite capacity. According to its website, the SmartPlatform "abstracts away all the complexity of a modern data center" by using a "SmartDataCenter to manage specific hardware and network topology behind the scenes" and allow for "maximum productivity, efficient resource utilization and best-in-class application performance" (Joyent SmartPlatform, n.d.).

IaaS, the third group of cloud services, offers virtual computing resources as a service. This means that instead of buying servers, software, data center space or network equipment, consumers can buy these resources as a fully outsourced cloud service ('infrastructure as a service'). This type of cloud service, which is similar to buying electricity, is generally referred to as utility computing. Popular examples are: Amazon's Elastic Compute Cloud (EC2) - Amazon Web Services, GoGrid, and Windows Azure. Although one popular use of IaaS is to develop websites, IaaS resources are normally used for more challenging and extensive computing and research efforts normally not performed at K-12 or secondary school level.

To better understand the impact that cloud computing may have on the development and delivery of K-12 (secondary education) in developing countries, we need to turn our attention to the development and current use of cloud computing services in the developed world.

2. Cloud computing in K-12 (secondary education): The developed world

Perhaps one of the most informative sources on the use of cloud computing applications by K-12 - also referred to as pre-college or secondary education in the developed world - is the K-12 Edition of the New Horizon Report published annually since 2009 by The New Media Consortium in collaboration with the Consortium for School Networking (COSN) in the United States (Horizon Report 2010 K-12 edition:1).

The report provides a valuable insight into cloud computing resources currently being used by schools in the developed world. Each edition of the K-12 report introduces six emerging technologies or practices, their potential use and impact on teaching and learning, and their estimated adoption time over the next five years (Horizon Report 2010 K-12 edition:1-35). The six technologies are:

(1) Cloud computing (one year or less);
(2) Collaborative environments (one year or less);
(3) Game-based learning (two to three years);
(4) Mobiles (two to three years);
(5) Augmented reality (four to five years); and
(6) Flexible displays (four to five years).

For the purposes of this paper, the authors have decided to concentrate mainly on cloud computing because it has the best possible chance of implementation in developing countries over the next five years. Although the adoption time for collaborative environments, also referred to as Learning Management Systems (LMS), in the developed world are seen as similar to that for cloud applications, the authors believe that given the current status of Internet connectivity and infrastructure in the developing world in general and South Africa in particular, LMS' adoption time in K-12 or secondary education will be much slower than the adoption time for general cloud applications for educational purposes.

This belief is partially borne from the fact that even in the developed world, the use of cloud-based collaborative environments by schools only began to take off in the first half of 2010 compared to 2009 when, according to the 2010 K-12 edition of the Horizon Report, only a few examples of cloud computing in general could be found in schools. Many of the cloud-based applications adopted by schools in 2010 were mainly for administrative purposes and productivity, such as curriculum development, scheduling and collaboration. This development also applies to K-12 schools in other parts of the developed world. The response of different

secondary educational institutions around the world to the 2010 K-12 report can be found on the COSN website (Horizon Report 2010 K-12 edition:1-35).

One of the most compelling reasons for adopting cloud services, especially software-as-a-service (SaaS), is the substantial cost savings in terms of IT support, software and hardware expenses. This is primarily because most of the required processing power needed for cloud computing is shouldered by large data centres; electronic devices with minimal processing power and memory can thus be used to access cloud applications, especially SaaS applications.

A significant finding of the K-12 report was that while schools were increasingly beginning to adopt cloud-based applications in 2010 to manage calendars, rosters, grade books, and to facilitate communication between school and home, the actual use of cloud applications by students was still slow, suggesting that either teachers were slow to adopt cloud applications for use in classrooms or that the infrastructure, namely fast high-speed broad connectivity, was not available, or a combination of both factors.

While some schools, like the Columbia Secondary School (CSS) in New York and the Minnesota Online High School, have adopted cloud solutions to facilitate student work in engineering, English and debate, others have not yet utilised the available cloud applications for teaching and learning. In the case of the Minnesota Online High School, the use of cloud applications has actively freed the school from having to press, ship, and inventory software CDs. It also made it simpler for their IT support staff to assist students, who use a wide range of computer platforms.

K-12 teachers of some Science Technology Engineering and Maths (STEM) courses in the US have started to partner with some US universities to access higher-end computing resources to enable students to work on complex projects involving scientific research data that K-12 desktop computers are unable to process. North Carolina State University, for example, is working with IBM to provide cloud applications, computing power, and storage space to every public school in the state.

In November 2009, IBM in the United States announced the release of its Cloud Academy (IBM, 2009), a global forum for educators, researchers and information technology (IT) personnel at K-12 and higher educational institutions, to pursue cloud computing initiatives, develop skills and share best practices for reducing operating costs while improving quality and access to education. According to IBM: "Cloud computing makes it easier for those in the education industry, including students, faculty and administrators, to gain immediate access to a wide range of new educational resources and research applications and tools."

Cloud computing therefore represents good value for money by providing access to services and tools that would otherwise require substantial infrastructural investment. Add to this the fact that cloud applications can be accessed from a variety of devices, ranging from

desktop to laptop computers, notebooks as well as many mobile devices, and the reason for shifting to cloud computing for secondary education starts to make a great deal of sense (Horizon Report 2010 K-12 edition:10).

As a result of the rapid growth and emphasis on cloud computing applications since 2008, some schools have started to integrate cloud computing into their design from the ground up. Coleman Tech Charter High in San Diego, California, is an example of one such institution. With new uses for cloud applications and services being discovered almost daily, designing and moving applications and services for K-12 institutions to the cloud makes increasing sense.

In October 2009, it was reported online that Australian primary and secondary schools had begun publishing educational content on iTunes U, which is a Section 25 of the Apple Store, allowing educators to share material. Although iTunes U was originally designed for universities and other tertiary institutions, it now actively caters for K-12 schools (Withers, 2009). The Western Australia Department of Education (DET), the Catholic Education Network (CEnet), the Presbyterian Ladies' College WA (PLC), and the Scotch College WA are the main drivers of this program. While the DET's content is designed mainly for the professional development of teachers, the CEnet's contributions are mainly classroom-oriented.

3. Cloud computing in K-12 (secondary education): The developing world

Although cloud computing is a relatively new concept and many of the current SaaS applications, especially the cloud-based office suites offered by Google, Zoho and Microsoft, have some way to go before they will be as functional, future-rich and compatible as existing Office applications, there can be little doubt that the future of Office suites is cloud rather than desktop based.

As pointed out at the beginning of this paper, cloud computing is primarily dependent on high speed broadband connectivity. According to the latest statistics released by the International Telecommunications Union (ITU stats, 2010), the developing world had only 12.3% fixed line connections compared to 42.7% for the developed world in 2009.

Cellular subscription for the same period stood at fifty seven point nine percent (57.9%) for the developing world compared to 115.3% for the developed world. However, when it comes to mobile broadband subscription, the figures are as low as three point one percent (3.1%) for the developing world compared to thirty nine point nine percent (39.9%) for the developed world. The figure for fixed-line broadband subscription is slightly higher at 3.6% for the developing world compared to 22.6% for the developed world. Estimated Internet usage for the developing world is given as 18% compared to 66.6% for the developed world (see Table 1 below, page 7).

As far as Africa is concerned, 37.5% of the continent’s population has access to cellular devices, but only 2.2% has mobile broadband subscription compared to 0.1% for fixed-line

broadband subscription. Although mobile broadband subscription is still low, it is expected to grow in the future as more and more people make use of mobile devices to access the Internet. Total Internet usage was estimated at 8.8% for the entire continent by the end of 2009 (ITU stats, 2010; see Figure 2, page 8).

Table 1: World telecommunication stats for 2009

World telecommunication stats as a percentage of total population, 2009		
Fixed telephone lines	**Year**	**Per 100 of the total population**
Developed	2009	42.7
• Developing	2009	12.3
Mobile cellular subscription	**Year**	
Developed	2009	115.3
• Developing	2009	57.9
Mobile broadband subscriptions	**Year**	
Developed	2009	39.9
• Developing	2009	3.1
Fixed broadband subscriptions	**Year**	
Developed	2009	22.6
• Developing	2009	3.6
Estimated Internet users	**Year**	
Developed	2009	66.6
• Developing	2009	18.0

Table 2: Telecommunication stats for Africa 2009

Telecommunication stats as a percentage of total population for Africa, 2009				
Fixed telephone lines	**Mobile cellular subscriptions**	**Mobile broadband subscriptions**	**Fixed broadband subscriptions**	**Estimated Internet users**
1.5	**37.5**	**2.2**	**0.1**	**8.8**

While the above figures are not very encouraging for the use of modern, Internet based technologies in K-12 or secondary education in teaching and learning in the developing world, especially Africa, progress is being made despite questions being asked about the cost and sustainability of the process and whether such investments are justified when the road networks remain poor, the energy supply is unreliable, and there is still no fixed line infrastructure in Africa (African ministers pass ICT directive, 2010).

According to a report on the 5th International Conference on ICT Development for Education and Training held in Lusaka, Zambia, in May 2010, "More and more African nations are embracing full-scale regulatory reforms and market liberalisation in a bid to attract more investment in the Information and Communication Technology (ICT) sector and exploit the potential of low-cost technologies [and] their efforts to improve access to the Internet are slowly paying off" (Ng'andwe, 2010).

The conference acknowledged that while approximately 17 African countries already have an Information and Communication Technology (ICT) policy for education, only 10 have developed an implementation plan or actually started implementation. While a number of best e-learning practices were proposed at the conference, no mention was made of applying cloud computing as a solution to the digital divide in African K-12 or secondary education (African ministers pass ICT directive, 2010).

4. Cloud computing in K-12 (secondary education): The South African picture

In January 2010, it was reported by World Wide Wrox that the number of South African Internet users had passed the 5 million mark, which represents about 10% of the total population. The data released by WW Wrox shows that the Internet user base grew by some 15% in 2009, from 4.6 million to 5.3 million, and was expected to grow at a similar rate in 2010 (Broadband Speeding Ahead, 2010). Most of this growth was in urban areas.

The same study found that most of the growth in fixed-line broadband came from small and medium enterprises (SMEs) upgrading to ADSL, thereby providing Internet access to more than half-a-million South Africans working in small offices who did not previously have access to the Internet. Although wireless broadband was found to have grown by some 88% during 2009, this was mainly the result of large companies supplying 3G cards to employees who needed to be connected whilst out of the office (Broadband Speeding Ahead, 2010).

According to the World Wide Wrox's "Mobile Internet in South Africa 2010" study, almost all urban cellular users have WAP-capable phones, and a high proportion have used that WAP capability to access a variety of Internet based content on a regular basis. Mobile web browsing, which is measured directly in the new study, accounted for almost three and a half a million users by the end of 2009. The Mobile Application Internet, which is measured across

several applications - instant messaging, downloadable applications, Gmail, etc. - is estimated at about 9 million (The Mobile Internet pinned down,2010).

As far as South Africa's public schools are concerned, most have no library facilities or any form of formal access to the Internet or make use of Internet applications for teaching and learning. In July 2010, the South African Minister of Basic Education, Angie Motshekga, announced that a new education curriculum will replace the widely criticised Outcomes-Based Education (OBE) system. Entitled "Schooling 2025", the new education plan comes after years of criticism by teachers and education experts that OBE was a disaster and that it has failed a generation of learners since its introduction by the former Minister, Kader Asmal, in 1998 (Mahlangu, 2010). According to Kader Asmal, OBE was the brain child of Dr. Blade Nzimande who was the chairman of the parliamentary education portfolio committee in 1998. Dr. Nzimande apparently had the support of the then Minister of Education, Sibusiso Bhengu, Cosatu and the SA Democratic Teachers' Union, who wanted the "…immediate implementation of OBE as a progressive response to apartheid education" (Asmal, 2010).

OBE largely failed for three reasons: the lack of supporting resources such as libraries and Internet access, lack of training, and inadequately qualified teachers to implement its principles. Dr. Graeme Bloch, considered by many to be OBE's main architect, had to admit that they were overoptimistic and that the system was too complex. The system, he pointed out, could not work in an education environment where only 8% of the more than 27 000 government schools have libraries and only ten percent (10%) have some form of Internet connection. According to Dr. Bloch, without the necessary resources, OBE was doomed from the start (Bloch and Ndebele, 2010).

Whether the new curriculum will accommodate any of these concerns remains to be seen. The 2003 Draft White Paper on e-Education was never implemented as a policy. A new policy on e-education that accommodates the new directions in technology, especially cloud based technology, is therefore urgently needed.

In a paper entitled "Realities versus ideals with regard to e-learning in South Africa", Conradie and Roodt argue that there is a stark contrast between the ideals of e-learning that have been put forward by education policy makers in South Africa and the realities and challenges facing its implementation, particularly in the rural and disadvantaged areas of the country (Conradie and Roodt, 2004). The authors argued that while there have been optimistic statements from official quarters on the one hand, such as the hope that was expressed in the 2003 Draft White Paper on E-learning that South Africa could 'leapfrog into the future', there are also many serious challenges to overcome, such as the marked urban-rural digital divide in the country (Conradie and Roodt, 2004).

The reality is that seven years after the release of the Draft White Paper on e-Education, only a small percentage of government schools have libraries and access to the Internet (Bloch and Ndebele, 2010). Equal Education (EE), a non-governmental group based in the Western

Cape, has estimated that R2.2 billion was needed to equip every public school with a functional library and qualified school librarian. KwaZulu-Natal and the Eastern Cape are the worst affected (OBE was wrong from the start).

In August 2010, Zwelinzima Vavi, Cosatu's secretary-general, launched a scathing attack on the country's 'corrupt political elite', saying that instead of focusing on and dealing with the country's many problems, such as the dysfunctional school system, they are fighting political battles and using the state's resources to enrich themselves. South Africa, Mr. Vavi pointed out, was moving towards a 'full-blown predator state' that cares little about service delivery (Steenkamp, 2010).

Yet in stark contrast to the digital divide in its basic educational system, South Africa in 2010 delivered the most hi-tech World Cup event yet. The semi-state telecommunications giant, Telkom, played a pivotal role in exclusively controlling and operating the two main digital hubs (carrier rooms). All stadiums were supplied with 20Gbps bandwidth networks that had capacity for High Definition TV broadcasting. A total of 1900 km of fibre optic cables were laid out for the World Cup venues (The Most hi-tech World Cup yet, Sunday Times, 22 May 2010**)**. It has been estimated that the World Cup could cost the South African taxpayer as much as R30 billion (2010 World Cup: A showdown of Costs).

In 2010, an amount of R165.1 billion was allocated for education in South Africa. Of this, R5.5 billion was allocated to infrastructural development. This figure was expected to rise to R9.4 billion by the 2012/2013 financial year. In March 2010, the Minister of Basic Education told parliament that South Africa needed R140 billion – slightly less than the total 2010 education budget - to build new schools, fix up old ones and provide libraries and other facilities, and that government was seeking outside assistance to foot the bill(R140bn is needed to fix school facilities. The Mercury, Durban, 24 March 2010)

Four months later, in July, the Department of Basic Education announced the official rollout of "The Teacher Laptop Initiative". While this development represents a step in the right direction, the need to provide teachers and learners with Internet access so that they may use existing and future cloud-based applications such as Google Docs, Zoho and Microsoft Office online, should be the cornerstone of the new curriculum. Without this, the Teacher laptop Initiative, the TuThong National Educational Web Portal it will be of little use to the majority of the country's teachers and learners.

CONCLUSION

In the introduction to this paper, we asked to what extent cloud computing applications and services, currently used by secondary education systems around the world, can be used to help breach the digital divide in secondary (basic) education in South Africa. The answer is that while a growing number of K-12 schools in the developed world are starting to make use of

cloud applications, particularly suitable SaaS applications for teaching and learning, education systems in the developing world have not even began to access these new developments in technology. The absence of fast and reliable high-speed Internet access is one (if not the) main stumbling block to progress. Providing teachers with laptops is a step in the right direction, but without Internet access they will be used as little more than glorified typewriters. Rolling out broadband Internet access and using cloud-based applications would allow for cheaper and more baseline laptops to be issued to teachers as less processing power is needed to access cloud-based applications than standard desktop applications. The savings incurred by installing broadband connectivity and moving from desktop to cloud-based applications for teaching and learning can be substantial.

Setting up libraries with Internet access should go hand in hand with the "Teacher Laptop Initiative". Internet access and its supporting technology should no longer be seen as a luxury, but rather as an essential part of the education process, especially in the developing world.

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Records Management and Risk Management in the Banking Industry: A Case Study of Kenya Commercial Bank Limited, Nairobi

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ABSTRACT

This paper provides a report on some of the research findings of a Master of Philosophy study conducted at Moi University between February 2009 and July 2009. The aim of the study was to investigate records management and risk management at Kenya Commercial Bank (KCB) Ltd in Nairobi and propose recommendations to enhance the functions of records and risk management in KCB. The specific objectives of the study were to: establish the nature and types of risks KCB is exposed to; conduct business process analyses and identify the records generated by KCB; establish the extent to which records management is emphasized within KCB as a tool for managing risk; identify vital records of KCB that need protection because of their nature and value to the bank; and provide recommendations to enhance current records management practices that support the function of risk management in KCB.The study was guided by Frank Upward's (1980) Records Continuum Model and the Government of Canada's (2000) Integrated Risk Management Model. Preliminary findings indicate that there are inadequacies in the management of records at KCB that consequently undermine risk management efforts.The study provides recommendations and a model for the management of records at KCB Ltd to support risk management through the strengthening of records management. It is hoped that the study will steer further research in other industries to establish the link between records management and risk management as well as records management and other business functions.

INTRODUCTION: RECORDS AND RISK MANAGEMENT

A record is defined by the ISO 15489-1:2001 standard as information created, received and maintained as evidence by an organization or person in pursuance of legal obligations or in the transaction of business. This definition is shared by a number of authors, who also note that a record can be held in any media - on paper, digitally, on microfilm, etc (Shepherd & Yeo, 2006; Shepherd & Yeo, 2003; Ngulube, 2001).

Records management (RM) is the activity responsible for the efficient and systematic control of the creation, receipt, maintenance, use and disposal of records, including processes for capturing and maintaining evidence of and information about business activities and transactions in the form of records (ISO 15489-1:2001). According to Ngulube (2001), records management is concerned with the creation, organization, storage, retrieval, distribution, retirement and final disposal of records irrespective of their form and media.

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The objectives of records management are to: set policies and procedures; assign responsibilities for RM at various levels within the organization; set best practice standards; process and maintain records in safe and secure storage; implement access policies; implement a records retention and disposal policy; integrate records management into business systems and processes; assign, implement and administer specialized systems for managing records; and provide a range of services relating to the management and use of records (ISO 15489-1:2001; Wamukoya, 2007).

Adequate records management affords organisations a number of benefits. It enables organizations to (IRMT, 1999; IRMT, 2009):

- Know what records they have, and locate them easily
- Increase efficiency and effectiveness
- Make savings in administration costs, both in staff time and storage
- Support decision making
- Be accountable
- Achieve business objectives and targets
- Provide continuity in the event of a disaster
- Protect the interests of employees, clients and stakeholders

The Government of Canada's (2000) Integrated Risk Management Model defines risk as the uncertainty that surrounds future events and outcomes. It is the expression of the likelihood and impact of an event with the potential to influence the achievement of an organization's objectives. Risk exists or can be grouped into operational, strategic, compliant or reputational risk (Central Bank of Kenya, 2000; Mwisho, 2001; Central Bank of Kenya, 2005).

Operational risk, also referred to as transaction risk, is the risk arising from fraud, error, and/or the inability to deliver products or services, maintain a competitive position, or manage information. Strategic risk is the risk arising from adverse business decisions or the improper implementation of those decisions, while compliance risk is the risk arising from violations or nonconformance with laws, rules, regulations, prescribed practices, or ethical standards. Reputational risk is the risk to earnings or capital arising from negative public opinion (Buttle, 1999; Lore & Borodovsky, 2002**;** Comptroller Handbook, 2002; Chance, 2004).

Risk management has become increasingly necessary in organizations and public sector institutions because of a growing demand for good corporate governance and greater accountability, efficiency and effectiveness in service delivery and the utilization of resources (Busby & Alcock, 2008; Lennart, 2008).

In the banking industry, risk management has become even more essential because of the nature of the banking business, which is essentially to safeguard people's money (Ioannis, 2008). By their very nature of business, banks deal with sensitive financial issues that are marred by various risks that impact on the bank's services to their clientele (Nyaoma, 2005; Gup & Kolari, 2005).

Generally, banks provide a variety of services that include but are not limited to cash and cheque deposits and withdrawals; provision of credit facilities such as loans, overdrafts and credit cards; processing payments; asset financing; mortgages; clearing; foreign exchange; money transfer; advisory services; safe keeping services; and custodial services (Mayo, 2009).

With respect to risk management, records management is considered to be critical in minimizing risk exposure within the banking industry. Poor records management poses challenges to banks in their efforts to manage risk. A number of scholars such as Makhura (2008), Sydney University of Technology (2008), Sampson (2003) and Williams (2007), contend that weak records management programmes, systems and practices have remained a problem and a major obstacle to developing watertight risk management strategies in the banking industry as well as in other financial institutions.

According to Gorrod (2004), commercial banks are exposed to risks such as fraud, poor service delivery and failure to enforce compliance within existing regulatory frameworks. These risks are usually exacerbated by weak information and records management systems and practices. Gorrod's (2004) opinion is also shared by Borodzicz (2005), Mlabwa (2004) and Richard (2006), who contend that effective records management is the foundation on which institutions can demonstrate legal and regulatory compliance, high standards of corporate governance, and sustain operational efficiency. Records management may also deliver additional benefits to an institution by reducing overheads, protecting assets and streamlining business processes.

Risk issues threaten the customer base of commercial banks as well as their own internal processes that direct the quality of the services they offer.

In Kenya, the need for stringent risk management strategies has necessitated the directive by the Central Bank of Kenya requiring all banking institutions to establish risk management units responsible for the task of risk mitigation (Njuguna, 2007; CBK, 2006; CBK, 2005).

Mat-Isa (2006) proposes that managing records must be prioritized and adequately supported if risk management is to succeed.

AIM AND OBJECTIVES OF THE STUDY

The aim of the study was to investigate records management and risk management at Kenya Commercial Bank (KCB) Ltd in Nairobi, Kenya, and propose recommendations to enhance the functions of records and risk management in KCB. The specific objectives of the study were to: establish the nature and type of risks KCB is exposed to; conduct business process analyses and identify the records generated by KCB; establish the extent to which records management is emphasized within KCB as a tool for managing risk; identify vital records of

KCB that need protection because of their nature and value to the bank; and recommend ways to enhance current records management practices to support risk management in KCB.

METHODOLOGY

The study's sample population consisted of thirty six (36) respondents drawn from five KCB Nairobi braches (Moi Avenue, Jogoo Road, Kipande House, River Road and Sarit Centre) and five head office units. This sample included 19 non-management staff and 17 management/senior staff, as indicated in Table 1.

Table 1: Study's sample population (N=36)

Category	**Number**	**Percentage**
Risk Management Managers	2	5.56
Human Resource Managers	2	5.56
IT Manager, Office Automation	1	2.78
Branch managers	5	13.88
Branch Operations Managers	5	13.88
Manager, CPC Archiving	1	2.78
Manager, Central Archiving	1	2.78
Section Heads	8	22.22
Clerical	11	30.56
TOTAL	**36**	**100.00**

Data collection instruments consisted of face-to-face interviews together with observations. Qualitative approaches were used to analyze, present and interpret data. The data analysis focused on specific issues as defined by the objectives of the study, and the data presentation was descriptive in nature

The study utilized simple random sampling and purposive sampling. A simple random sample is gained by choosing elementary units in a way that ensures each unit in the population has an equal chance of selection (Hughes, 2008). Simple random sampling was used in this study specifically to select clerical and section-head members of staff.

The purposive sampling technique proved extremely useful in the selection of interviewees within the head office of KCB and its branches. The interviewees chosen were those with a direct role, either strategic or operational, in both risk management and records management, such as branch managers, branch operations managers and risk management managers. The branches were purposely selected depending on their size and levels of activity. Thus a few large branches and a few small branches were selected.

THEORETICAL FRAMEWORK

The study was informed through the triangulation of Frank Upward's (1980) Records Continuum Model (RCM) and the Government of Canada's (2000) Integrated Risk Management Model (IRMM). Triangulation is the use of a combination of different methodologies in a study on the same phenomenon or the use of multiple theories in tandem to study a single phenomenon. Thus it mixes theories, methods, and multiple data sources to strengthen the credibility and applicability of findings (Hoque, 2006).

The Continuum Model is a consistent and coherent hierarchy of management processes from the time of the creation of records (and even before creation in the design of record-keeping systems) through to the preservation and use of records as archives (AS4390 1996, Part1: clause 4.22). The RCM also advocates for a records management process where both records' managers and archivists are involved in the ongoing management of recorded information (Xiaomi, 2001).

The RCM stipulates that an archival document can be retrieved and returned to its current status just as a newly created record can be archived immediately after its use. This is more practical in the banking sector, where an archival record may be returned back to current use, for example when a closed bank account is reactivated or when there is a reemergence of an old case for auditing or legal purposes. Some of these cases can relate to transactions initiated over ten years prior. Furthermore, the RCM captures the modern definition of records that is inclusive of the key elements of content (the facts about the activity), context (information about the circumstances in which the record was created) and structure (relationships between the constituent parts).

The IRMM provides a clearer and more holistic step by step model for risk management. This model provides a clear pattern within which the function of records management can be evaluated as a tool for risk management. The model's presentation is such that it advocates the establishment of risk management frameworks across an organization right from the first step of developing a corporate risk profile.

IRMM does not focus only on the minimization or mitigation of risks, but also supports activities that foster innovation so that the greatest returns can be achieved with acceptable investment and low risks (IRMM, 2001). The IRMM consists of four related elements, namely developing a risk profile, establishing an integrated risk management function, practicing integrated risk management, and ensuring continuous risk management learning.

The RCM and IRMM also address the needs that are mentioned in the objectives of the study. For instance, the first step in the IRMM in risk management is defining a corporate risk profile. This is essential in understanding the nature of the business activities of an organization and the risks encountered in the course of delivering these activities. This step ties in well with the first objective of the study, i.e. conducting business process analyses, which also means

understanding business activities and placing records management within the context of these activities.

The approach given by the RCM to RM is a holistic one, integrating RM within business activities other than viewing RM in isolation. This approach is very close to the overall aim of this study which is also viewing RM as an integral part of risk management because of the role of RM in delivering banking services and achieving operational resilience.

PRELIMINARY FINDINGS

Business process analysis and records created at KCB

The bulk of business activities in KCB are in the form of direct financial activities. These activities include local currency deposits, credit facilities (loans, overdrafts, credit cards, short and medium term loans, local bills discounts), guarantees (bid bonds, performance bonds, commercial guarantees), issuance of cheques, safe custody, foreign currency deposits, international trade finance, mortgage financing, asset based financing, and community social responsibility.

Examples of records generated from these core financial activities include transaction vouchers, account statements, customer files, cheques, daily ledger books, investment reports, loan performance reports, fraud reports, fund transfer reports, forex statements, circulars and daily correspondence relating to customers, staff and business issues.

Other than financial activities, there are also support and control activities like human resource management, auditing, clearing, financial management, information technology (IT), and facilities and estate management. Examples of records generated from these non-financial support and control activities include personnel records, audit reports, annual accounts and financial statements, estate and facilities reports, ICT deployments status reports, and periodic financial turnover reports.

Risk management is an absolutely crucial business activity within the banking industry. This is because the bulk of business activities in the bank are sensitive activities that relate to the core of the economy or the money-society. This implies that by the very nature of these business activities, the need for adequate risk management is high. Consequently, the need for records management in principle is also high**.**

Nature and types of risks at KCB

The most prevalent type of risk in the banking industry is operational risk. Other risks include compliance, reputational and strategic risks. Operational risks do not only include fraud, management failures, weak systems and human error, but also inadequate records management. Of the 19 clerical and section head staff, 63.15 % cited operational risk, while 70 % of the branch and operations managers cited operational risk as the most prevalent risk affecting their performance. Risk exposure at KCB is therefore high.

Records management status at KCB

The study revealed inadequacies in RM at KCB. There is no comprehensive, professionally drawn records management programme (RMP) other than the operations manual, which is limited. There are no professionally trained records managers in the bank as cited by all 10 (100 %) branch and operations managers interviewed and all the respondents from other units in the head office (there could be similarly trained professionals working in other assignments at the bank). The levels of satisfaction in existing RM systems were also very low (only 1 respondent, 5.26 %, of the 19 clerical and section heads interviewed was satisfied with the systems). Yet most of the staff members are aware of the importance of RM to banking activities (80 % of branch and operations managers).

Overall, this suggests that records management at KCB is inadequate and requires strengthening in order to sufficiently support risk management.

Records Management as an integral part of risk management at KCB

The findings revealed that there are enormous risks that arise from inadequate RM (records management) at KCB. These risks include loss or the misplacement of records; long retrieval times that affect management's decision making; inadequate information which affects the quality of decisions; dissatisfied customers because of delays in the retrieval of customers' records; and exposure to fraud perpetrated through weak record keeping systems. 94.74 % of the clerical and section-head respondents acknowledged exposure to risks due to weak record keeping systems. The study revealed that existing RM systems and practices do not sufficiently support risk mitigation, as observed by 50 % of the branch and operations managers and 68.42 % of the clerical and section-head respondents.

It can therefore be concluded from these findings that existing records management systems and practices at KCB do not adequately foster risk management and that they in fact contribute to risk exposure within KCB.

Vital records management at KCB

The findings of the study revealed that KCB places emphasis on the management of vital records given the investment made in storage equipment and authority controls in the handling of vital records. The bulk of vital records held at the bank are those belonging to clients who have deposited their important documents there for safe keeping. These include title deeds, academic documents, wills, partnerships, agreements and investment certificates.

Every KCB branch has a (fireproof) security safe to protect the vital documents as revealed by all the branch managers. Registers to control access to the safes have also been prepared and are audited periodically. The emphasis on the vital records could be a result of the direct financial implications of the vital records given that they are a source of business to the

bank and therefore a core area of focus, as opposed to ordinary records, which are viewed to be secondary.

It can be concluded from these findings that the bank has placed priority on vital records management but not ordinary daily transactional records, which apparently tend to be the channel for most fraud cases and causes of the greatest operational risks.

CONCLUSION

This research endeavored to study the role of records management in risk mitigation at KCB because of RM's strong impact on risk management. The study has revealed that inadequate records management undermines risk management and can be a breeding ground for more risks. The study also revealed that the nature of business at KCB exposes it to enormous risks that require comprehensive and integrated approaches to risk mitigation. Specifically, it revealed that KCB, as a banking institution, is faced with various risks including those associated with inadequate records management.

The overall conclusion of the study is that existing records management systems and practices are inadequate and undermine risk management and that immediate attention by KCB is required to review existing records management systems to ensure they sufficiently support risk management efforts.

RECOMMENDATIONS

The study revealed gaps and weaknesses in records management systems and practices at KCB that undermine risk management. The study made the following recommendations that could be useful in strengthening records management to make it an integral part of risk management at KCB's offices and branches in the Nairobi area.

Records management systems and practices

- The KCB Operations Division, which is responsible for developing all KCB operational procedures and standards, needs to develop a comprehensive enterprise-wide records management programme for the bank to control and standardize records management practices across all branches.
- There should be a central office established within the Operations Division with a professionally trained records manager at the office to control records management activities in the bank.
- The KCB Training and Development department should invest in staff training in records management, preferably for all the staff at the bank. This is because every staff member is involved in the creation of records and their use.
- The KCB Retail Division, Risk Management Division and HR Division should facilitate the establishment of positions of records officers in the departments and/or branches or review the duties of filing clerks with a view to expand them to cater for all day-to-day records management functions.

- There is a need for the IT Division, in conjunction with the Operations Division, to automate file tracking activities by introducing computerized file tracking systems. This would address concerns raised by the respondents of long retrieval periods because of misplacement or the misfiling of records.
- The KCB IT Division together with the Operations Division should develop and implement a comprehensive electronic records management programme (ERMP).
- The Risk Management Division and Audit Division should ensure the enforcement of procedures to ensure that the consistent appraisal of records is paramount to avoid the accumulation of records for unnecessarily long periods, which compromises the physical and intellectual control of the records and exposes KCB to risks.

Records management and risk management

- There is an urgent need for the Risk Management Division to integrate records management within the KCB's enterprise-wide risk management strategy. Currently, the bank is conducting business-wide training on ethical and reputational risk. Similar efforts should be expended to records management given its huge impact on operational, compliance and reputational risks.
- A central office to oversee records management is essential, as recommended above. However a minimum alternative to this could be a department to cater for records management under the Risk Management Division.

Vital Records Management

A comprehensive vital records management programme should be developed by the KCB Operations Division. This programme should, among other things:

i. Provide a clear description of what constitutes vital records within the business
ii. Provide standards for the description, arrangement and storage of all the categories of vital records
iii. Make provisions for a disaster management plan for vital records

This programme would be significant in strengthening risk management in KCB because it would safeguard KCB against strategic and compliance risks arising from the lose or destruction of vital records and guarantee the continuity of the business in the event of a disaster.

Disaster management for records

- A disaster management programme for records should be developed by KCB to establish standards for records' protection. This programme should cover all aspects and types of disasters, both artificial and natural
- A training programme on disaster management and the recovery of records should be developed by the training and development department for KCB staff or those responsible for records management. This programme should also cater for aspects of records preservation and conservation as elements of disaster planning for records within the bank.

The two programmes will support risk management by safeguarding KCB against reputation and strategic risks that could arise due to the loss of records in the event of a disaster.

PROPOSED RECORDS MANAGEMENT MODEL TO SUPPORT RISK MANAGEMENT

The study proposes a model that could be used to ensure adequate records management in KCB to support the function of risk management. The suggested model presents eight stages that KCB would have to go through to ensure that there is adequate RM to support risk management. These stages and the subordinate action points under each are shown in Figure 1.
The model has been adapted from existing models on records management and risk management.

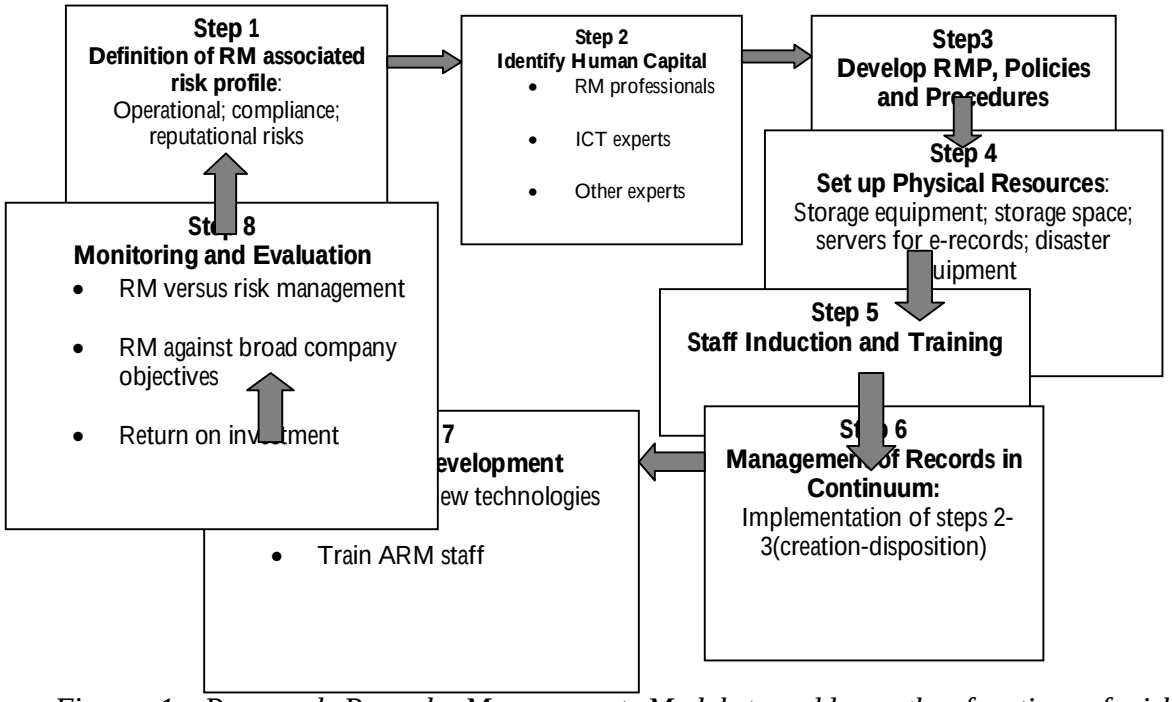

Figure 1: Proposed Records Management Model to address the function of risk management at KCB

Step 1: Definition of RM associated risk profile

The first step is designed to ensure adequate business analyses and to establish a strong case for the need for RM. Here it is necessary to:

- Identify all risks associated with records management
- Relate RM to enterprise-wide risk management
- Indicate how improved RM would assist in downscaling or eliminating the risks
- Indicate the overall value of improved RM to the bank with an emphasis on risk management

Step 2: Identifying human capital

Step 2 is essential in addressing the problem of lack of professionalism in RM and is in place to ensure that the correct people drive the RM process from its first stages. In order to achieve this, it is necessary to:

- Identify personnel requirements for the right people to drive the process
- Identify RM expertise professional qualifications, including ICT skills and expected roles in RM
- Identify other non-RM personnel useful in the management of records such as ICT staff, risk management staff/experts, and legal experts
- Orientate the selected experts to the organizational broader vision, mission and strategies, business activities and company-wide risk management profiles
- Prepare and empower the experts to drive the process in subsequent steps (steps 3- 8).

Step 3: Development of RMP, RM policy and procedures

This step would give the RM function a formal existence and structured approach as well as documented processes that can be transferred to facilitate organizational learning and the transfer of knowledge:

- Draw a policy statement on RM authorizing the RM function, position the RM function within the company administrative hierarchy, and define authorities of responsibilities for the RM function
- Develop an RMP for the bank to cater for all technical and administrative issues of the RM function
- Draw procedural manuals to guide the company staff and RM staff in the creation, preservation, access, use, appraisal, classification, arrangement and description, storage, retention-scheduling, archiving and disposal of records, both paper-based and electronic.
- Consider legal issues relating to records management

Step 4: Set up of physical resource requirements

The necessary tools, equipment and infrastructure conforming to acceptable qualities and standards are essential to quality RM and must be determined and put in place by:

- Establishing storage areas for the records and necessary and appropriate storage equipment for all types of records – ordinary records, vital records and electronic records
- Considering security, preservation and disaster management issues when setting up physical resources

- Identifying and setting up a location for records' centres and archival repositories
- Establishing the necessary ICT infrastructure for e-records
- Set up disaster management and response tools and equipment

Step 5: Staff induction and training

Since individual members of staff create records in the bank and are involved in their use, and because records impact on employee performance, all staff must be trained to reinforce the value of RM in risk management. This would also win staff support in fostering adequate RM. To achieve this, it is necessary to:

- Train all company staff about the value of RM to business growth, stability and risk management, clearly identifying risks accruing from poor RM
- Relate the impact of RM on staff performance and overall company performance
- Induct all staff on RM policies and procedures and authority responsibilities for RM function

Step 6: Management of records in the continuum

This refers to the full, day-to-day management of records in the organization based on an established programme, policies and procedures, under the set up of physical resources and infrastructure and by the identified personnel and staff, from creation to disposition. In other words:

- The actual management of records to serve company needs, fostering operational efficiency, compliance and overall risk mitigation, from creation to disposition. This is the most sensitive part and the core of RM in the bank
- Enforcing compliance of the RMP, policies and procedures developed in step 3.
- Enrolling all necessary expertise from RM staff, ICT staff and consultants throughout this process to ensure RM adequately serves the business
- Enforcing compliance with international best practices in RM, international standards such as ISO 15489:2001, professional ethics in RAM and legal issues in RM

Step 7: Continuous development

This step involves the continuous improvement of the systems to match organizational changes, industry changes and paradigm shifts in records management and risk management professions, requiring:

- Continuous improvement of the RM systems and practices on a daily basis to ensure they match the company's mission, vision and broad strategies
- Consistent appraisal of records to enforce retention and disposal guidelines
- Assimilation of new technologies in RM activities, e.g. digitization of records, automated file tracking systems, enrollment of electronic records management systems (ERMS), etc.

- Continuous training of the records and archives management staff on emerging trends in ARM

- Review of the RMP, policies and procedures, including factoring in changes in the legal framework to reflect any organizational, industry and professional changes

Step 8: Monitoring and evaluation

It is necessary to review the RM systems to ensure that they reflect the aspirations of the organization and contribute to the overall success of the parent organization by:

- Consistently reviewing the RM function against the risk management function to assess the adequacy and impact of RM in risk mitigation

- Assessing the overall achievement of the objectives of the RM function in relation to those of the parent organization and the contribution of RM in achieving efficiency, effectiveness and economy within the organization

- Calculating the return on investment (ROI) on the RM function in the organization to justify its existence

SUGGESTIONS FOR FURTHER RESEARCH

Given the need for the banking industry to effectively integrate records management in risk management and the need for records management experts, risk management experts, and other experts in the banking industry to collaborate in enforcing professional records management in the banking industry, this study recommends a number of areas for further research.

Records management and banking service delivery

Further studies are necessary to reveal the current state of records management at KCB and its impact on service delivery. Such studies should be extended to other banks, such as Barclays Bank of Kenya, Cooperative Bank of Kenya, Standard Chartered Bank of Kenya and Equity Bank. Research on the nexus between RM and service delivery would have a direct impact on risk mitigation because efficient service delivery systems contribute heavily towards risk mitigation.

Research in KCB branches outside the Nairobi area

This study limited itself to KCB in the Nairobi area, targeting head office units and five branches in Nairobi. There is a need to conduct a similar study in other KCB branches in Kenya and other countries where KCB is present to reveal the status of records management in these branches. This would be necessary to understand whether the findings of this study are representative of the entire bank or not. It is also necessary in helping KCB come up with a comprehensive, well thought out records management programme for the entire bank.

Research in other banks

There are approximately 60 commercial banks in Kenya. This study limited itself to only one bank (KCB). A similar study could be conducted in other banks to reveal the status of records management and risk management in other banks in Kenya . This would contribute to establishing whether there are similarities and differences amongst the various banks in records management practices and identify factors contributing to these similarities or differences. This type of study would also be useful in enabling banks to learn from each other on records management issues.

Electronic records management for Banking

This study revealed that there is an enormous use of electronic platforms to transact business in modern banks, including KCB. As a result, an enormous amount of electronic records are generated. At the same time, there is also an increase in electronic fraud in the banking industry as the society grows more digitally-informed and also because of weaknesses in the ICT systems in use. Further research and development in the area of electronic records management in the banking industry would be useful in advising the banking industry on how it could comprehensively deal with electronic records management.

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Demystification of Bibliometrics, Scientometrics, Informetrics and Webometrics

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ABSTRACT

Among the many statistical analyses of scientific publications, bibliometrics holds a privileged place for counting scientific papers. Bibliometrics is one of the sub-fields concerned with measuring the output of scientific publications. Bibliometrics ows its systematic development mainly to the works of its founders V V Naliv, D J D Price and Eugene Garfield in the 1950s. Since 1958 Bibliometrics has evolved as a field, taught in library and information science schools and it emerged as a tool for scientific evaluation for a number research groups around the world. This process was made possible by the work of Eugene Garfield and his Science Citation Index. Castell, an American psychologist was credited with the launching of Scientometrics, when he produced statistics on a number of scientists and their geographical distribution, and ranked the scientists according to their performance. He introduced two dimensions into the measurements of science, namely, quantity and quality. The term informertics was introduced by Blackert, Siegel and Nacke(1979) but gained popularity by the launch of the international informetrics conferences in 1987. A recent development in informetrics called the webometrics/cybermetrics, has become a part of the main stream library and information science research area. The term webometrics refers to the quantitative studies of the nature of scientific communication over the internet and its impact on diffusion of ideas and information. This paper reviews the evolution of bibliometrics and its fast growing offshoots, scientometrics, informaetrics and webometrics.

Keywords: Bibliometrics, Scientometrics, Informetrics, Webometrics,

INTRODUCTION

The last five decades or so have seen major changes in bibliometrics, which has emerged as an established field of research in Library and Information Science (LIS) schools. It is taught in universities as part of Information Science (IS) courses both in the developed and developing world with a substantial body of techniques or methods, some theories, and an international group of specialist science evaluators (Thelwall, 2008). In 1906, Cattell launched the biographical directory entitled *The American Men of Science,* which was published every five years, and which collected information on thousands of American scientists active in research (Godin, 2007). Catell introduced two dimensions to the measurement of science, namely quality and quantity, and these two dimensions still largely define the field of bibliometric studies today. Quantity or productivity, as he called it, simply entailed counting the number of scientists a nation produces, while quality or performance was defined as contributions to the advancement of science and was measured by averaging the rankings of colleagues (Godin, 2007). Although

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bibliometrics was used as a standard for measuring the publication output of scientists almost a century ago, it was largely the work of Eugene Garfield in the 1960s and his Science Citation Index which made possible the quantitative analysis of scientific research output (Garfield, 1979). Two major changes in publishing have been the computerization of the printing process and the conversion of the entire publishing cycle on the Internet, from the submission of an article to refereeing and publication, allowing for faster and cheaper communication.

This paper aims to discuss bibliometrics and its development into scientometrics and informetrics; the applications of bibliometrics on the web and its development into scientometrics and informetrics; and the application of bibliometrics on the web, referred to as webometrics.

BIBLIOMETRICS

Bibliometrics is described as the quantitative analysis of publications in order to ascertain specific kinds of phenomena (Herubel, 1999). It encompasses the measurement of properties of documents and document-related processes (Borgman and Ferner, 2002). Bibliometrics uses mathematical and statistical methods to analyse and measure the output of scientific publications. The vast majority of bibliometric studies have been devoted to scientific and technological disciplines. It is important to note that since E.W. Hulme wrote his famous study in 1923, the measurement of published scholarly and scientific research developed its own momentum and evolved its own nomenclature. From statistical bibliography to bibliometrics to scientometrics, and informetrics to webometrics, these types of publications have grown instrumental in Library and Information Science as well as for scholarly communication (Sengupta, 1992). Researchers can examine literature and establish the characteristics of disciplines, assess the obsolescence of scholarship, institutional affiliations and relationships, and the types of materials constituting scholarly pursuits. Bibliometrics is used as a method in many fields of science, first and foremost to map the publication pattern in different disciplines and its development into scientometrics and informetrics and the applications of bibliometrics on the web. For instance, for the historian studying the intellectual heritage and evolution of a discipline, bibliometrics is an indispensable tool. Similarly in economics and sociology, the main interest has been to use bibliometrics for cognitive purposes, e.g. studying a researcher's publication behaviour.

1. The origin of bibliometrics

Cattell, as pointed out above, is generally associated with the first systematic collection of statistics on science (Goddin, 2007). He laid the foundation for others who introduced the systematic use of bibliometrics (Sengupta, 1992; Hood and Wilson, 2001). Catell used his bibliographical directory to study scientists and their activities in research in the United States, and from the data, produced statistics on the number of scientists and their geographical distribution and ranked scientists according to their performance. Catell can thus also be credited for having launched scientometrics or the systematic measurement of science.

Catell was followed by other psychologists such as Buchner who started his series of reviews on psychology. In these reviews, he included a discussion on recent papers and noted the number of psychologists, list of new journals, statistics on publications, a percentage distribution

of papers appearing in the Psychological Index, and the interests of the psychologists (Godin, 2006). But it was S W Fernberger of the University of Pennsylvania who developed the statistics on publications. He looked at the evolution of membership and placed increasing emphasis on publishing as a criterion for eligibility and discussed finances, journals of the association, and the organisation and its meetings. He charted the number of papers presented at each meeting since 1892 and looked at the productivity of universities at these meetings, what he called the consistency of publication and fields of interest. He found that 19 universities produced 53 % of all papers. It was thus Fernberger who put forward the concepts of productivity and the index for the measurement of scientific productivity.

Bibliometric analysis predates the development of the Science Citation Index (*SCI*), but the advent of SCI, and specifically the availability of electronic access (online, CD-ROM and web-based) to the Institute for Scientific Information's (ISI) massive datasets, has had a catalytic effect on the popularity, scope and ambition of bibliometric research, both within and beyond the information community. SCI was created as a database of references made by authors to earlier publications which leads readers to other similar articles, and in so doing, encourages them to work on similar topics. The ISI also developed other databases, such as the Social Sciences Citation Index (SSCI) and Arts and Humanities Citation Index (AHCI), and along with them, new and varied statistics. These statistics, according to Thelwall (2008), include the number of citations to all articles in a journal or all articles by an author, research group, or country. Some are developed further to name indicators with supporting theories and reasonably well accepted standard interpretations. The most well known is the journal impact factor (JIF).

Since the advent of SCI, three types of bibliometric applications have arisen, namely descriptive, relational and evaluative (Borgman and Ferner, 2002). Descriptive bibliometrics places emphasis on the characteristic features of the document, while relational bibliometrics seeks to illuminate relationships within research, such as the cognitive structure of research fields, the emergence of new research fronts, or national or international co-authorship patterns. Evaluative bibliometrics seeks to assess the impact of scholarly work and compares the relative contributions of two or more individuals or groups (Thelwall, 2008).

2. Descriptive bibliometrics

Descriptive bibliometrics describes the characteristics or features of text or literature and is used to measure the productivity of scientists and information scientists. It is divided into geographic areas, time periods, and departments and disciplines. The area of descriptive bibliometrics includes the study of the number of publications in a given field or productivity of literature in the field for the purpose of comparing research in different institutions or countries as well across different periods.

3. Evaluative bibliometrics

Most evaluative techniques use citations as their raw data (Thelwall, 2008). The theory behind this stems from Robert Merton's (1973) 'sociology of science', which indicates that citations are the way in which scholars acknowledge influential prior work. Based on this, citation counts could be used as an indicator of scientific value. Subsequent research has shown that Merton's perspective is a simplification of reality. There are many and varied reasons to cite articles and they are : for paying homage to pioneers; to identify the original publications in which an idea was discussed and disclaiming work or ideas of others, etc., to mention a few.

4. Relational bibliometrics

Bibliometric methods are used to examine relations within science through the use of ISI data. This was not possible in earlier days due to the lack of computing power and lack of experience in technology. But these early relational analyses produced interesting insights into the structure of science through simple means, such as network diagrams of the flow of citations between key sets of articles (Cawkell, 2000). This idea, says Thelwall (2008), came from the geneticist Allen in 1960 after he sent his citation diagram to Garfield (Cawkell, 2000). Journal citation diagrams could illustrate the connections between journals within a field, both central and peripheral.

Garfield was credited with co–citation as a measure of similarity, i.e. if two documents often appear together in reference lists (co-cited), they are likely to be similar in some way. This simply means that if collections of documents are arranged according to their co-citation counts, then they should create a pattern reflecting cognitive scientific relationships.

5. The importance of bibliometrics as a research tool

Modern bibliometrics has been largely inspired by Derek de Solla Price and the seminal work carried out by him in the middle of the last century. In the book, "Little Science-Big Science" that was published in 1963, he analysed research communication and presented a number of quantitative evaluation techniques. He was the first to examine the increasing trend of collaboration among chemistry researchers using bibliometrics. Since bibliometrics has developed into a research field in its own right, it has given rise to a community of specialised experts, called bibliometricians. Bibliometrics, explains Mattison (2008), is used as a method in many other fields of science, mainly to map the patterns of publication in different disciplines.

Bibliometrics has gained increasing importance in science policies and management over the last decade, and particularly plays a prominent role in the domain of research evaluation. The development of performance indicators to respond to science policy questions has been the most common application. Indicators used for this purpose include productivity analyses measuring the output and volume share of a specific actor, e.g. a country's world share of publications or citations; research impact analyses using citations; and relational indicators studying the heterogeneity of collaboration patterns between different actors (Mattson, 2008).

One major focus in bibliometrics is research collaboration, which is receiving increasing attention from policy-makers and more general users. Modern research is regarded as increasingly complex and specialised, making it impossible for an individual researcher to master all the knowledge and technical skills needed. In collaboration, different skills compliment each other, and this complimentarity is hoped to stimulate knowledge sharing and the generation of innovation and new ideas. As a result, collaborative research activities not only enable the pooling and sharing of resources for enhanced efficiency, but are also linked to the quality of the research outcome (Mattson et al., 2008).

Funding agencies and institutions also seem to encourage collaborative research. Grants awarded by many different funding institutions for many different disciplines often seek to encourage and at times require as a condition collaborations between different countries, research fields or institutions. Being able to map and analyse research networks and collaboration has therefore evolved into a key practice in the design and assessment of research policies and related funding programmes. A study done by the National Science Foundation found that research done by multiple institutions had increased from 40 % to 61 % between 1988 and 2008 (NSF S&E indicators).

SCIENTOMETRICS

It is a common misconception that scientometrics is nothing other than the publication- and citation-based assessment of scientific performance, or compiling cleaned-up bibliographies on research domains extended by citation data. In actual fact, scientometrics is a multifaceted endeavour encompassing subareas such as structural, dynamic, evaluative and predictive scientometrics. Structural scientometrics came up results like the remaping of the epistemological structure of science based, for instance, on co-citation, “bibliographic coupling” techniques or co-word techniques Dynamic scientometrics constructs sophisticated models of scientific growth, obsolescence, citation processes, etc. These models are not only of theoretical interest, but can also be usefully applied in evaluation and prediction. Beyond policy relevant applications of scientometric results, there are recently important applications in the context of studying the link between science and technology, or applications to related fields such as Library and Information Science and most recently, webometrics. Examples of the latter are the large ongoing projects EICSTES (European Indicators, Cyberspace and the Science-Technology-Economy System) and WISER [Web Indicators for Scientific, Technology and Innovation Research] (Ganzel, 2003).

Scientometrics is considered to be the study of the quantitative aspects of science as a discipline or economic activity. It is part of the sociology of science and can be applied to science policy-making. It involves quantitative studies of scientific activities, including among others, publication, and so overlaps bibliometrics to some extent. The term ‘scientometrics’ came to prominence as the name of a journal founded by T.Braun in 1977, originally published in Hungary and now based in Amsterdam (Jean Tague-Sutcliffe, 1992). The main subjects of scientometrics are individual scientific documents, authors, scientific institutions, academic

journals, and regional aspects of science. According to Van Raan (1994), there is a rapid addition of scientometric data added to areas of research, such as data on human resources, infrastructural facilities, and funding. In IS-oriented scientometrics, in contrast to economy, sociology or the psychology of science, aspects of information and communication are examined. These aspects may include productivity (documents per year), subjects of the documents (words or co-words), reception (readers of the documents), and formal communication, references, citations and co-citations (Juchem, Schlogl and Stock, 2006).

INFORMETRICS

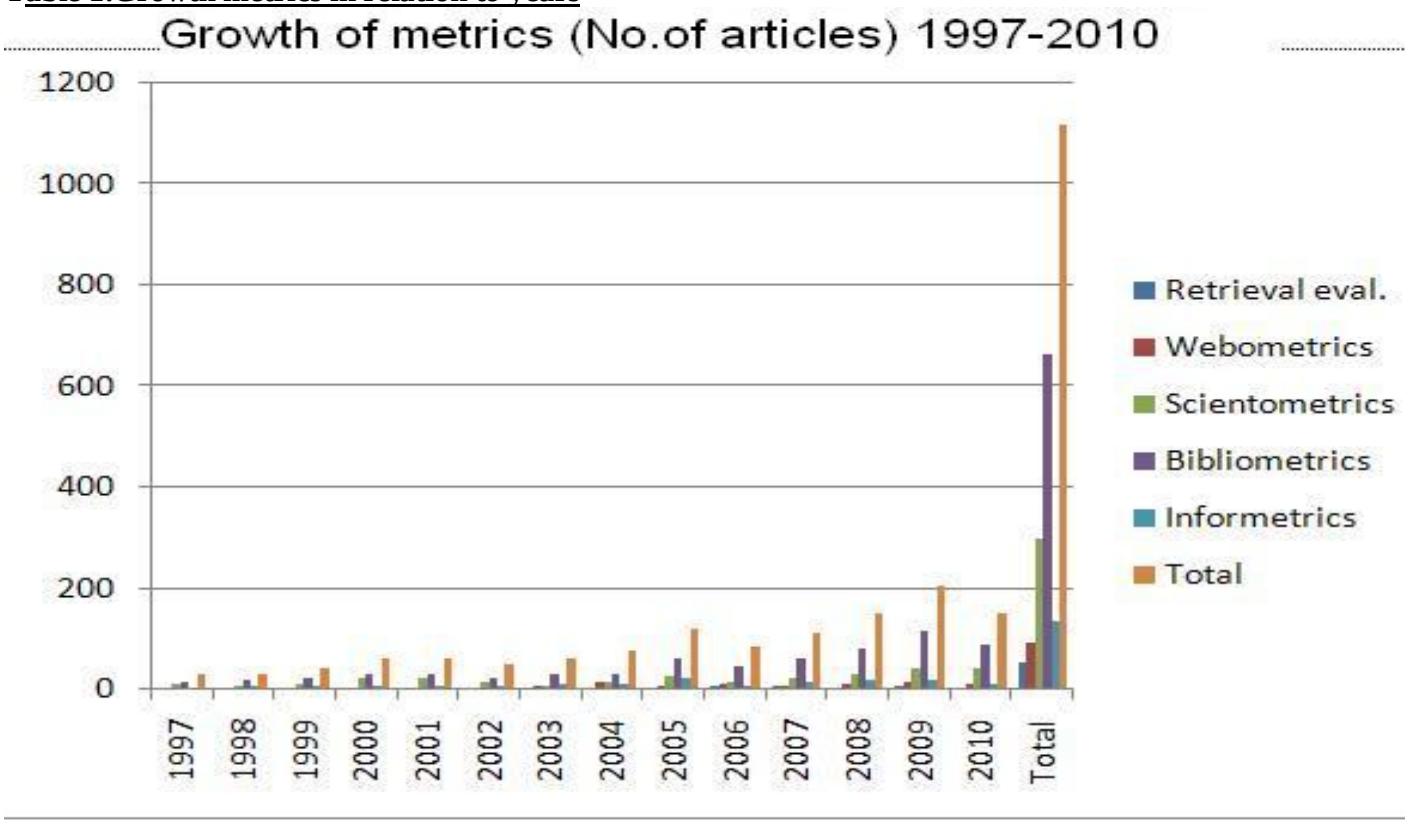
The term 'informetrics' was introduced by Blackert and Siegel (1979) and Nacke (1979) to describe the area of information science "...dealing with the measurement of information phenomena and the application of mathematical methods to the discipline's problems" (Wilson, 1999). It gained popularity because of the International Informetrics Conferences in 1987. The field of informetrics had already started in the first half of the twentieth century in the works of Lotka (1926) Bradford (1934) and Zipf (1949). For further details and explanations, readers are advised to check Lawani (1981), Ikpaahindi (1985), Egghe and Rousseau (1990), Tague-Sutcliffe (1994), and Wilson (1999).

Informetrics is described as the study of the quantitative aspects of information in any form, not just records or bibliographies, and in any social group, not just scientists. It looks at both informal or spoken communication and recorded information, and information needs (Tague–Sutcliffe, 1992). The quantitative study of recorded discourse may relate to any medium, although until recently, print media dominated informetric research. With the wider availability of documentary resources and discourse in electronic format, particularly through machine-readable databases and more recently, the Internet, informetric research based on electronic data sets has become commonplace. It incorporates and utilizes many studies of measurements of information that lie outside the boundaries of both bibliometrics and scientometrics; the term 'informetrics' is used as a broad term comprising all -metrics and studies related to information science.

1. Growth and expansion of the informetric field

For Egghe, information science is a growing branch of science (Stock and weber, 2006). According to Egghe, "There is a fast multidisciplinary expansion (growth) of the field of informetrics, mainly due to the new topics that have been included in informetrics such as the quantitative study of networks, including the Internet" (Egghe, 2006). To confirm this assumption, I performed a request on "Web of Science" and made use of its ANALYSE function. I searched for "TS= informetrics OR bibliometrics OR scientometrics OR webometrics OR retrieval evaluation". The result displayed below was an indication that informetrics is really growing.

Table 1.Growth metrics in relation to years



Although the field of informetrics has grown in the twentieth century, its development and expansion has become more clear over the last few decades. One of the main contributors to this expansion, according to Lipetz (1999), is the advent and the exponential growth of the *Journal of the American Society for information Science and Technology,* which promulgated the publication of documents dealing with informetrics. The growth of the journal indirectly encouraged the publication of papers in terms of the number of authors and even in terms of the average number of references per paper. The popularity and standard of the journal also encouraged the number of authors who wanted to have their papers published in *JASIS*. The popularity of the journal and its insistence on publishing informetric papers of very high standard attracted authors from other scientific disciplines, thereby encouraging the multidisciplinary growth of the field of informetrics. Summers, Oppenheim, Medows, McKnight and Kinnell (1999) indicate the influence of informetrics on other scientific disciplines. Multidisciplinarity is evident if one looks at the new topics that informetrics is covering--the metrics of the web and the internet, intranets and other social networks, such as citation or collaborative networks. Informetrics also owes much of its growth to the advent of the 'information society'. LIpetz (1999) believes that the average number of authors per paper is increasing because there seems to be a greater strive towards collaboration. Thus one can say that the field of informetrics

nowadays comprises the fast growing field of webometrics (Hood and Wilson, 2001).

International authors who have increased in numbers in their publications in the *Journal of Documentation* prove that their share in these journals has grown larger, indicating an increase in the internationalization of the field of informetrics (Shubert and Spink, 2002). The same can be said of authorship in the papers presented in the International Conference of Informetrics and the increase in the number of articles in the proceedings of the conferences. Egghe (2005) explained that the growth of the field of informetrics has led some journals to increase their number of volumes or the number of issues per volume. The *Journal of Information Processing and Management* decided to devote two special issues from 2005 to the broad topic, "Informetrics" (bibliometrics, scientometrics, webometrics,…) where the scope of these special issues is to attract good papers dealing with gathering important data sets and presenting original models and explanations.

The recent expansion of information science to networks and the information society in general has resulted in more and more data gathered in an automatic way. This implies that data can be gathered in a much faster way than it used to, but the downside of this is that the accuracy of the collected data is falling. The reason for this, as explained by Egghe (2005), is that one gets data from a documentary system such as OPAC, primary or secondary databases or a digital library, but there is no clear definition of the topics because of a lack of standards. Glanzel (1996) and Rousseau (2002) concur, saying that one is not completely sure of what one gets from these systems, and besides an electronic system may suffer from a system failure, in which case one is obliged to make interpolations that are not always accurate.

2. Informetric distributions: from social principles to laws

Informetric studies in Library and Information Science are based on the mathematical expression of three principles relating to social and economic life dubbed the 80/20 rule, also referred to as Pareto's rule. The 'principle of least effort', the 80/20 rule and the 'principle of success breeds success' are considered in the context of informetrics (Erar, 2003). The principle of least effort means that a person will strive to solve his problems in a manner that minimizes the total work that he must expend in solving both his immediate problems and his probable future problems (Zipf, 1949). Zipf used the term 'least effort' to describe the least average rate of probable work. This principle emphasizes the importance of summarizing an article using "little words with substance" - authors feel free to repeat certain words instead of using new ones. To express with many words what can be expressed with a few is meaningless (Zilf, 1949). In informetric studies, for example, it can be expected that 80 % of the citations refer to a core of 20% of the titles in journals. Likewise, it can be stated that approximately 80 % of the circulation is accounted for by about 20 % of the collection, or 80 % of the articles in journals belong to about 20 % of the authors.

Another general theory characterising processes of scientific communication is the 'principle of cumulative advantage'. Price formulated this in 1976. The social phenomena "success breeds success" (SBS) is also reversed to "failure results in failure" from time to time. In the context of informetrics, the rule means that a paper which has been cited many times is more likely to be cited again than one that has been less cited. An author of many papers is more

likely to publish again than one who has been less prolific. A journal that has been frequently consulted for some purpose is more likely to be turned to again than one of previously infrequent use (Potter, 1981). So according to this rule, success in the past increases the chances of success in the future.

RELATIONSHIPS BETWEEN THE METRICS

The relationships between informetrics, bibliometrics and scientometrics are shown below in Thelwall, Vaughan and Bjorneborn's (2005) diagram, which shows the field of informetrics embracing the overlapping fields of bibliometrics and scientometrics. Webometrics on the other hand is entirely encompassed by bibliometrics because web documents in their various forms, e.g. text or multimedia, are all recorded information stored on web servers. In the diagram, webometrics is partly covered by scientometrics because many scholarly activities today are web-based. Webometrics is shown to be contained within the field of cybermetrics which exceeds the boundaries of bibliometrics. This is because some activities in cyberspace are not normally recorded but communicated synchronously, as in chat rooms (Tague-Sutcliffe, 1992).

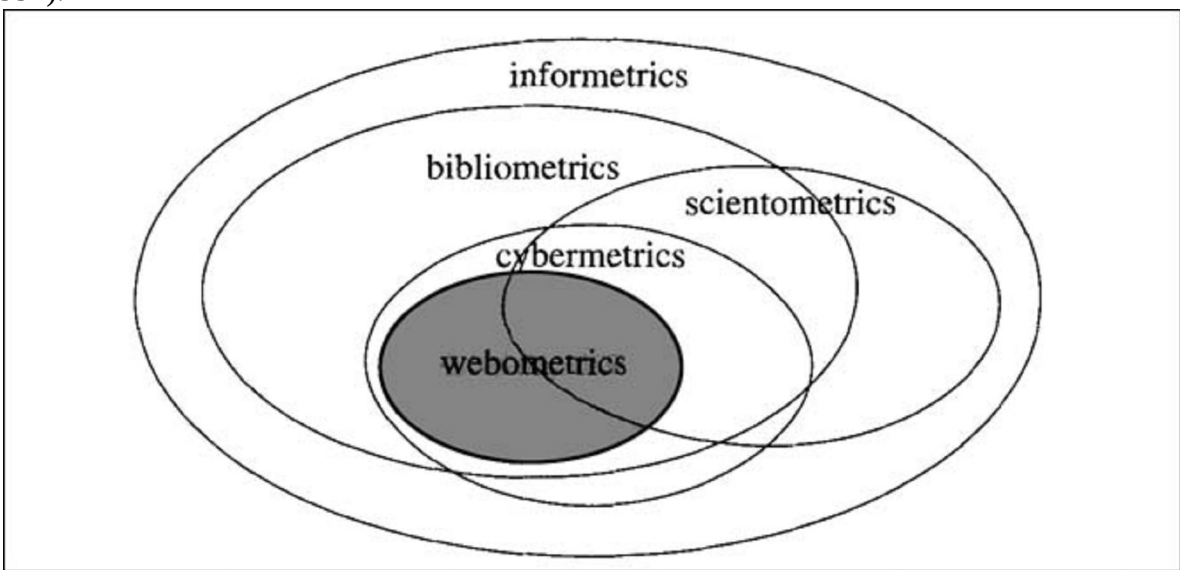


Figure 1 Thelwall, Vaughan and Bjorneborn, 2005

The inclusion of webometrics expands the field of bibliometrics because webometrics will inevitably contribute further methodological developments. As ideas rooted in bibliometrics, scientometrics, and informetrics have contributed to the emergence of webometrics, insights from webometrics will likely contribute to the development of these more established fields (Thelwall, Vaughan and Bjorneborn, 2005).

WEBOMETRICS

Webometrics is the quantitative analysis of web-related phenomena, drawing on

informetric methods (Bojorneborn and Ingwersen, 2004), and typically addressing problems related to bibliometrics. Webometrics emerged with the realisation that the web is an enormous document depository with many academic texts (Almind and Inwersen, 1997).

Björneborn and Ingwersen propose different terminology. Distinguishing between studies of the web and studies of all internet applications, they used the information science related definition of webometrics as, "The study of the quantitative aspects of the construction and use of information sources, structures and terminologies on the World Wide Web drawing on bibliometric and informetric approaches" (Björneborn and Ingwersen, 2001). This definition thus covers quantitative aspects of both the construction and utilization sides of the web, embracing the four main areas of webometric research: "(1) Web page content analysis, (2) Web link structure analysis, (3) Web usage analysis (e.g, exploiting log files of users' searching and browsing behaviour), and (4) Web terminology analysis (including search engine performance)"(Thelwall,Vaughan and Björneborn, 2004). (Notes: check quote) Pirolli, Pitkov and Rao (1996) explored web analysis techniques for automatic categorization using link graph topology, text content, and metadata similarity, as well as usage data. All four main research areas include longitudinal studies of changes on the dynamic web, for example of page content, link structures and usage patterns.

Moreover, the web has its own citation indexes in the form of commercial search engines and is thus ready for researchers to exploit (Egghe, 2005). One of the most visible outputs of webometrics is the ranking of world universities based on their websites and online impact (Aguillo et al., 2006). Webometrics, explains Telwall (2008), includes "...link analysis, web citation analysis, search engine evaluation and purely descriptive studies of the web together with the recent addition of the web analysis of web 2.0 phenomena".

1. Link analysis

Link analysis is the quantitative study of hyperlinks between web pages. The use of links in bibliometrics was prompted by Ingwersen's (1998) web impact factor (WIF), which was created through analogy to the journal impact factor. The hypothesis underlying early link analyses was that the number of links targeting an academic website might be proportional to the research productivity of the owning organisation at the level of universities (Thelwal, 2001), departments (Thomas and Willet, 2000), research groups (Barjak and Thelwal, 2008), or individual scientists (Barjak, Lee and Thelwal, 2007).

In essence, say Thelwal and Harries (2004), the two are related because more productive researchers seem to produce more web content, on average, although this content does not attract more links per page. Very often, this pattern is likely to be obscured in most studies except in large-scale studies because of the indirect relationship between research productivity and web visibility, the reason being that some researchers produce highly visible web resources as the main output of their research, while others with equally high quality offline research attract less online attention.

Links are not used in an evaluative role, but they can be useful in describing the evolution

or connectivity of research groups within a field, especially in comparison to other sources of similar information. But the main problem with link analysis is that the web is continuously changing and seems to be constantly expanding, so that webometric findings might become obsolete (Thelwal, 2008). A series of longitudinal studies done to investigate the university websites in Australia, New Zealand and the UK have addressed this issue. These university websites seem to have stabilised in size from around 2001 after several years of rapid growth (Payne and Thelwal, 2007).

2. **Web citation analysis**

A number of webometric investigations have focused not on websites, but on academic publications, using the web to count how often journal articles are cited. The rationale behind this is partly to see if the web can produce evidence of the wider use of research, including informal scholarly communication and for commercial applications. A number of studies have shown that the results of web-based citation counting correlates significantly to ISI citation counts across a range of disciplines with web citations (Kousha and Thelwal, 2007).

CONCLUSION

Bibliometrics has changed beyond recognition since the late 1950s. Today it is taught widely in library and information science schools and is used as the core evaluatory tool by research groups around the world, such as the centre for Science and Technology Studies in the Netherlands. Several countries use the journal impact factor (JIF) and bibliometrics when making important policy decisions about the future of government funded research. Some of the studies done by experts on bibliometric indicators have shown that although most of the indicators are well known and easy to calculate, they also have significant flaws that most users might overlook. Hence one important task for bibliometric practitioners is to convince policy makers on the importance of commissioning high quality and robust indicators as well as ensuring that no indicator is taken at face value.

Scientometrics and informetrics have also changed because of the expansion of the number of data sources that can be used. Although Thomson Scientific has always been considered as the database for biblio, info and scientometrics, it is now being challenged by two of the most important international databases, i.e. Google Scholar and Scopus. More importantly, large scale patent analyses are now much easier than before because of digitisation and the indexing of patent databases. This opens up an aspect of the commercial value of scientific research for informetric studies. The metrics have changed and expanded the range of tasks that can be investigated. This wide range of relational informetric studies opens up new ways of understanding the scholarly communication process and the structure of science through citation.

Webometric studies have been conducted by both information scientists and computer scientists for different reasons. With information science, webometrics has changed and expanded from its initial focus on bibliometric-style investigations to more descriptive and social

science-oriented research. Certainly, webometrics will continue to evolve in response to new web developments and to supply valuable results. The web, and hence research on the web and webometrics, is in contrast to bibliometrics. The web can be timelier than ISI databases. The time lag between a research project's completion and publication in a journal can be as long as two years, if not more. Hence ISI-based bibliometrics is invariably always retrospective, describing the research of years ago, whereas a research project might start publishing on a website and therefore be analysed with webometrics long before the research is published. The web can be accessed by all web users and so potentially opens up bibliometric-style analyses to those who could not access or afford ISI data.

Webometrics research also has some shortcomings; although the web is available for all to access, it has no quality control mechanisms such as the ISI publication lists (Thelwall, 2008). As a result, the data tends to be of lower quality. Web data is also not standardised, making it difficult to extract all except the simplest data-like link counts. It is also difficult to separate web citations in online journal articles from those in online course reading lists. Hence webometric results tend to be a mix of sources with variable value (Harries, 2004; Wilkinson, 2003). Although web data can be timely, it is sometimes impossible to find the publication date of a web page, and thus webometric results typically combine new and old web pages into one data set. In many cases, web data is also incomplete in arbitrary ways. Although some academic articles are freely available online, most of them are not. Similarly, some researchers and research groups maintain extensive and comprehensive websites but others do not, and hence the results reflect the web in a way that is very partial to certain research activities.

While webometrics is very much advanced in the ways of manipulating the web for research purposes, we find that it is unlikely to replace traditional bibliometrics when comparing their advantages and disadvantages. However, it can be used for fast pilot studies to identify areas for follow-up systematic bibliometric analyses (Robinson et al., 2006).

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The Present And Future Growth Of Scholarly Publishing In Africa

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ABSTRACT

While scholarly publishing in Africa is still struggling to keep pace with the rest of the world, major progress has already been made. Many universities in Africa are seriously engaged in scholarly publication in both print and electronic formats. The output of research is constantly disseminated through universities that plan and hold conferences and seminars, with the presentations then published as proceedings or in peer-refereed scholarly journals. The various initiatives of universities and departments in African universities have provided researchers with opportunities to present their findings in various scholarly journals that are published in universities or through collaborations with various publishing houses. Scholarly publishing is an indispensable avenue for the dissemination of research findings from Africa, adding significantly to a vast body of knowledge whose main contributors are predominantly of western origin. The advent of electronic publishing has widened the scope for African researchers to publish their work. Most African universities maintain pages on their websites that upload research findings, albeit with a number of problems. The uploaded material, from research proceedings to published work, contributes to the visibility of African research in the world. Scholarly journal publishing hence has the potential to encourage research in Africa.

Keywords: *Scholarly publishing, Africa, universities, scholarly journals*

INTRODUCTION

The world is in the information era, a knowledge society that is the result of a swift change from a labour-driven economy to a knowledge-driven economy. However, scholarly publishing in Africa is still struggling to keep up with the rest of the world. This is an obvious threat to the growth of Africa's economies.

RESEARCH IN KENYAN UNIVERSITIES

Most higher institutions of learning are still largely dependent on print resources as access points to knowledge resources. During UNESCO's 29th World Conference on Higher Education in 2009, the then South African Minister for Higher Education and Training, Dr. Nzimande, said that African universities are essentially consumers of knowledge produced in developed countries. The former are the producers and the latter the consumers of knowledge, which seriously undermines fostering multiculturalism in higher education as virtually all partnerships, are one-sided. This demonstrates that universities in Africa are contributing an insignificant amount of scholarly writing in comparison to developing countries. The number of journals and books produced annually by African researchers is still very low.

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George Magoha, the vice chancellor at the University of Nairobi, stated that research output is regarded as an important yardstick for measuring the success of academic institutions. It is hard for Kenyan universities to support research work because most of them are severely constrained by lack of funds - most research activities depend on donor support. However, Kenyan universities are making progress by increasing allocation to their research kitty using internally generated funds. The University of Nairobi has in particular intensified collaboration with local and international partners, which has resulted in a substantial increase in the available research grants.

Moi University also has research units that collaborate with researchers within and outside the university. The Moi University Act gives the university the mandate to carry out research projects that are expected to maintain strong relationships with communities, conform to Kenya's broad national objectives, supplement teaching, and solve problems of the rural communities.

The university sets aside funds under its research grant which are awarded on a competitive basis. The fund, however, fails to satisfy demand, which forces researchers in the university to seek support from other sources. The research results are disseminated through field days organized by the projects, at stakeholders meetings, at symposia and during the Moi University Annual International Conference. The university will be holding its 6th International conference in September 2010 where research findings from researchers across the globe will be presented. All the research activities at the university are coordinated, monitored and evaluated by the University Research Committee under the office of the Deputy Vice Chancellor (Research and Extension). Between 2005 and 2010, the university has organised eight international conferences and symposia that resulted in research findings being presented and published in various journals or conference proceedings.

The university has ten scholarly journals that are published in schools. These are in the following schools: Arts and Social Science, Business and Economics, Education (2), Environmental Studies, Human Resources Development, Information Sciences, Law, Medicine, and Natural Resource Management. Although the said journals suffer from the 'visibility syndrome' (lack of visibility), as is the case with most African universities' journals, efforts have been made to attract papers from researchers outside Moi University and to list them on the university website to improve visibility. Frequency is another major problem that faces the publication of these journals. This problem has been contributed by the insufficient funds allocated to schools for the publication of journals.

Efforts have been made by the university to set aside funds for research purposes. The university allocates 3 % of its tuition collection from the privately sponsored students programme (PSSP) to research. This fund covers all research activities including annual international conferences, symposia, journal publication, research grants and conference attendance. From this fund, schools are allocated KShs 500, 000 (approximately US$ 6,250 – exchange rate KShs 80 to one dollar) to be competitively awarded to researchers in a school on an annual basis. Another one to the tune of KShs 250,000 (approximately US$ 3,125) is given to schools as seed money to start scholarly journals. Such seed money is provided to start the

journal, market it and hopefully sustain it after the first volume and first issue. A further KShs 100,000 (approximately US$ 1,250) is allocated to schools for international conference attendance on an annual basis. This amount is assumed to be sufficient to fund all travel for about ten or more scholars in a school per year, although in fact it may not even be enough to fund one scholar for a return trip to Uganda or Tanzania (Kenya's neighbours).

Maseno University's research activities are co-ordinated by the office of the Deputy Vice Chancellor in charge of Planning, Research and Extension Services (DVC-PRES). The university has established a centre within the office of DVC (PRES), the Centre for Research and Technology Development, whose main role is to enhance the capacity to undertake research and technology development and to handle research activities. The university also organises conferences, seminars and workshops where research findings are presented. The university is also one of the focal institutions for the implementation of the Kampala-based Inter-University Council of East Africa (IUCEA) research programme on the Lake Victoria Region (VicRes).

Research activities at the Jomo Kenyatta University of Agriculture and Technology are administered by the office of the Deputy Vice Chancellor in charge of Research, Production and Extension. The university has a host of scholarly journals listed by AJOL. The university has demonstrated its ability to attract substantial amount of research funds from outside the university through collaborations.

SCHOLARLY PUBLISHING IN AFRICA

Scholarly publishing in Africa can best be described by comparing publications in various countries on the continent (see Table 1).

Table 1: Scholarly publications in some selected countries in sub-Saharan Africa, 2000 - 2007

Country	2000	2001	2002	2003	2004	2005	2006	2007	Total
South Africa	4609	4732	5049	4974	5394	5657	6305	1077	37797
Nigeria	884	746	854	855	926	1223	1269	204	6961
Kenya	578	597	666	694	662	684	843	159	4883
Tanzania	253	235	271	316	322	370	473	80	2320
Cameroon	209	216	263	292	332	344	425	69	2150
Ethiopia	244	216	275	300	312	302	333	58	2140
Uganda	191	203	188	244	310	304	382	119	1941
Zimbabwe	263	256	269	251	216	242	234	44	1775
Ghana	198	194	208	206	239	261	305	53	1664
Senegal	202	182	176	239	209	247	224	40	1519
Eritrea	142	147	155	146	153	148	156	35	1082
Benin	134	110	135	126	156	168	216	38	1083
Botswana	129	128	156	135	143	148	186	29	1054
Malawi	132	124	132	132	143	148	167	30	1008

Source: Thompson Scientific, May 2007

In the 21st century, scholarly publishing should promote knowledge dissemination. Ondari Okemwa (2007) states that scholarly publishing should support knowledge and capacity development and notes that low scholarly publication in Africa limits knowledge generation and diffusion. Publishers in Africa, however, seem very much engaged in publishing textbooks. In other words, publishing in Africa is largely devoted to supporting the passing of school and professional exams. More of the same books covering the same subjects are published in Africa annually. Publishers have ignored key questions that face the continent (Adebowale, 2001). AJOL currently has 388 journals of various subjects published across the continent (AJOL, 2010). Over 5107 issues have been published. However, some of the 388 journals are not up to date in publication, meaning that frequency of publication is a challenge. In 2009, AJOL had hosted over 370 African-published, peer-reviewed journals from 28 countries, accessed by over 100,000 researchers from all over the world, enabling it to accomplish its aim of increasing scholarly communication on the African continent and with the rest of the world.

Notably, although South Africa leads in scholarly publishing in Africa, it has shied away from uploading its journals on AJOL. This has denied many African scholars the opportunity to access research findings and scholarly input from South Africa (see Table 2).

Table 2: Number of journals per country

Country	No. of Journals
Algeria	2
Benin	2
Botswana	2
Burkinafaso	2
Cameroon	6
Congo DR	1
Cote D'ivoire	4
Egypt	11
Eritrea	1
Ethiopia	17
Ghana	19
Kenya	24
Lesotho	1
Madagascar	1
Malawi	3
Libya	1
Mauritius	1
Nigeria	168
Senegal	7
South Africa	1
Sudan	72
Swaziland	3
Tanzania	14
Togo	1

Tunisia	1
Uganda	9
Zambia	2
Zimbabwe	10

Source: African Journal OnLine (AJOL) - 2010 June/website URL

TECHNOLOGY AND SCHOLARLY PUBLISHING

Electronic technology has facilitated the broad, swift and convenient communication of research, offering authors the promise of increased visibility, flexibility, storage, and access to their work. Today, scholarly information is increasingly digitized. Almost everyone involved in the knowledge production process prefers the electronic format. Digitization has revolutionized the way knowledge is produced and disseminated to the end user, usually in a fast, timely and efficient way. Although authors, publishers and librarians are all motivated by different factors, they agree that the electronic medium hastens the knowledge production process. In libraries for instance, it has changed the way the librarian acquires, processes, stores and delivers information to users. Electronic publishing has been gaining ground in recent years and is now a recognized aspect of the digital world. In the process, it has changed the roles of researchers and publishers.

CHALLENGES FACING SCHOLARLY PUBLISHING IN AFRICA

There are many challenges facing scholarly publishing in Africa, including low literacy levels, poverty, poor technological infrastructure and a shortage of national policies, particularly those focusing on information dissemination and financing the information sector.

Low literacy levels and poverty

Scholarly publishing in Africa is hindered by low literacy levels. In some countries, literacy levels are as low as 10 %. Poverty is therefore perhaps a more serious challenge than most because of the number of people that live below the poverty line. Even the minority that live above the poverty line use most of their income to purchase basic needs – food, shelter, clothing and basic education. Consequently, the market for scholarly works is very small. In Kenya, for example, literacy levels are high, going well over 60 %. However, most Kenyans have low incomes and a poor reading culture. These issues are not supportive of a market for scholarly works.

Technology

The most pressing problem is the need to maintain the technology for traditional printing in scholarly publishing while at the same time investing in and developing a new system that relies on digital creation, transmission and distribution. The costs of doing both things simultaneously are enormous, both to scholarly publishers and to research libraries. The presence of the Internet in sub-Saharan Africa is extremely low. This has made Africa lag behind in terms of scholarly publishing. There is also a need to build the capacity of editors and designers. Access to ICT facilities is also a pressing need for most publishing institutions.

Marketing and distribution

The available scholarly works in Africa are poorly distributed, barely marketed and hardly accessible. For example, it is easier for a librarian in Africa to find out what books have been published on a given topic in Britain than it is to locate relevant titles published on the African continent. Bibliographic resources have not been developed well enough to enable access to African material.

Information policies

Most African countries have no policies on managing information, whether in print or in electronic format. Most government agencies are still operating in a paper based environment, and many of these countries are still struggling to even make the policy decision to move to an electronic environment. It is only recently in Kenya, through the passing of a Communication Act in parliament, that electronic communications such as email and short messaging (SMS) through the mobile have been recognised as binding contracts or as official communication.

Financial constraints in libraries

Higher education institutions in Africa have been cutting down on funds allocated to their libraries, particularly those for book and periodical subscriptions. This trend has affected most areas of library operations, including the preservation and maintenance of scholarly information material. The training of library personnel to gain knowledge of the new technologies used in modern libraries has been another casualty in the process.

As mentioned earlier, most African people also have very limited disposable income. Altchback (1975) says that even academics, who feature near the top of the income ladder, have difficulty in purchasing scholarly books and journals.

Market

The development of permanent and sustainable local capacity is necessary if the publishing of scholarly works is to succeed. Publishers on the continent should improve their marketing strategies for scholarly works in order to increase the market for their products. There is also an urgent need to improve and expand existing technological infrastructure so that publishers can use the Online Access System to publish and publicize their publications. Through such efforts, Africa will no longer be scholarly marginalized on the globe.

According to INASP (2006), the geographical distribution of document delivery orders of AJOL articles shows that the majority were sent to less developed countries in Africa, Asia, and Central and South America. This is a clear indication that African published scholarly materials have a market outside Africa if their visibility is improved through electronic publishing.

Changes in scholarly communication

According to Ondari-Okemwa (2007), the communication of scholarly findings is done through attendance at conferences that are organised by institutions of higher learning in various regions, and scholars should do everything possible to attend such conferences. Attendance at such conferences allows scholars to understand the current paradigms in their various areas of research.

Poor understanding of changes in the communication of scholarly publications is another big challenge. There is a growing sense of urgency about the need to promote a better understanding of emerging communication systems and also embracing them. This would promote a shared vision of the future beginning with what scholarly publishing entails today and what changes are needed for it to succeed in the future.

THE FUTURE OF SCHOLARLY PUBLISHING

Scholarly publishing in Africa should be encouraged by universities and governments taking a keen interest in research and the dissemination of research findings. The global ranking of universities has consistently shown that African universities are ranked at the bottom. Although such results may be disputed, they indicate that the output of research in Africa is not disseminated or African scholars never engage in research. There is a need to disseminate research findings to a global audience in a visible medium.

Universities in Africa and more so in Kenya, must increase the funds allocated to research and the dissemination of findings. The funds allocated should not only fund the activity of research, but should also promote activities that are used to disseminate findings. Attending conferences, seminars and symposia in some African universities is often viewed as a waste of time and money, and is hence regarded as a low priority area for fund allocation. This needs to change and be seen as an opportunity by African universities to increase their visibility on the global stage and showcase their contribution to scholarly work.

Universities should allocate more money to organising conferences, seminars and other forums where research findings are shared. Such meetings should not only target researchers within a particular country, but also international scholars. In this information age, universities can use the limited resources at their disposal and advertise their conferences through postings on their websites. The proceedings of such conferences should also be published and disseminated to the widest possible audience.

Published scholarly materials from African scholars have been largely invisible to the global audience, save for works emanating from South African universities. Although some universities produce large quantities of research material in terms of theses and dissertations, there is no evidence in terms of visibility outside the gates of these universities. It is therefore necessary to post most of these research findings on the websites of universities and to encourage the extraction of major findings and their presentation during conferences, or sending them for publication in journals in countries other than where the research was done.

To further increase visibility, there is a need to improve Internet connectivity in African universities. A deliberate effort should be made to increase Internet connectivity with high bandwidth in universities in Africa and enable the upload of published works to increase visibility. As mentioned earlier, the use of Internet postings would reduce the amount of money

required for the dissemination of research findings. A number of conferences organised by various universities, particularly in Kenya, have published their proceedings in hard copy with limited circulation. With web publishing, these same conferences would reach more audiences and hence increase visibility. This should also apply to the publication of scholarly journals that have limited visibility. As indicated earlier in this paper, some African universities publish journals that are not even known by some scholars within the same university. It is therefore important for such journals to be listed and for their abstracts be posted on universities' websites. It is also important for their frequency to be maintained, and in order for this to happen, more articles need to be attracted from scholars outside the university. This can only happen if the visibility of the journal is addressed.

Universities in Africa should strive to utilise a university press if there is one existing in a university. If there is no university press, there should at least be a publishing office within the library section. According to Bonn (2007), the University of Michigan became involved with scholarly publishing in 2001 in order to develop lower cost publications and scalable mechanisms for publishing online and distributing the journals and other digital scholarly material. This enabled the university to produce 40 publications as at 2007, most of which were open access (OA). If African universities adopt the same approach, they would produce publications at a lower cost, and even more so if their in-house publishing, production and distribution is by electronic format.

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Thinking E- scholarship. How far can we go?

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ABSTRACT

Although scholarly publishing is not a new concept, e-scholarly publishing is--many scholars still struggle to embrace it as a vehicle for their research dissemination and visibility. Scholarly publishing has been extensively used by many generations of scholars for self promotion and publicity, networking, the creation and development of new knowledge, announcement of ownership of research output, justification for funding, and proof of the existence of a scholar or department/research unit, among other reasons. Notably, the digitization of research publications and electronic publishing has made scholarly communication exceedingly versatile, accessible, effective and efficient. But these positive traits have also been shrouded with skepticism and obscured by other challenges. This paper discusses various issues, opportunities and challenges of e-scholarly publications in a digital environment and focuses on open access, institutional repositories and self archiving, conferences, electronic journals, the Internet or web, and relevant ethical issues.

INTRODUCTION

The nature and variety of publishing options and publications have grown significantly with the evolution of information technologies and communication networks, increased literacy, and the commercialisation of this important and enlightening educational activity. Since the day the first printing press, i.e. the famous Gutenberg Press in 1440, lay the foundation for mass publication, publications have continued to proliferate and have surpassed the wildest dreams of the Gutenberg's inventors with the Internet, arguably the greatest revolution (in the infosphere) of all time. Because of the Internet, the publishing industry has taken on various forms that have gone beyond the traditional three main categories, i.e. general, commercial, and scholarly or academic publishing. Even within these three categories, publishing is swiftly moving away from print or traditional publishing to electronic publishing, and from the control of large, traditional publishing firms to small, private or personal publishing initiatives, introducing new challenges.

In this paper, I intend to discuss the status and challenges of scholarly publishing and e-scholarship in information studies. My paper is divided into three sections: i) Conceptualising and contextualising publishing, scholarly publishing and e-scholarship; ii) Discussing the challenges of e-scholarship, focusing on peer review as a quality management activity in e-scholarly publishing, errors in scholarly publishing, mapping and auditing, electronic publishing, self-archiving, Institutional Repositories (IRs) & Open Access (OA), publishing from theses and dissertations, conferences, visibility and web presence; and iii) Conclusions.

2. PUBLISHING, SCHOLARLY PUBLISHING AND E-SCHOLARSHIP

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Publishing is the process of making information and knowledge public or known by distributing and circulating that knowledge or information beyond the jurisdiction of its origin or source through the publication of content, mainly in print and electronic format, but also in other formats, such as by word of mouth (WOM). Of the three types of publications, i.e. general, commercial and scholarly or academic, the latter is where e-scholarship resides.

E-scholarship is closely tied to digital scholarship and e-research. A scholar is still viewed to be a learned person; he or she could be an academic or a person involved or engaging with investigative or knowledge based activities, mainly as a learner, researcher or teacher. Scholarship is what the scholar does in terms of activity or work. The letter 'e-' stands for electronic, which has now come to denote the use of electronic or digital media for collecting, sending, processing, sharing/connecting, and receiving messages/ information/ knowledge. E-scholarship therefore would be an academic or research activity or work undertaken or fulfilled by a scholar using an electronic medium to enhance teaching, learning and research. This definition is not far removed from the definition of digital scholarship (DS). For example, DS can be "any element of knowledge or art that is created, produced, analysed, distributed, published, and/or displayed in a digital medium, for the purpose of research and teaching"(Kirsten Foot cited by Mutula, 2009:6). Most of the terms provided by Mutula (2010:6) for defining digital scholarship, such as the electronic handling of research articles, peer review, blended learning, evaluation of scholarly work, collaborative research, communication and e-resources, show insignificant differences between the two concepts, although not all digitised publications are 'e-something' and vice versa. We note that e-scholarship and digital scholarship provide solid opportunities for e-research, enabling researchers to collect research data or information and share their research activities or output virtually.

The purpose of scholarly publishing is to promote and support scholarship, research, and academic or learning activities. A large number of scholarly publications now occur in both print and electronic format; web-based publications are growing increasingly popular in the academic community for e-scholarship and the rapid dissemination of research results. Scholarly publishing differs from other types of publications because of its characteristics. Most scholarly publications are conveyors of scientific research output and there are specific requirements for such output to belong to the scholarly output category, such as research quality and rigour, audience,readability and originality, to mention a few (see http://education.pwv.gov.za/content/document/307.pdf:6;http://www.isinet.com; Mabawonku, 2005:21).

We understand research output to be "textual output where research is understood as original, systematic investigation undertaken in order to gain knowledge and understanding"[8]. The publication of research findings is a fundamental aspect of research dissemination and knowledge sharing processes, and such publications often go through a number of stages before they appear in the public domain for wider circulation and readership. Authors of research papers come from different backgrounds and scholarly and writing traditions. One of the main aspirations of scholarly publishing is the publication of quality papers, mainly in credible and

[8] http://www.researchoffice.uct.ac.za/publication_count/overview/

prestigious peer-refereed scholarly journals and other publishing houses of good national and international standing. There is a diverse range of publications for scholarly research papers, the most common being books (largely monographs), articles in academic or professional journals, chapters in books, reviews and peer-refereed conference proceedings or papers, research reports (e.g. theses and dissertations), and patents and creative works (such as those originating from the visual and performing arts). However, journal articles in peer-refereed scholarly or academic journals with good national or international standing still dominate when measuring research output.

3. WHY PUBLISH?

Several widely cited reasons explain why scholars publish their research output (Ocholla, 2007; Stilwell, 2006:7). Calvert and Gorman (2002:3) observe that authors write "to disseminate new research findings or ideas. The publication of a paper establishes precedents in the formation of new knowledge, and puts new information in the professional domain where it can be scrutinized, criticized and either accepted or rejected. It may then contribute to further discourse. The author also makes personal gains by adding to a list of publications that can be used for tenure and promotion, for gaining professional acceptance that may lead to speaking engagement, consultancy work, perhaps even awards." Murray in Stilwell (2006:7) summarizes the reasons as follows: career progression or moving up to the next rung on the ladder, gaining recognition for work done, preventing others from taking credit for one's work or using one's materials, helping one's students gain recognition for their work, learning higher standards of writing, contributing to knowledge, building the institution's status, and developing a profile. Other noteworthy reasons, in our view, include: to justify funding for an individual, department or institution; for tenure or permanent appointment, "publish or perish", or as a job requirement; career progression/ promotion and other forms of reward, gratification, or boosting one's ego through recognition/ visibility; knowledge sharing; announcement of propriety or ownership; community practice and incentive; and education and training.

4. CHALLENGES AND OPPORTUNITIES

The challenges and opportunities of e-scholarship are numerous and can be viewed from different perspectives. In this paper we focus on challenges and opportunities drawing from peer review, errors in e-scholarship and publishing, mapping and auditing research and scholarship, institutional repositories, self archiving and open access, publishing from a thesis or dissertation, conferences, and web presence.

4.1. Peer review

Scholarly publication would not be what it is today without peer review, and e-scholarship is not exempt from this process. Peer review has a history that extends back to more than 300 hundred years of learned inquiry, acting as a traditional instrument of quality control that involves the screening of intellectual output for quality, reliability and credibility. Peer reviewing/ refereeing is standard practice amongst scholars, where research output undergoes

thorough evaluation by peers who are mostly in the same research domain or discipline. This is done in order to determine or vet the quality of output in terms of originality, relevance or significance and contribution to knowledge, methodology, awareness of research in the domain through the review of related studies, and readability, among other variables. Thus, peer reviews are important quality control mechanisms used by the scholarly community and most scholarly journals and publishers to establish the suitability of a manuscript for publication. In the words of Pouris, "No analysis of research publishing can avoid underlining the critical role of editing and peer review in the maintenance of the global system of knowledge production, accumulation and use" (Pouris, 2006:xiv). Ultimately, as a measure of quality control, peer reviewing [both content and form review] is important.

Peers are assumed to be credible scholars or qualified adjudicators in a discipline or subject domain who scholars, editors or journals rely upon for views or comments on the content suitability of a manuscript up for publication in a scholarly publication or academic journal. The process of this 'review' service in the form of comments to the scholarly publisher or journal editor and/or author, is referred to as "peer review". It is built on the premise that research output (articles, monographs, research reports, patents, etc.) would earn more credibility, be more accepted, contribute more towards a society or discipline, command more respect, and be more reliable if peers (experts in the discipline) vet its quality by scrutinizing, screening and evaluating its content and format. Peer review, therefore, should generally improve the quality of research output and the standard of scholarly communication, protect the public/ scholarly community from unreliable or invalid information or knowledge, and safeguard the reputation and recognition of individuals, affiliate institutions and academic journals and scholarly publishing houses.

Although peer review is widely used to determine the quality of publication in journals, it is also liable to weaknesses. Most of these weaknesses are intellectual, such as insufficient knowledge in the subject domain, moral or psychological bias, and sociological (distance from context and political) arrogance and ignorance. However, it is generally recognized that quality control is infallible; peer review is therefore not exceptional. Strong critics of peer review, such as Tipler (2003) when referring to and analyzing cases involving prominent discoveries in science such as "Copernicus's heliocentric system, Galileo's mechanics, Isaac Newton's grand synthesis and Charles Darwin's evolution theory" as well as highly respected Nobel prize winning papers (such as Albert Einstein's theory of relativity), argue that "today, the peer refereeing process works primarily to enforce orthodoxy", and offer "evidence that 'peer' review is not peer review: the referee is quite often not as intellectually able as the author whose work he judges. We have pygmies standing in judgment of giants" (Tipler, 2003:2). However, Tipler does compromise by proposing that "leading journals in all branches of science establish a 'two-tier" system. The first tier is the usual referee system. The new tier will consist of publishing a paper in the journal automatically if the paper is submitted with letters from several leading experts in the field, 'this paper should be published" (Tipler, 2003:10). That, in my view, still leads us back to the importance of peer review. Equally intriguing but a fairly constructive and sometimes subversive take on this issue is offered by Steven Harnad[9]. In one of his many

[9] (see:http://www.princeton.edu/~harnad/intpub.html,

seminal articles on peer review (Harnad, 1998: paragraph one), he argues that journals [scholarly work] should not be free from the "process of peer review, whose "invisible hand" is what maintains its quality".

Peer review process

Peer reviewers are expected to be competent and credible scholars in order to be sufficiently eligible to participate in a review process that comes with critical challenges at each stage of the review process. Gorman (2000:101), for example, identifies three qualities of good reviewers, that of competent researcher, objective assessor, and comparative evaluator. Although there are variations in the peer review process from journal to journal and publisher to publisher, there exist strong threads concerning manuscript flow from author to editor to reviewer, as outlined in a study by Ocholla (2007) focusing on the *South African Journal of Libraries and Information Science* (*SAJLIS*). While guidelines are important for guiding reviewers, most journals unfortunately do not provide them, as is the case with LIS journals in Nigeria (Mabawonku, 2005). The main tenets of the peer review process are outlined graphically in Figure 1.

http://cogsci.soton.ac.uk/~harnad/intpub.html).

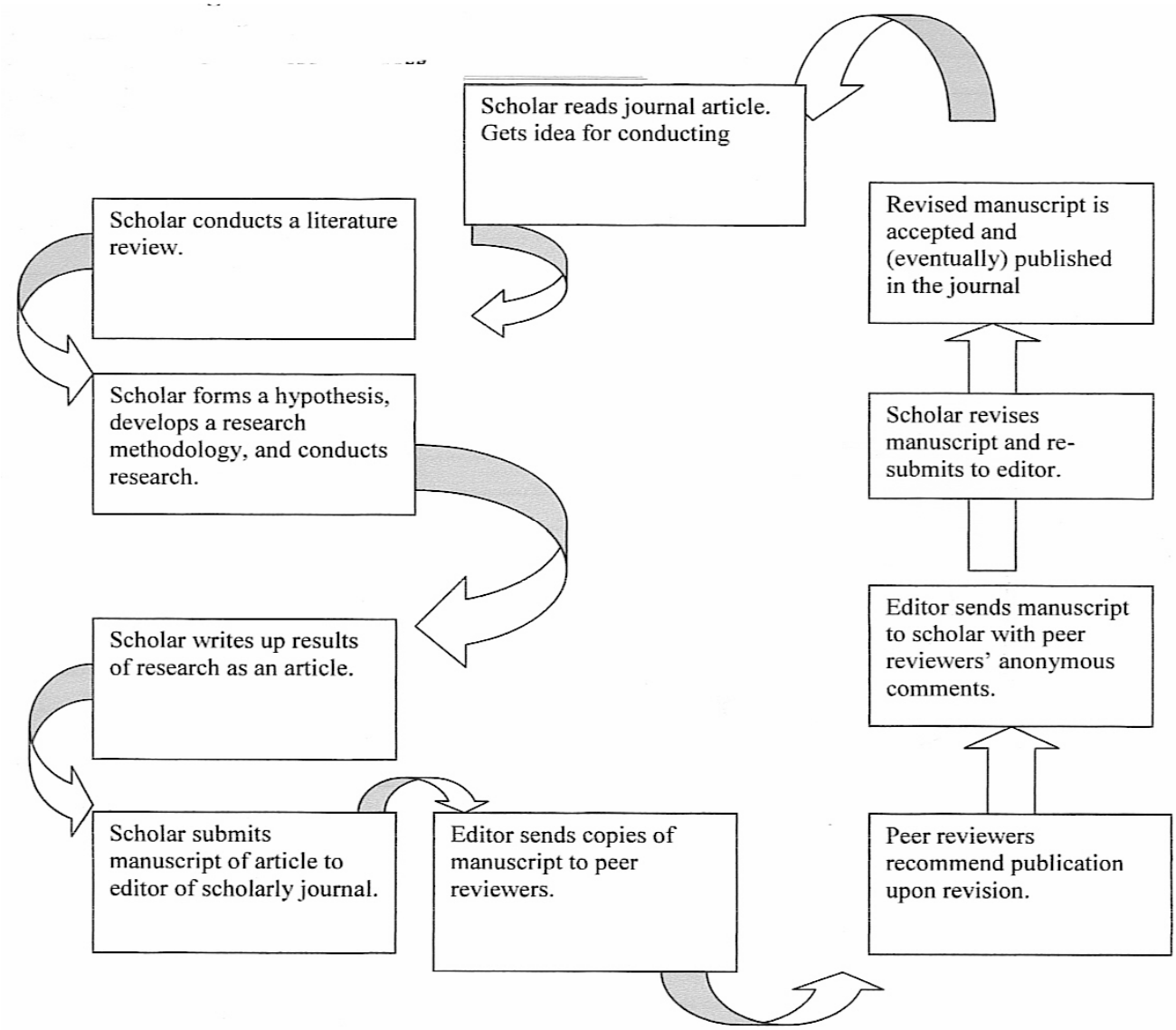


Figure 1: Peer review process
Source: **http://www.lmunet.edu/library/INFL/materials/INFL100_InfoEval_Part2.ppt**

Nature and type of review

The nature, type and level of review are normally outlined in instructions to reviewers which are sent to the reviewers together with or separately from the manuscript. Reviewers are normally required to evaluate and rate the manuscripts and either recommend them for publication - without [any] corrections, with minor corrections, with substantial corrections that may demand a complete revision of the manuscript and a follow up review - or reject them. In most instances, reviews are required to determine or judge the quality of the manuscript in terms of theoretical and methodological validity, originality, significance and contribution, and readability. Tipler (2003:2) outlines three criteria informing judgment, listing them as the

validity of the claims made in the paper, originality of the work or whether similar work has already been done, and "whether the work, even if correct and original, is sufficiently 'important' to be worth publishing in the journal". Gorman citing Gorman (2000:102-103), identifies six criteria for assessing submissions to Asian LIS Journals: the advancement of knowledge, new information or data; theoretical validity (use of appropriate theory or multiple theories); level of scholarship (quality of analysis and author's ability to generate new knowledge); acceptable research design and appropriate methodology and analysis that assists referees in establishing levels of "contribution in terms of knowledge or information conveyed"; originality of the contribution; and the soundness of the methodology, findings and structure.

4.2. Errors in scholarly publications

Errors do not only necessarily occur during the preparatory phase of publication, but also at the early stages of research design. Mistakes that occur during the preparation of LIS theses and dissertations by students, as discussed by Kaniki (2000), are frequently carried on to the final preparation and submission stage of manuscripts prior to publication. Hinchliffe (2003:3) advises that, "Thinking about your final manuscript begins when you start thinking about your project." In her view, this includes searching for or reviewing literature and placing the project in context; choosing a topic and determining the relevance of the topic; manuscript and component organization; and technical preparation (proofreading, removing typographical errors, and adherence to the requirements provided by publishers in their 'guide to authors', etc.). Smarby, Crews and Downing (1999), citing Dies, Henson and McGowen, identify the following areas under which technical writing errors are made by aspiring authors: selecting topics to write about; describing research methods; following the American Psychological Association (APA) format; citing related research; using the appropriate writing style; and responding productively to feedback on manuscripts from editors. Searing (2003:4) advises that in the case of journals, it is important to find out whether or not the journal is peer reviewed and whether the journal is prestigious (highly selective), and to assess the journal's audience. Foster (2003:5) is of the view that a good manuscript is created when the author has current and concise references, the manuscript is repeatedly revised, the paper is well edited and proofread, instructions to authors are familiarized (leading to finer submission requirements), the manuscript is read by others for comments, and the paper is accurately submitted. It is important to review recent issues of journals in order to be inline with their latest requirements. An editor, according to Fischer (2004), functions as a "gatekeeper" that ascertains the suitability of a paper for publication in a journal, or separates what he calls "wheat from chaff", using the following criteria: i) The paper does not fit the journal's editorial mission; ii) The submission is poorly written; iii) The use of out-of-date literature, iv) Inadequate levels of scholarship (no academic rigor or opinion, no validation of viewpoints); and v) Unwieldy writing (e.g. overly complex, poorly organized, etc.). Results from a related study conducted by Ocholla (2007) on "Common errors and challenges of publishing in a peer refereed Library and Information Science journal" based on the content analysis of reviewers' reports for research articles published in *SAJLIS* from 2002 – 2006, identified more or less similar errors, with the top five falling under research methodology, presentation/ organization, readability/ language, literature review, and referencing. Based on

this study, Ocholla (2007) highly recommends that authors for scholarly journals, and indeed scholarly LIS publications, take note of the following eight advice as outlined by Fischer (2004) based on referees' and editors' comments: i) One must pick one's level and build up (begin with less competitive publication sources or outlets and build on them); ii) Diversify your portfolio of submissions (decide whether you want to go a mile wide and an inch deep or an inch deep and a mile wide); iii) Follow your comparative advantage (explore and engage co-authorship for sharing expertise and to reduce your workload); iv) Partake in apprenticeships (work with experienced authors); v) Network to enable partnership and knowledge sharing; vi) Learn from the best - access and read the 'best papers' in journals or as declared at conferences; vii) Get critical feedback - benefit from the expertise of colleagues who offer critical feedback, some of which can be offered at conferences or other paper presentation forums; and viii) Learn critical evaluation skills - look at your own work critically and market your submission to the editor (a good covering letter clarifying items in the paper is worthwhile). Organizing and participating in authors' workshops, seminars and conferences is essential. Above all, actively participating in scholarly communication at various levels regularly, learning from one's mistakes, and not being afraid of the peer review process produces the best results. Error studies suggest that no author, not even the most experienced, produces an error-free manuscript.

4.3. Mapping and auditing of scholarly research output

It is essential for researchers and institutions to know what is going on around them, in other words who (individual/ department/ school) is doing what, why, how, where and when. It would be impossible to discern research capability without the mapping and auditing of research.

Research auditing and mapping, like information auditing (see Robertson, 1994:33; Booth and Haines, 1993:36), should be viewed as "a routine process of gathering, sometimes limited to creating an inventory" of research resources that includes both tacit and explicit knowledge (e.g. records of all formats) produced by individuals and organisations. An information audit maps the network of an organisation's information processes and flows, showing the links between the communication process, the users of information within the organisation, and the means by which information is transferred and used (Thornton, 2001:128), and research auditing and mapping should allow the same. Thus a research audit should permit research mapping by enabling the mapping of the university's/ organisation's research producers, processes, flows, links/ networks, dissemination and users. One of the purposes of the research audit, is to evaluate the effectiveness of an existing research system and service in order to determine effective ways of making the research operation and services relevant, and also to establish the strengths and weaknesses of the existing research system by identifying the research culture, practices, activities and challenges. Some of the benefits of the research audit are closely tied to those of information auditing and mapping (see Thornton, 2001:129), e.g. providing a comprehensive listing of existing research resources and output.

As the name suggests, mapping provides a blueprint of something, for example the research environment within an institution or organization, by providing a map of all the research entities that exist within that organization for its effective management and exploitation that is also achievable through digitisation. Similar to what Burk and Horton (1998) observed when

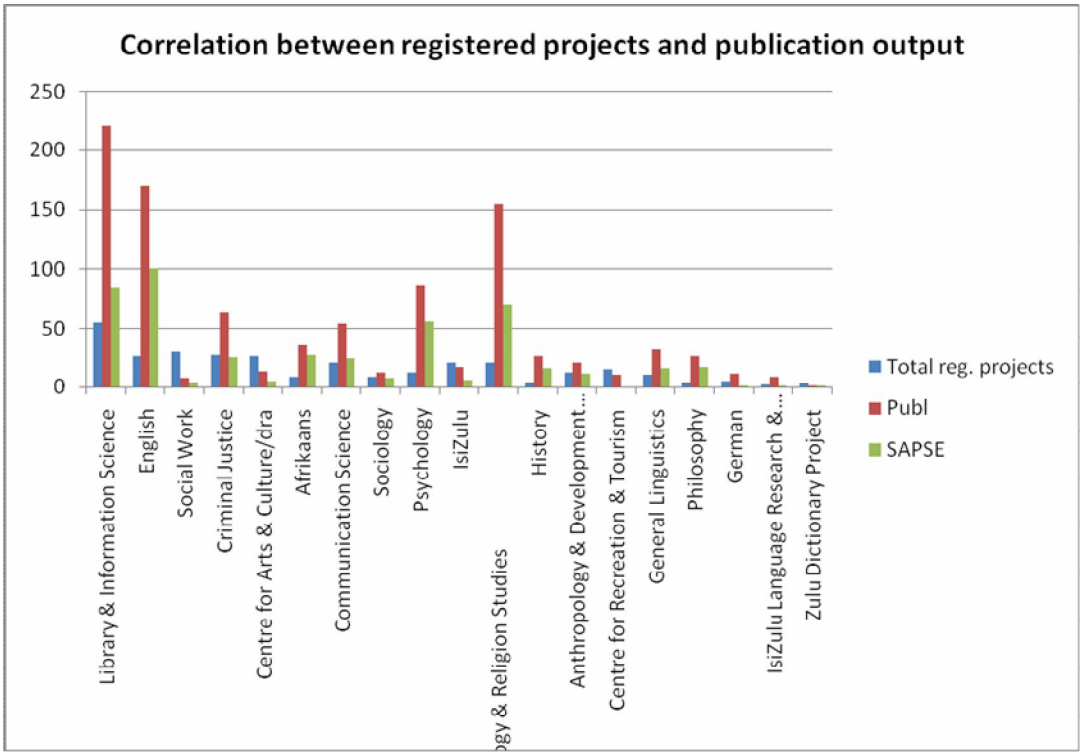
referring to information mapping, research mapping, is a process of discovery based on the research activities and entities within an organisation that includes people (researchers); facilities, equipment and technology; and energy (information flow processes), information (content) and other inputs that have the capacity to create, acquire, process, store or disseminate research information. Mapping normally involves several approaches (see Burk and Horton, 1998) and includes a survey that allows one to list all of the research resource entities currently in use and identify their strengths and weaknesses for improvement or intervention to occur. With research mapping, it is easy to do an inventory of all the research sources, services and systems in the organization.

A recent study by Ocholla and Mostert (2010) captured data relating to individual, departmental and faculty research output and visibility through publication count by using research data reflecting on on-going and completed arts, humanities and social science research publications by staff and students from 1994 – 2008, based on research records originating from the University of Zululand's Research Office for the period. Data analysis was done by categorizing research output by overall research publication by department, publication in accredited (SAPSE) journals by department, author productivity, and comparison of research output by categories. Results showed the status, strengths and weaknesses of research activities and output in the faculty that could be used to inform research decisions. Ultimately, research projects need to translate into quality publications. As noted in Table 1 and Figure 1, there is a strong correlation between research projects and publication output.

Table 1: Relationship between registered research projects and research publication output by categories and department

Department	**Dept**	**Ms**	**D**	**Total**	**Pub**	**SAPSE**
Library & Information Science	27	13	15	55	220	85
English	17	4	5	26	170	100
Social Work	19	8	3	30	7	4
Criminal Justice	18	3	6	27	63	25
Centre for Arts & Culture/dram	19	5	2	26	13	5
Afrikaans	4	0	4	8	35	27
Communication Science	10	5	5	20	54	24
Sociology	4	0	4	8	12	7
Psychology	6	5	1	12	86	56
IsiZulu	6	5	9	20	17	6
Theology & Religion Studies	17	0	3	20	154	70
History	4	0	0	4	26	16
Anthropology & Development Studies	8	3	1	12	20	11

Centre for Recreation & Tourism	8	2	5	15	10	0
General Linguistics	8	1	1	10	32	16
Philosophy	0	0	4	4	26	17
German	5	0	0	5	11	1
IsiZulu Language Research & Development Centre	2	0	0	2	8	1
Zulu Dictionary Project	1	0	2	3	1	1
	183	54	70	307	965	472



Related studies enabling mapping and auditing LIS research was done by Ocholla and Ocholla (2007), entitled "Research in Library and Information Science in South Africa: an analysis of journals research output from 1993 - 2006". This study was based on a publication count and analysis of peer refereed articles indexed in the Library and Information Science Abstracts (LISA) and Thompson Reuters (TR) or ISI Web of Science databases (Science Citation Index or SCI, Social Science Citation Index or SSCI, and Arts and Humanities Citation Index or A&HCI) between 1993 and 2006 by 250 LIS authors, using journal, subject and author indicators for the analysis. The study provided some useful trends in LIS scholarly journal publishing in South Africa (Ocholla and Ocholla, 2007:116-117). Closely related to this was a study by Onyancha(2007) in which he examined library and information science (LIS) literature as produced and published by researchers in Africa in order to establish the productivity and impact of LIS research in the region by using publication count and citation analysis. This study provided insight on the research output and impact of LIS on the continent, that is important for

mapping research in the continent. There are several related studies using informetric/bibliometric methods or quantitative methods for enabling mapping and auditing of research at various levels.

4.4. Publishing from theses and dissertations

A large part of scholarly research output emanates from postgraduate theses and dissertations at Masters and PhD levels. Unfortunately, such scholarly output rarely gets disseminated beyond the walls of the HEIs of origin, particularly in Africa. For example, a study by Ocholla (2000) focusing on research output based on the analysis of 218 Masters and Doctoral papers from 1993 to 2000 indexed in the Union of Theses and Dissertations (UTD) database (hosted by the South African Bibliographic Network, SABINET), revealed that approximately 52 % of this kind of research output gets published. This trend was confirmed once again in a study by Sitienei and Ocholla (2010) that investigated the publication pattern of academic librarians in Eastern and Southern Africa. Here it was found that scholarly/ research publications are often motivated by a reason, particularly where such publications are linked to career growth, tenure, promotion and financial gain. Unfortunately, as I have witnessed, most postgraduate students find it difficult to publish their dissertations because they lack knowledge on how to prepare their research output for publication in scholarly journals or outlets, and also because they fear possible criticism from peer reviewers. As we will learn later, archiving theses and dissertations in institutional repositories for open access is becoming standard practice in higher education institutions (HEIs) and provides a strong case for e-scholarship.

Generally, the nature, size, level, structure, quality and orientation of a thesis or dissertation largely varies from one research paradigm to the next, and in some cases from discipline to discipline. For example, variations between positivists or quantitative and interpretive/ critical/ analytical/ constructionist or qualitative research, as well as a blend of the two (mixed method, or quantitative and qualitative) paradigms, would influence the structure or appearance of a thesis or dissertation. The research articles emanating from these variations could be analytical, empirical, descriptive, evaluative, etc. I do, however, identify common structures in theses and dissertations that can be used to develop an easy publication formula, as illustrated below. From my experience of extensive publication with postgraduates, one can produce research publications from a thesis or dissertation by using one or more of the following combinations:

1. Preliminaries (title, address, abstract and keywords)
2. Introduction
3. Problem statement, purpose, aim and objectives
4. Literature review
5. Methodology
6. Results
7. Discussions

8. Summary, conclusion and recommendations
9. References

Formula:

- A=1+2+4+5+7+8+9.
- B=1+2+3+5+6+8+9
- C=1+3+5+6+8+9
- D= 1+2+3+4+8+9
- E= 1+3+5+7+8+9
- 1+3+4+7+8+9

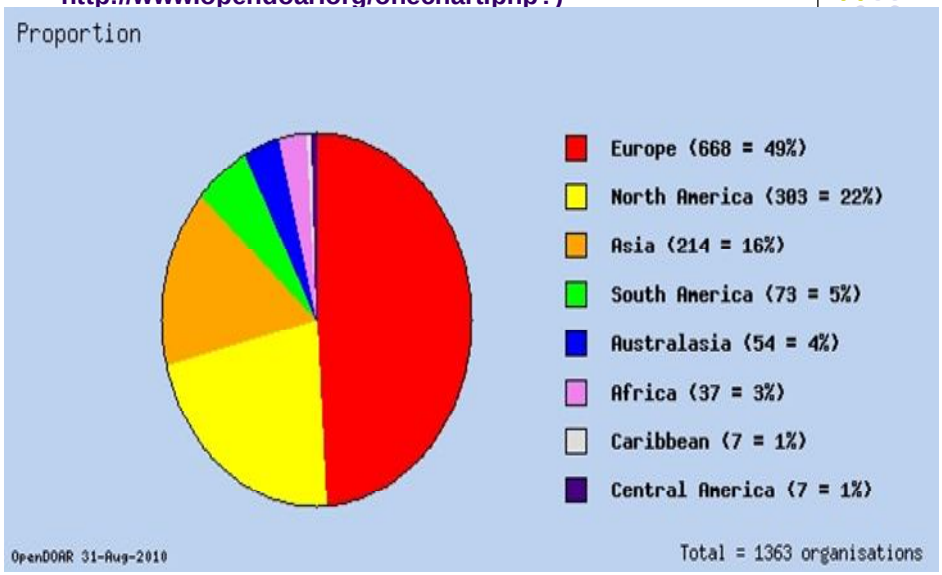
Successful publication from theses and dissertations calls for significant support for and mentorship of novice researchers by research supervisors, experienced peers and established researchers, and this calls for a great deal of collaboration, as alluded to earlier.

4.4. Electronic publishing, self archiving, institutional repositories and open access

This section presents the crucial part of e-scholarship. Electronic publishing is an activity and a process for all types of publications, such as scholarly or research work on the web by an individual or organization for private or public access and use. Self-archiving, which involves posting or publishing one's research output/ documents in digital form, on private (e.g. blogging) and/or public web space (e.g. institutional repositories, websites), is increasingly popular in scholarly electronic publishing. Increasingly, the scientific or scholarly community is using self–archiving to enable better access, searchability, usability, and visibility of their research output by those with Internet access. It is, however, encouraged that such digital documents be compliant with the open access initiative (OAI) [Eprint[10]]. The tables and figures that follow illustrate the OA situation.

[10] http://www.eprints.org/openaccesss/self-faq/ (Accessed 10 October 2009)

World Proportion of OAR - (see http://www.opendoar.org/onechart.php?)



Institutional Repository in Africa

Repository name	Country	Num. Recs.	Pubs	Confs	Theses	Unpub	Other	Base URL	Software
University of Botswana Research, Innovation and Scholarship Archive	Botswana	343							DSpace
Biblioteca Digital da Universidade Jean Piaget de Cabo Verde	Cape Verde	178	+	+	+	+	+		DSpace
AUC DAR Repository (Digital Archive and Research Repository)	Egypt	595		+	+		+		DSpace
Cairo University: مخطوطات	Egypt	707	+	+	+		+	OAI	DSpace
Digital Assets Repository	Egypt	62000	+				+		[Unknown]
Institutional Digital Repository For Library and Information Department at Faculty of Arts, Menofia University	Egypt	49	+	+	+	+	+		Greenstone
The BUE e-print repository	Egypt	46		+				OAI	EPrints
Addis Ababa University Libraries Electronic Thesis and Dissertations Database	Ethiopia	1568			+			OAI	DSpace
knustspace	Ghana	1211		+	+		+		DSpace
KARI e-repository	Kenya			+			+		[Unknown]
Mahider	Kenya	88	+		+	+	+		DSpace
Sudan Open Archive	Kenya					+			Greenstone
Digital Collections of the University Library	Namibia						+		Greenstone
Ounongo Repository	Namibia	45		+	+	+		OAI	DSpace
University of Jos Institutional Repository	Nigeria	839		+			+	OAI	DSpace
University of Nigeria Nsukka	Nigeria	21102			+	+			[Unknown]
Biens Cultureis Africains	Senegal	133	+	+		+	+	OAI	DSpace
African Higher Education Research Online	South Africa	165	+	+	+	+	+	OAI	[Unknown]
Boloka: Research Repository North-West University	South Africa	1391			+			OAI	DSpace
CSIR Research Space	South Africa	3257		+				OAI	DSpace
Digital Innovation South Africa	South Africa		+	+	+	+	+		[Unknown]
Digital Knowledge	South Africa	383			+	+			Digital Commons
DUT IR	South Africa	248			+				DSpace
Rhodes eResearch Repository	South Africa	1279		+	+			OAI	EPrints
Scientific Electronic Library Online - South Africa	South Africa								SciELO
Stellenbosch University SUNScholar Repository	South Africa	3390		+	+		+	OAI	DSpace

Institutional Repository in South Africa

Repository name	Country	Num. Recs.	Pubs	Confs	Theses	Unpub	Other	Base URL	Software
African Higher Education Research Online	South Africa	165	+	+	+	+	+	OAI	[Unknown]
Boloka: Research Repository North-West University	South Africa	1391			+			OAI	DSpace
CSIR Research Space	South Africa	3257		+				OAI	DSpace
Digital Innovation South Africa	South Africa		+	+	+	+	+		[Unknown]
Digital Knowledge	South Africa	383			+	+			Digital Commons
DUT IR	South Africa	248			+				DSpace
Rhodes eResearch Repository	South Africa	1279		+	+			OAI	EPrints
Scientific Electronic Library Online - South Africa	South Africa								SciELO
Stellenbosch University SUNScholar Repository	South Africa	3390		+	+		+	OAI	DSpace
UCT Computer Science Research Document Archive	South Africa	290	+	+	+	+		OAI	EPrints
UCT Lawspace	South Africa	197		+	+	+	+		DSpace
UJDigispace	South Africa	405			+			OAI	DSpace
UKZN Institutional Repository	South Africa	551			+			OAI	DSpace
Unisa Institutional Repository	South Africa	2928			+	+	+		DSpace
University of Fort Hare Institutional Repository	South Africa	121			+				DSpace
University of Limpopo	South Africa	70			+				DSpace
University of Pretoria Electronic Theses and Dissertations	South Africa	4224			+			OAI	ETD-db
University of the Free State ETD	South Africa				+				ETD-db
University of the Western Cape Research Repository	South Africa	26		+		+		OAI	DSpace
University of the Witwatersrand Institutional Repository	South Africa	5405		+	+	+	+	OAI	DSpace
University of Zululand Repository	South Africa	31			+				DSpace
UPSpace at the University of Pretoria	South Africa	5562		+	+		+	OAI	DSpace
UWC Theses and Dissertations	South Africa	479			+			OAI	[Unknown]

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Unfortunately, according to data obtained from the Directory of Open Access Repositories (DOAR)[11] and Registry of Open Access Repositories (ROAR)[12], the development of IRs in Africa is weak: only 11 of the 53 independent African countries have established 42 IRs, which account for approximately 3 % of the world's total. South Africa has the largest number of IRs (23 of 42). Institutional repositories have become popular vehicles for self-archiving and e-scholarship. The self-archiving process is outlined in Figure 2 below.

[11] http://www.opendoar.org/countrylist.php

[12] http://roar.eprints.org/ (Accessed 10 October 2009)

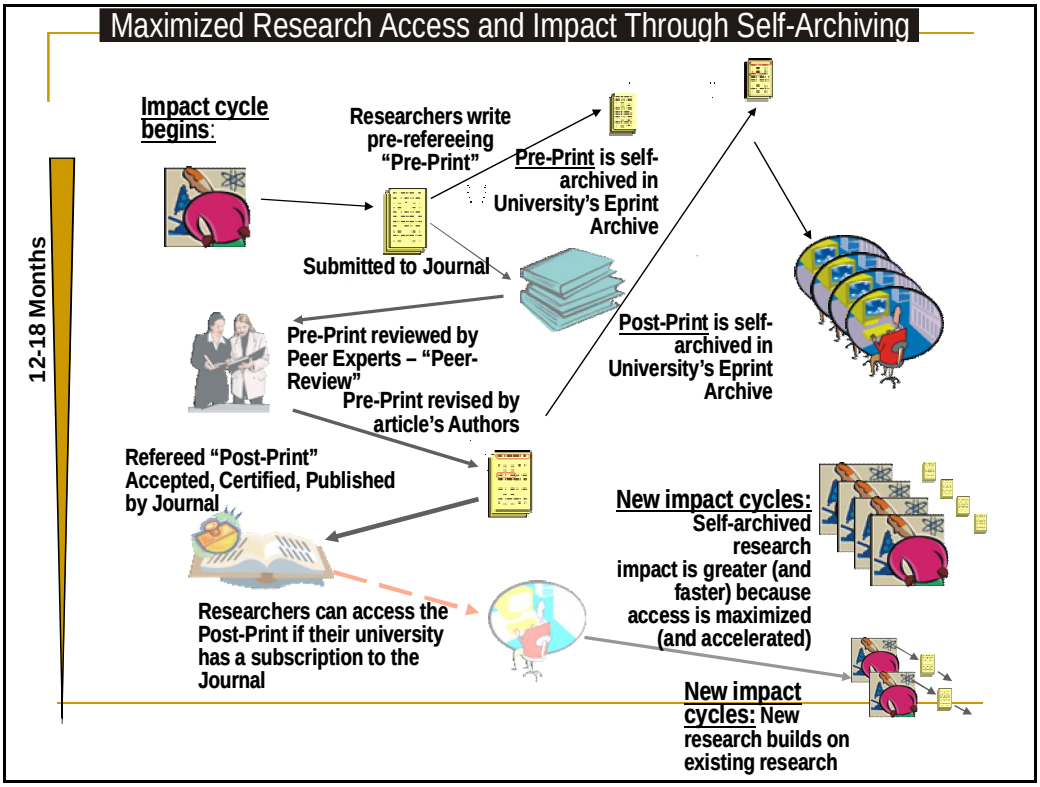

Fig 2: Maximized research access and impact (Source: Brody & Harnard, n.d.)

A recent study by Onyancha (2008) entitled "Self-archiving by LIS schools in South Africa: practices, challenges and opportunities", cites Eprints' (Eprints.org, n.d.) recommendation for collaboration between stakeholders where the institutions' or universities' role could be installing an OAI-compliant EPrint archive; encouraging staff to deposit their scholarly work, both pre-print and post-print, in departmental or institutional repositories; and training digital librarians who may assist as 'proxies' in self-archiving. This can be illustrated as follows:

Scholarly publishing/Open Access

Green Route	The author can self-archive at the time of submission of the publication whether the publication is grey literature, a peer-reviewed journal publication, a peer-reviewed conference proceedings paper or a monograph
Golden Route	The author or author institution can pay a fee to the publisher at publication time, the publisher thereafter making the material available 'free' at the point of access.
Preprints	Preprints are articles that are pre-peer-review
Postprints	Postprints are articles that are post-peer-review
eprints	eprints can be either preprints or postprints but in electronic form
White Literature	White literature is peer-reviewed, published articles
Grey Literature	Grey literature is preprints or internal 'know-how' material

Onyancha's study noted that some institutions (or departments) conduct self-archiving activities by posting documents on their websites, but while such initiatives are encouraging access to digital documents, such as online scholarly publications, Onyancha observes that they pose challenges with respect to preservation and the permanence of the material archived on the websites. His advice is therefore to develop an OAI-compliant EPrint archive or repository. For example, in the process of developing a new LIS departmental website at my university, some documents that were posted on the website are removed. From my experience, the lack of an OAI-compliant Eprint repository should not prevent self-archiving as an interim measure. We (DIS-UZ – http://www.lis.uzulu.ac.za) have been fairly successful in enabling online access to some of our content, benefiting from the advantages of IRs and sensitizing the university towards the development of a compliant repository (see http://uzspace.uzulu.ac.za), as reflected below.

http://uzspace.uzulu.ac.za

- **DSpace Home**
- **DSpace/Manakin Repository**
- DSpace Home
- Login
- **University of Zululand Repository**
- Welcome to the new Manakin interface to the DSpace digital repository. DSpace is a digital service that collects, preserves, and distributes digital material. Repositories are important tools for preserving an organization's legacy; they facilitate digital preservation and scholarly communication.
- **Search DSpace**
- Enter some text in the box below to search DSpace.
- **Communities in DSpace**
- Select a community to browse its collections.
- Faculty of Arts
- Faculty of Education
- Faculty of Law and Commerce
- Faculty of Science and Agriculture
- UZULU Collection
- **Search DSpace**
- Advanced Search
- **Browse**
- **All of DSpace**
  - Communities & Collections
  - By Issue Date
  - Authors
  - Titles
  - Subjects
- **My Account**
- Login
- Register
- This website is using Manakin, a new front end for DSpace created by Texas A&M University Libraries. The interface can be extensively modified through Manakin Aspects and XSL based Themes. For more information visit http://di.tamu.edu and http://dspace.org
- Contact Us | Send Feedback

Essentially, Onyancha's (2008) proposal and suggestion for workshops and seminars on IRs, the evaluation of existing IRs, and enabling OAI-compliant EPrint archives, among others recommendations, are highly essential for the development of LIS scholarly publishing. The involvement of HEIs' libraries in this activity is fundamental because of their strong academic role.

4.5. Conferences, seminars and workshops

Most research and scholarly publications appear in conference proceedings and either end there or get revised and published in journals. I visualise research conferences, seminars and workshops as the enablers of conference proceedings, which in turn act as a formidable supply chain for journal articles and other scholarly publications. Conferences offer opportunities for on-going and completed research to be shared, discussed, scrutinised and validated for further dissemination and use. As a matter of fact, many of the reasons behind why researchers publish relate to their engagement and participation in conferences and seminars. I find conferences, workshops and seminars to be extremely essential for research and publication management. Increasingly, I observe that they are strong research capacity building tools as well. Fisher's

(2004) advice to researchers is that: "One must pick one's level and build up (begin with less competitive publication sources or outlets and build from them)." A lot of research papers published by scholars emanate from conference presentations, which are largely used to share knowledge on ongoing and completed research and enable peers to evaluate research output and activities and thereby improve research quality. In essence, for novice and even established researchers, conferences act as important forum for self development and research capacity building.

While conferences, seminars and workshops are important for scientific and scholarly publication, opportunities for participation in conferences are limited mainly by financial constraints. This is not the only constraint. Another major challenge is the possession of the knowledge, skills and courage or attitude necessary to prepare a conference paper. This is where a strong support system, such as mentorship and research collaboration between novice and established researchers, is required within a department, faculty or research unit.

There are many conferences announced nationally and internationally that invite LIS researchers to participate and present their research work. A large number of these conferences are organised by professional associations and societies as well as HEIs such as universities. For example, in the LIS discipline known to our region, we can list the Southern Central Eastern Conference of African Libraries (SCECSAL), the Library and Information Association of South Africa (LIASA) Conference, Progress in Library and Information Science Research in South Africa (ProLISSA) Conference, and the ZA WWW Conferences. In addition to LIS schools and libraries, the University of Zululand, Moi University (Kenya), University of South Africa (UNISA), University of Johannesburg, University of Stellenbosch, University of Pretoria, and the University of Botswana are increasingly organising conferences, seminars and workshops that push LIS research. This means that there are avenues in Africa within closer proximity that translate to fewer expenses for those who wish to present and publish LIS research. The challenges of cost and knowledge for conference paper preparation still remain, however, and methods of intervention require attention. For example, the publication of less costly conference proceedings is a challenge that can now be addressed through electronic publishing and institutional repositories (see http://www.dissanet.com/jsp/index.jsp and http://www.lis.uzulu.ac.za/index.php/research/56-research-conferences for examples).

4.6. Web presence and visibility

E-scholarship plays a major role in pushing web presence and visibility that, to some extent, translates into the widely published and often controversial university rankings (see http://www.webometrics.info/). Webometric studies on in-links, co-links and out-links to institutional websites, such us those done by Onyancha and Ocholla (2007 and 2008), also rely a lot on e-scholarship activities on the web. For instance, in Onyancha and Ocholla's study in 2008, the authors executed a co-link analysis of 95 (out of a total of 142) institutions of higher education in eastern and southern Africa. Data was collected using a uniform search strategy, i.e. two search queries were used to extract relevant data from the Yahoo! search engine. UCINET version 6 (comprising of several analytic technologies) was primarily used to analyze the data in order to find out the number of external in-links for each institution; determine the most co-linked institutions; map the colinkages; measure the strengths of colink ties; examine colink

relationships; and establish the motivations for colinking. For the presentation of the findings, 40 institutions that recorded a normalized colink count of 1.5 and more were selected. Results indicated that most South African institutions have the highest number of in-link and co-link counts. Institutions belonging to the same geographic region established closer relationships amongst themselves than institutions located in different geographic regions. Institutions that yielded fewer in-link and higher co-link counts produced stronger co-link ties. Strong web presence and visibility played a major role for higher counts.

In Onyancha and Ocholla's (2007) study focusing on South Africa and Kenya, they used link analysis to compare Kenyan and South African universities according to several web-based indicators, including the number of pages and the number of in- and out-links. Here the authors examined the external out-links in order to determine the institutions targeted by South African and Kenyan universities. Also investigated were the networks or links between universities. Web impact factors (WIFs) were calculated and reported in order to compare the universities' web influence. Results indicated that Kenyan universities, like most African universities, have embraced the Internet and its constructs fairly recently, therefore most of their websites are at initial stages of construction. Comparatively, South African universities have made remarkable progress in their web presence, which is at an advanced stage of development when measured against institutions in more developed countries. The study's recommendation was that regional webometric studies should be conducted periodically in order to investigate and map the web-related developments of African universities. The authors' conclusion was that African universities, although not at the same level as institutions in developed countries, can have their websites evaluated webometrically.

There have been significant improvements in the web presence and visibility of the studied institutions since those studies were conducted and reported. We assume that the development of websites is becoming increasingly important for HEIs for visibility and that web content is increasing; a significant portion is driven by e-scholarship, such as publications in institutional repositories. The volume of e-quality publications is also increasing. Whether university rankings have anything to do with this burgeoning interest in web presence and visibility is difficult to tell, but websites and web presence are becoming common practice and a showcase of achievement and credibility among institutions. We believe that e-scholarship should spearhead web content or publications, strengthen web presence and increase visibility, and continue to influence all types of institutional rankings.

CONCLUSION

Electronic publishing is increasingly the catalyst behind scholarly publishing's phenomenonal growth, mainly because of web-based publications. Library and information science is one of the disciplines that is benefiting heavily from this burgeoning publication outlet. Because unpublished research is the equivalent of 'dead research', reasons why researchers conduct research and publish have to be regularly evaluated to ensure maximum benefits are accrued from research activities. Therefore research quality control through the peer

review process, among other emerging quality measures, has to be maintained. But peer review should not only be viewed from a quality control or assurance point of view. Peer review should also be used as an instrument for research capacity building. In this case, peer reviewers must be prepared to go a step further by understanding that their job as peer reviewers also involves pushing researchers to be better authors and publishers. Researchers therefore need to know what types of errors they make, why they make them, and how to correct the errors and improve their manuscripts and increase the quality and volume of publications.

The challenges and opportunities identified in this paper are fundamental for library and information scholarly publications. We need to explore, use, evaluate and strengthen self–archiving, institutional repositories, and open access. As a matter of fact, self-archiving and institutional repositories without OA are unattainable, particularly in Africa which has been suffering an 'information famine' for ages. Institutional repositories (IRs) act as the mirror that allows the world to interact with our stories or content and enable the sharing of knowledge and creation of better understanding. I think that enabling knowledge sharing should be our (information science's) primary activity. For this reason, publication from theses and dissertations should be encouraged and supported, at least through IRs. We should also create regular and relevant platforms for conferences, seminars and workshops and support participation in such scholarly gatherings by bringing conferences closer to those who cannot afford far-off locations. Conferences should be seen as research capacity building platforms aimed at better knowledge and information dissemination. We most certainly have to keep our options open in exploring and exploiting new additions to e-scholarly publishing that may also extend to (current) rapidly expanding social networks.

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Beneath The Bandwidth: Exploring Africa's Information Divide

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ABSTRACT
This paper uses the metaphor "beneath the bandwidth" to explore Africa's information exclusion in the face of new information innovations. As innovations in information keep advancing, bringing greater comfort, sophistication, speed and ease of access, and as technologies grow smaller, the divide simultaneously keeps widening in Africa. The question is, what can and should Africa do?

Keywords: Digital divide, information divide, Africa

INTRODUCTION

Until two decades ago, the debate in Africa's information circles was dominated by the role of libraries in widening the services available to a growing array of information users. As time went on, the debate shifted to Information and Communication Technologies (ICTs) when libraries started using computers and telecommunications. The uncertainty was summed up by Lor, who wondered whether seeing as Africa had not been a huge success story in the 20th century library and information world (Lor, 2000), could the introduction of yet another innovation into libraries, i.e. ICTs, bring about better results? The fear was the presumed inability of Africans to maintain computers and pay for telecommunication services due to lack of expertise and/or the money necessary to maintain them. As the debate ensued, it moved to a higher level 'technology zone': the bandwidth and its use in Africa beyond libraries. Bandwidth is a term used in computer networks and in electronic communication. In computer networks, it is explained as the amount of data that can be carried from one point to another in a given period of time, usually expressed in bits. In electronic communication, it is the range of frequencies that an electronic signal uses in a given transmission medium. Here, it is considered to be the amount of data and information that Africa passes from one destination or point to another and vice versa and the imbalance both in physical access to technology and the resources and skills needed to effectively participate as a digital citizen.

Following the debate above, I came up with three questions: seeing as the information space in Africa is seemingly largely still the same, can Africa's information scene change for the better? If it will someday, what will it take to catalyse Africa's information immersion, especially now with the arrival of advanced technologies? Or shall Africa need its own agenda and standards by which to be judged? I raise these questions because in various fora where the state of Africa is discussed, the constant reminders are that arguably and rightly, Africa is a very rich continent in unexploited natural resources, yet the continent is not developed or developing.

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While the rest of the world is moving forward Africa, particularly sub-Saharan Africa, is shuffling at snail's pace, and in some instances growth is slowing down.

AFRICA IN THE INFORMATION AND COMMUNICATION WORLD

This paper explores Africa's information exclusion in the face of new information innovations. It highlights that as innovations in the information industry keep advancing, providing greater comfort, sophistication, speed and ease of access, and as technologies continue to grow smaller, the information divide simultaneously keeps widening in Africa. Basic statistics show that the continent is poor, with 32 % of African people below the poverty line (as at 2006). Illiteracy currently stands at 49 % in a population of one billion. The debt burden stands at US$ 300bn, and the digital access index shows that Africa's penetration is 10.9 % this year (Internet World Stats 2010) against Asia's 21.5 %, Europe's 58.4 % and North America's 77.7 % and against the world average of 28.7 percent.

Viewed in context, the title of this paper, "Beneath the bandwidth", is a metaphor used to illustrate that while the rest of the world has a heavy presence in cyber information trafficking, enjoying the benefits of new technologies, Africa is virtually at the bottom of the cyber revolution and in fact almost outside it. Although access to the Internet has increased on the continent by 134 % in recent years as a result of growth in the Internet and broadband sector (broadband replacing dial up), improvements in infrastructure, the arrival of wireless access technologies, and lower tariffs, Africa is still the least connected continent in the world, both from an Internet penetration perspective and in terms of the total bandwidth feeding the continent. Within the continent, Africa's presence is felt only in traces, although figures are impressive. For example, Seychelles' penetration is 38.4 %, Morocco's is 33 %, and Nigeria's is 28.9 %, which takes the bulk share of where traces occur as a percentage of their population, but absolutely insignificant against the percentage of users in Africa as a whole. Measured this way, Seychelles is at 0.0 %, Morocco 9.4 %, Nigeria shows promise with 39.6 %, South Africa 4.8 %, Kenya 3.6 %, Tanzania 0.6 % and Uganda 2.9 % (Internet World Stats, 2010). It is this invisibility that makes Africa stay 'below the bandwidth', accentuating the information divide and exclusion. Based on the findings of the International Telecommunications Union [ITU] (2003) Digital Access Index, Sagna (2005?) discloses that access to the weapons of bandwidth namely ICTs in Africa, is very low. Other than the Seychelles, which is in the upper access category, all but a handful of the rest have a low level of ICT access. Teledensity stands at around 5.2 telephones per 100 inhabitants, with very few access points to the Internet. In my view, this certainly demonstrates how Africa is 'below the bandwidth'.

Information exclusion is one aspect of social exclusion that is a multi-dimensional process of progressive social rupture, detaching groups and individuals from social relations and institutions and preventing them from fully participating in the normal or normatively prescribed activities of the society in which they live, and can be passed on from generation to generation. It is a term for what can happen when people or areas suffer from a combination of related problems such as unemployment, poor skills, low incomes, unfair discrimination, poor housing, high crime, bad health and family breakdowns (Office of Deputy Prime Minister, 2004). While these are social indicators, in the information and communication industry they translate into weak and in most cases poor and fragile information systems, disabling people from participating

in the mainstream world of information services. This exclusion is historical in Africa and has been passed across all generations, culminating in the current information, knowledge and digital divides. Africa's information divide can therefore be described as the gap that exists between those enjoying and benefiting from existing world information systems and services, and the majority that suffer deprivation. Regions and countries enjoying and benefiting from super information systems are those found in the east and west where the economies far exceed most countries in the south, particularly those in Africa. Powerful nations in this category include the USA, European Union (EU) countries, and in the east, countries like Japan, Malaysia, Korea and Singapore.

WORLD INFORMATION INNOVATIONS

Technological revolutions have taken place and continue to happen across the information world. In his book, "The information society", Prof. Feather traces these revolutions and wonders whether such a society exists in reality or is merely a myth. In the end he concludes that information technology is what defines whether a nation is in or out of the information society. This is perhaps the heart of the matter. All revolutions in the information industry have been tied to technology, and it therefore follows that Africa's information exclusion is foremost a technological one. Feather suggested that the departure of the world from a largely oral paradigm to the organised mass information systems of today initiated the first information divides. First came writing with the technology of the pen, followed by the printing press, which caused the first mass communication revolution. Following this, mass media and new technology focused on the image and the recording and transmission of sound. Radio and cinema or simply wireless broadcasting became the next great contributor to the development of oral communication culture, and those without access to these new forms of technology were automatically excluded. With further developments in science and technology came the television, spurred on by limitations in broadcasting and the cinema. These technologies of mass media supplemented, but did not supplant, print-based media. The third revolution was founded on the use of computers, and it was influenced by practical developments in the communication industry, i.e. the transistor and semiconductors. Transistors were developed for use in radios which became common in the 1980s. The properties of semiconductors were investigated and their potential grasped in the miniaturization of the computer. The silicon microchip became the next natural progression in the computer industry. Microchips are now the basis of microcomputers. Computers grew useful in managing vastly complex calculations, and this expanded into managing information as well. Because information in computers was needed for retrieval purposes worldwide, the need for sharing it led to networks. Networks are now commonplace - connection to networks is now possible via satellites, cables, and over the last few decades, the Internet and WWW. The same applies to list servers and electronic mail.

Following this line of thinking Hilliard (1998), in his book "Intellectual traditions of pre-colonial Africa", suggests that information exclusion came about much earlier with the introduction of foreign languages into Africa. Africa was a great continent relying on its own systems of communicating information. By introducing writing and reading in foreign alphabets

or languages, Africa prematurely exchanged mainstream communication, i.e. entirely oral communication, to coded communication that required specific skills that had to be learnt prior to use. Africa lost out until it adopted these skills later through formal learning. Most people who could not learn or read in these languages were and still are automatically excluded in the development of information.

FACTORS ACCELERATING INFORMATION EXCLUSION

The factors outlined above were not the only ones that brought about Africa's information exclusion. They only highlight the technology-based aspect of exclusion. Other factors have been found to play a role, and one that extends from the former discussion, is languages. Today, information on the Internet is mainly translated into international languages, namely English, Arabic, French, Spanish, Russian, and Chinese. Japanese, and German. Google has also introduced Zulu, Xhosa, Luganda, Kinyarwanda and Swahili but to a limited extent. Statement not valid) Most of the information on the web is in these languages. What percentage of Africa's population is able to present information or express themselves in any of these languages? The language factor alone explains one of the issues and concerns about Africa's information exclusion. The argument this raises is that had colonisation not occurred, would Africa have remained static?

Closely related to foreign languages, is the linguistic diversity found on the African continent. Africa is home to close to 1000 languages; most of them are not written and almost none are in use on the Internet. This diversity and almost total absence of African languages on the web is a serious drawback for non-English speakers, bearing in mind that the bulk of information available on the web is in English. The linguistic divide confines a lot of African societies within short radius systems of communication and languages. They are consequently potentially irrelevant to bandwidth.

The geographical distribution of telecommunications infrastructure is uneven and least developed on the African continent. Most telephone lines are in the capitals of the countries, leaving thousands of villages disconnected. Although developments in mobile telephony are redressing this, Africa is still a long way away from enjoying even distribution and the wider diffusion of telecommunication technologies. Uneven development in information infrastructure is therefore also partly responsible for information exclusion. The message from all this is that Africa's exclusion is *within* people or communities, regions and countries, as it is *between* Africa and the rest of the world.

Information exclusion encompasses the social divide that exists between people. Principally, poverty is an influential factor in this respect - over 39 % of the population in Africa is living in absolute poverty. This category of the population has little to do with information beyond what is necessary for daily living or survival. Poverty does not allow them to possess any information interests or assets. With such a high figure, it is not hard to imagine or believe that none but a privileged few have access to ICTs that are so central to information delivery and bridging the information divide.

Africa, with over one billion people, is also home to high levels of illiteracy that affect some 40 % of the population aged 15 and over, and close to 49 % of whom are women (UNESCO, 2004). Illiteracy precipitates information exclusion because it prevents information access and use. This problem has also grown into other 'advanced' forms, such as digital illiteracy among the functionally literate.
Information exclusion is also a product of gender disparities. The majority of those suffering from illiteracy and digital illiteracy are women. This inequality in Africa is historical and detrimental because women are often not able to access information, digital or otherwise, for various reasons, such as limited freedom of movement and their perceived status as 'secondary citizens'.

Whilst it is difficult for African nations to participate effectively in the global information society, they could rely on their researchers for information produced locally and somehow avoid complete information deprivation. However, it has been established that Africa is marginalized in research publication within the global community (Gray, 2009). Research publications from Africa, in print and online, comprise a disproportionately small percentage of global scholarly output and are declining (Gray, 2006). It was estimated in 2002 that Africa contributed a paltry figure of less than 3 % of books published and 12 % to the total volume of research information and knowledge, and 0.2 % to online content. Much of African research is either grey literature or published in the north where it cannot easily be accessed (in Africa), or worse still, in journals that are so obscure that they are not indexed locally. In the words of Gray (2009), "The publications are there, but buried in departmental websites that are in turn buried inside the university website." Most disturbing is the very fact that the distribution of journals or other print products is inhibited by physical and tariff barriers. Journals struggle to survive on voluntary labour, and subscription to local journals is hit by constant budgetary constraints.

Experience in using valued information on the Internet has produced another form of information exclusion in Africa. This is about the economics of information. Not all information on the Internet is free. Often if you want a good article, the system quickly opens a proforma invoice for you to fill and asks you to part with US$ 30 or more or else miss what you want. One could opt for libraries, but these institutions are also hard hit budget-wise, and access policies to such facilities may also be restrictive. Books on the Internet are posted with pages missing to inform one that one has to buy in order to get all the pages. Further technicalities of accessing information include encryption using html restrictions. An information seeker is given no option to download or highlight anything. Attempts at printing result in a blank page in the case of protected PDF files. Like the adage, 'he who pays for the piper calls for the tune', Africa is not a 'payer', and is therefore beneath the band in the information circuit. African nations will mostly rely on information in the creative commons or information issued freely on the net, or perhaps advocate for open access products.

The economic dimension also points to the dichotomy between the information rich and the information poor. This is a political dimension of information. The rich are able to pay for

the bandwidth and the poor of Africa cannot because it is expensive. This denies most of the continent's population access to information on the Internet. Presently, the cost of bandwidth is associated with wealthy states and also controlled from the west. A user in Africa who wishes to send information to a colleague in the same country or even office has to send it via the USA where it is relayed back at astronomical cost. The fact that information is controlled by the west is an issue whose implications Africa has not significantly addressed.

HELPING AFRICA CROSS OVER

The foregoing discussion gives the impression that Africa will continue being excluded unless something is done. The first suggestion would be to recognize that given Africa's state of development, information availability is critical to each country's economic growth and development. Secondly, and in my view, it is necessary to understand that there is no way out without embracing ICTs. Thirdly, it is necessary to understand that other than ICTs, factors influencing information exclusion are socially constructed. These are human constructs and can be dealt with. It is my personal view that African people need to develop positive attitudes towards work and not lament or squander efforts on non-productive things. Africa's information exclusion can be changed into inclusion. Why do I think this way? The history of nations the world over gives evidence that the powerful nations of today were once where Africa is now, if not worse. What did they do to become great? Look at Singapore, how long has it taken for it to develop into one of the five richest nations in the world? Fifty years of hard work, planning, and the luck of benevolent leadership committed to the development of their country. Africa must resolve to follow a development pattern that instigates change. Most importantly, the transition to greatness is often a gradual process, not a big bang. African nations need to be resolute, have faith in and love their nations, work hard for change to occur, and develop the capacity to achieve it. Already there have been some positive developments. For example, the introduction of several new international fibre optic submarine cables in Africa, such as Seacom in 2009 and 2010, has led to massive investments in terrestrial fibre backbone infrastructure to take the new bandwidth to population centres in the interior and across borders into landlocked countries.

The introduction of competition and increasing regulatory pressure on monopolistic pricing by incumbent telecommunications companies for international bandwidth is also having a positive effect. The costs of connectivity are getting somewhat lower for customers as the markets expand. This is another good indicator and one that should be encouraged. Obviously this requires stability in the governance of countries in order to retain, sustain and promote investor confidence.

Another development has been VoIP (Voice over Internet Protocol), which continues to gain ground in Africa with rates exceeding 100 % per year following steady improvements in Internet bandwidth. VoIP is a technology that allows voice messages to be sent over the Internet using programmes such as Skype, Yahoo messenger, and MSN messenger (African-Broadband and Internet Markets, 2007).

Broadband is also replacing dial up Internet. African traffic is on the rise fuelled by the rapid growth of ADSL (Asymmetric Digital Subscriber Lines) and wireless broadband services, a method of connecting computers to the Internet that enables the rapid exchange of information

and also allows one to be connected at all times without paying extra money. This suggests an increase in the awareness and use of technology that somehow goes to reduce digital exclusion.

What African nations need to identify at this stage are the challenges affecting the information industry in their countries and plan wisely to find ways of turning them into opportunities. Africa must remember that she cannot and doesn't need to be fed all the time with grants. Supporters get tired, as has happened with the MDGs where the G8s have folded their arms to help Africa realize them on her own. African nations should build self confidence and redirect their efforts into what would move their countries forward. It is Africa's unpreparedness stemming from various weaknesses that prevented it from building up its systems and made it a victim. It should be known that the lack of ICTs is one of the principle causes of the divide; that information shortage is a result of the digital divide and not a result of a lack of natural resources, and also the limited use of the continent's qualified human resources; that nations that do not comply with ICTs will be worse off economically; that Africa's brain drain is one of the main factors contributing to the widening of the divide; and that focusing on natural resources at the expense of developing human resource potential is the wrong direction in narrowing the divide. African nations should also note that the effects of the digital divide have cost Africa dearly. Poor nations spend more on seeking connections worldwide in the cost of calls and Internet access. The key should be narrowing the digital divide and working towards an information society where human capacity is expanded, nourished and liberated, by giving people access to the tools and technologies they need with the education and training to use them effectively (Kofi Annan, 2005). African nations need to note that the information divide is like a virus that brings many setbacks to economic, social, political and psychological initiatives.

The nations in Africa also have to admit that the existing divide is also a product of the sloth-like speed with which they joined the digital world. Africa is still engaged in an agrarian level of existence and aspiring to be at the level of the industrial revolution. For Africa to be able to reach her potential, she must begin by acknowledging that she is a victim of the development process. African nations should become pragmatic and conduct situation analyses of their countries (baseline studies) to identify where they are in respect to where they should be and how to get there. To bridge the information divide, Africa should embrace plans for system developments that eliminate the digital divide. Nations need deliberate efforts to make ICTs one of their national priorities. The continent should be able to garner support for this by engaging different stakeholders such as academics, NGOs, civil society and the private sector within their countries to participate in driving the agenda forward. Accompanying this should be appropriate tools such as policies, projects and initiatives that facilitate change. For instance, letting computers and other information technologies into their countries without taxing them as Uganda is doing is the right way to tackle the information and digital divide. Promoting investments in information technology industries like India is doing in Bangalore and other countries is also a good way forward. Opening information technology education, providing one low cost laptop per child at all levels at all levels, as suggested at the World Summit on the Information Society (WSIS), and consolidating this at university level as the Massachusetts Institute of Technology is

doing, is also a way forward. MIT is sponsoring a variety of outreach programmes which bridge the divide through IMARA project. Its aim is to find and implement long-term, sustainable solutions which will increase availability of educational technology and resources to domestic and international communities. Organizations such as Geekcorps, Eduvision, and Iveneo are also helping in lessening the divide using low cost laptops/subnotebooks, handhelds (simputer, E-Slate,..) tablet PCs and low cost WiFi should be encouraged (Wikipedia Aug 2010). Africa's virtue is that she has human resources that are trainable, particularly the youth; she should have policy frameworks for reducing the brain drain of educated persons as a strategy aimed at developing the critical mass of human resources that can help her implement policies, projects and initiatives. The youth form the greater percentage of Africa's workforce and potential human resource capital. They should therefore be trained and remunerated properly. According to Gbenga (2003), the energies and adventurous nature of young people, when well redirected, could help bridge Africa's information and digital divide. Africa's youth must be equipped with appropriate ICT skills and youth-led and youth-friendly initiatives that seek to bridge Africa's digital divide must be identified and encouraged. Furthermore nations seeking to bridge the divide must not fall headlong into projects and initiatives while leapfrogging the necessary steps it takes to get there. The act of bridging will involve nations on both sides of the divide reaching bilateral and multilateral agreements, as suggested by WSIS. Bridging must be done "in context", taking care not to borrow from nations without interpreting them in the context of the target nation. And the role of information seniors should now be to redirect and shape the debate that information is very important for any country, and investment in ICTs is a fundamental must. Let's lead by example. Let's talk politics of information for I believe we shall be heard.

CONCLUSION AND RECOMMENDATIONS

Africa's information divide can be bridged and will eventually become an undeniable digital opportunity, as Asian countries have shown. However, commitment is urgently necessary. Africa does not need a different agenda or standards by which it should walk its development path. Rather, the continent needs to develop its own capacity to work hard intellectually. African nations need to identify what is not being done correctly now in bridging the digital divide and take corrective measures to address it. African nations need to understudy and emulate successful countries in this area and pair with them in order to build capacity. The continent needs leaders with a vision to work towards removing information divides by building information institutions like libraries, and liberalising the investment space by allowing strategic industries to come and invest. Leaders should have the capacity to examine what went wrong and develop plans that can cause change. Transformational leaders are what the continent should be looking for. Investment in relevant and especially technical education is important in order to create a critical mass of people as drivers of change. Mass education to eliminate illiteracy is an important consideration along the lines of the Millennium Development Goals in order to not only improve information access, but also increase the uptake and use of information. Africa must build its technological capacity and should support NEPAD's ICT initiatives as this offers opportunities for bridging Africa's digital divide, and should emulate countries like Rwanda which have succeeded in making ICTs the backbone of their economy. African elites should get more deeply involved in developing software and conduct research into the kind of things that could liberate Africa from the information divide. They should be at the apex in the translation of complex development information into acceptable packages for their people as well as in developing local content.

African nations should be prepared to put in place legislations that promote closing the digital divide, and information scientists on the continent should become part of all efforts to promote change.

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Is it Feasible to Establish a Library and Information Management School in Swaziland?

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ABSTRACT
This paper summarizes a study that investigated the feasibility of providing Library and Information Management education and training locally in Swaziland. It was observed that Swaziland is still over dependant on foreign LIS education, training and qualifications, and this is becoming increasingly expensive for a country that can establish its own LIS education. The study investigated the LIS education needs, resources, potential, employment market and higher education institutions likely to host local education and training in LIS. Both qualitative and quantitative research approaches were used through surveys, newspaper scanning, content analysis and observation. Tentative results show that it is feasible to establish a LIS school in the country, and plans to achieve this need to be put in place.

INTRODUCTION

Ever since Library and Information Management became a recognized and required profession in Swaziland, local candidates to the profession have been acquiring tertiary education from higher education institutions outside the country. Local higher education in Library and Information Management has been non-existent. Scholarships for prospective students have been [mainly] available from tertiary education schools in Botswana, Namibia, South Africa, Australia, the United States of America, and the United Kingdom. Government, through the Ministry of Education and Training (MOET) and the Ministry of Public Service and Social Security (MOPSSS), has been the main sponsor. Incumbent professionals have been trained at certificate, diploma, under-graduate and post-graduate degree levels.

Out-of-country education and training of Library and Information Management professionals presents some benefits to new incumbents, such as the experience and personal development gained from training in well-established and reputable schools while experiencing different social and cultural environments, and also establishing out-of-country contacts and networks for sustainable professional development. However, it also presents a number of challenges. One such challenge, as observed by Johnson (2007), is the relevance of imported tertiary education. Foreign acquired education is often based on foreign models and environments that may not necessarily be similar to

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the country of the incumbent. Another challenge is the continuous dependency on external agencies and the promotion of the idea that valuable education and training can only be obtained from outside. A further challenge is that of cost because imported education requires a considerable amount of money, which limits the number of professionals that can be trained at a time.

RESEARCH PROBLEM

Swaziland appears to be ignoring its own local education and training programmes in Library and Information Management. There is still a lot of dependency on out-of-country schools to supply the required professionals.

A lot of money has been spent on the education and training of Library and Information Management personnel outside the country over the years, and the government has been the main sponsor. However in recent years, the government announced a decrease in its scholarship funding and introduced a new criterion of awarding scholarships based on certain priority areas, acceptable institutions, and exceptional academic performance (Ministry of Education Press Statements, 2006 & 2007). This affects Library and Information Management professionals in the following ways:

- Library and Information Management (and related professions) is not included as a priority area
- Some Library and Information Management schools are not included as approved and acceptable institutions to which the government would delegate funding
- Exceptional academic performance has not been a requirement to enter into this profession
- Major employers in Library and Information Management have not been recruiting based on good high school grades prior to tertiary training

It is very clear to all and sundry that it is becoming more and more expensive for the government to fund outside education and training. And with the relocation of other partners in tertiary education sponsorship, such as the German Embassy from Swaziland to Mozambique and the British Embassy to South Africa, it has become difficult for prospective candidates to attract willing sponsorship for formal tertiary education in Library and Information Management. The remaining (albeit generous) Embassy of Taiwan in Swaziland focuses mostly on health, medicine and agricultural education scholarships to institutions in Taiwan.

However, even with these problems, the need for properly educated and trained workers in Library and Information Management needs to be addressed if libraries and information centres are to make a relevant impact on national development. This study

investigated the feasibility of providing Library and Information Management education and training locally in Swaziland.

LITERATURE REVIEW

Evidence in literature suggested that the practice of librarianship has been replaced by Library and Information Management in order to accommodate the range of services and diversity of applications currently on offer by the LIS profession. The feeling is that there is no need to separate library work from information management work as there is so much overlapping in the practice of the two (Haigh, 2007; Jordan & Jones, 1995; Laffan, 2009; Stueart & Moran; 2002). The name change has been reflected in the wider adoption of Library and Information Management instead of the former Librarianship, Library Science, and Library Service (Dong, 1997; Karisiddappa, 2004).

The issue of the relevance of imported education and training is widely covered in literature, although from the context of developed to developing countries' importation, and with seemingly collective agreement that education obtained from outside cannot be relevant to the needs of the African environment (Albright & Kawooya, 2007; Johnson, 2007; Shiholo &Ocholla, 2003).There seems to be a general consensus on the financial implications of importing education and training from the western world and its negative impact on developing countries' economies (Britz, Lor & Bothma, 2007).

Another concern is the change in the former predictable employment market of Library and Information Management professionals brought about by new and emerging information related services that compete unfairly with libraries. The feeling is that Library and Information Management professionals need to be relevantly equipped to tap into this new market and compete effectively, more so because traditional library markets are stagnant(Mohammed, 2008; Ocholla, 2005; Ocholla & Bothma, 2007) .

Professional associations and bodies in developing societies are also not effectively contributing towards the profession through active involvement in tertiary education, standards setting and accreditation, particularly when compared to their counterparts in the developed world (Diso & Njoku, 2007; Harvard-Williams & Atan, 1987; Ocholla, 2000; Shiholo & Ocholla, 2003; Younis, 2002).

Throughout the literature, the concerns of the profession in the developing world remained consistently similar, although the degree or specifics varied in certain applications. There was a need to investigate the impact in developing countries that are still not hosting their own education and training in Library and Information Management in their local countries or those countries whose efforts are still very minimal and hardly noticeable. This paper summarizes the findings of a study that investigated the feasibility in a developing country that has not been hosting its own local education in Library and Information Management.

METHODOLOGY

In this study, both qualitative and quantitative data was obtained in five categories of respondents as follows:

* Prospective entrants to the Library and Information Management profession
* Existing and practicing Library and Information Management professionals
* Job advertisements for Library and Information Management professionals
* Existing and potential employers of Library and Information Management professionals
* Training institutions likely to host Library and Information Management education and training

A quantitative research method, according to Creswell (1994) and Locke, Silverman & Spirduso (1998), "measures a phenomenon using numbers in conjunction with statistical procedures to process data and summarize results". In this study, the quantitative method was used to obtain data to address the following objectives:

- Determine if there is a need for local education and training for candidates to the profession and existing professionals in Swaziland
- Investigate whether or not there is a market for Library and Information Management professionals to be educated and trained in Swaziland
- Determine the feasibility of providing Library and Information Management education and training in Swaziland in terms of cost and human resources

Quantitative data was in the form of the number of job offers advertised in local newspapers, number of employers who advertised jobs within the targeted period (2005 to 2008), number of individuals who were interested in the profession, number of professionals who were interested in educating and training other professionals and the cost of education and training locally in Library and Information Management.

Qualitative research is conducted in a natural setting and is concerned with viewing experiences from the perspective of those involved, the aim being to attempt to understand why individuals act or behave as they do (Cresswell, 1994; Locke, Silverman & Spirduso, 1998). The qualitative method was used here to address the following objectives:

- Investigate the current state of Library and Information Management education and training in Swaziland
- Investigate the availability of the required infrastructure for providing education and training in Library and Information Management in Swaziland
- Establish the challenges faced and the opportunities that can be gained from offering Library and Information Management education and training in the country
- Determine the role of major stakeholders, such as the government and the Library and Information Professional Association, in providing local education and training

Qualitative data was obtained from interviews conducted with the representatives of employers in Library and Information Management organizations, who were also potential employers; training officers or human resource planning and development officers from two government ministries directly involved with education and training; and also the professional association representative. Observations in the selected training centers also yielded qualitative data.

Data was collected using three different tools, namely surveys, content analysis and observation. The surveys employed both questionnaires and semi-structured interviews.

FINDINGS

The aim of the study was to find out whether it is feasible to provide Library and Information Management education and training locally in Swaziland. Feasibility was measured in terms of prospective entrants desire to be part of the profession, existing Library and Information Management workers desire for more education and their training needs, the availability of education and training institutions, the availability of markets, and the human resources required to provide local education and training.

The findings of the study aimed to answer the following questions:

* What is the current state of affairs in terms of Library and Information Management education and training in Swaziland?
* Is there a need for the education and training of Library and Information Management professionals locally in Swaziland?
* What are the existing educational and training needs in Library and Information Management in Swaziland?
* At what level, if required, should Library and Information Management professionals in the country be educated or trained locally?
* Is there demand, among employers and potential employers, for locally educated and trained Library and Information Management professionals in Swaziland?
* Does the infrastructure exist for establishing and sustaining an educational or training programme in Library and Information Management in Swaziland?
* Are there Library and Information Management professionals in the country who could be involved in education and training?
* What are the main opportunities and challenges of providing education and training locally in Library and Information Management?
* What could be the role of major stakeholders, such as the government and Library and Information Professional Associations, in providing local education and training?

Current State of Library and Information Management education and training

Education

The findings indicated that local higher education in Library and Information Management is currently not available. Both the working Library and Information Management personnel and employers confirmed this through a survey. A total of 42 survey questionnaires were administered to all working Library and Information

Management personnel who were found at their duty stations during data collection. 35 questionnaires were returned, resulting in an 83 percent return rate. Library and Information Management work-stations visited were: the University of Swaziland libraries - Kwaluseni campus and Faculty of Health Sciences, Mbabane campus; Swaziland National Library Services - Mbabane (headquarters), Manzini public library, Nhlangano branch, Simunye branch and Siteki branch; Institute of Development Management (IDM); Swaziland Institute of Management and Public Administration (SIMPA); Fundza Centre; and Unesco Library and Nazarene - Manzini Nazarene High School, Nazarene College of Education and Nazarene College of Nursing. The workstations visited, except for Nhlangano, Simunye and Siteki, are within the Manzini–Mbabane proximity of Library and Information Management employment centers.

Four semi-structured interviews were conducted with the employers. Two employers were heads of the major library and information services divisions, i.e. the University of Swaziland (UNISWA) librarian and the director of Swaziland National Library Services (SNLS). The other two employers were government representatives in the ministries of education and training and of public service. All the employers were aware of the current state of Library and Information Management education in Swaziland in that it is not yet provided locally. Three of the employers (75% of this population) viewed the current state as not normal and wanting, while one employer (25 %) felt the situation was normal. Employers identified a combination of factors that have contributed to this current state as follows:

* Lack of trained staff (trainers and educators)
* Lack of a consented effort from the profession & professional associations to address the issue of local education
* Complacency about funding for outside education, which has always been available in the past
* Small market offered by the country in terms of absorbing locally educated products
* Initial regional agreements with neighbouring universities (especially Botswana) to complement each other in education programs. This was part of the UBLS (University of Botswana, Lesotho and Swaziland) initial arrangement. It was indicated that the foreign university was expected to offer programs not offered in the country as a regional partner.

Training

Local training in Library and Information Management is existent. It is currently offered in different ways, such as on-the job training, workshops and seminars, and through recognized training centres. Both workers and employers confirmed the existence of short-term training. A majority of employees – 28 out of 34 – also confirmed attendance of training whenever funds were available or whenever the training fell under their portfolio. The professional association, Swaziland Library and Information Association (SWALA), was quoted by most workers (45%) as the provider of professional training. Government came second with 29% and training centres took third

position with 26%. Employers also provide training (14%) and so do colleagues in the profession (11%). Training is usually funded by the government (49%), employers (29%), partners and friends of the profession (17%), professional associations (14%), and business partners and suppliers (6%). 6% of the employers had self-funded their own professional training in Library and Information Management.

All employers indicated the awareness of local training in Library and Information Management. Employers expressed their support for the continuous training of employees in their employment life-span and recognized the various ways in which employees receive training. The employers indicated that on their yearly departmental plans, training features all the time.

FEASIBILITY OF HOSTING LOCAL HIGHER EDUCATION

The findings reveal feasibility in terms of these categories:

* Prospective entrants to the profession
* Need for education by existing Library and Information Management workers
* Relevance of locally hosted higher education
* Availability of appropriate higher education and training infrastructure and resources
* Availability of markets
* Cost and funding

Prospective entrants to the profession of Library and Information Management

The views of 242 completing high school students in the four regions of the country were sought concerning the Library and Information Management profession and whether they would like to join it and pursue higher education in the near future.

* Most of these respondents (228, which is 94%) were familiar with libraries and information centres and appreciated the role they play in contributing to an informed citizenry
* 144 of these respondents appreciated a library and information facility that has all types of books, computers, CDs, Internet, games & television. They also valued the information they get from it, the quietness and strict rules, as well as the good service from the people that work there. They felt that information helps them make better decisions and they definitely need information that is easier to find, read, understand and use
* 122 of these respondents (50%) wished to work in a place where people find information (Information Centre, Resource Centre, Documentation Centre, Research Centre) when they finish school
* 95 respondents (39%) would only work in a library if they could get paid a lot of money
* 204 (84%) and 217 (90%) respondents agreed that a person who works in a library and a person who helps people find information easily, respectively, should be educated as their work requires unique knowledge and skills
* However, only 99 (41%) of them said that they would love to pursue a career in Library and Information Management, and only if it is a well paying career

* 64 (26%) said that they would definitely pursue a career in this profession
* 41 (17%) had not thought of it or were undecided
* Only 2 respondents said that they would pursue this career, provided it is an easy one
* 63 (26%) stated that they would never pursue a career in this profession
* 149 (62%) respondents said that if they chose this profession, they would require the highest possible tertiary education in the field
* 49 (20%) respondents would be content with a degree
* 21 (9%) would want to achieve education up to diploma level
* 108 of these respondents said their choice of a career was influenced by the love of that profession
* 62 felt that money, in terms of how much they would earn in the career, would influence their choice
* The rest – 26 and 20 – felt prior knowledge and status the associated with the career respectively would influence their choice

From the above data, one can deduce that it is feasible to provide local education in terms of prospective entrants. The total number of prospective entrants who indicated interest was 155 (64%). However, with marketing and effective campaigns intended to enlighten undecided prospective entrants about their careers, the feasibility percentage is likely to rise to 81% (196 entrants).

Existing Library and Information Management workers

This category of respondents indicated feasibility through their responses to three (3) major questions as follows:

Does Swaziland have the capacity to provide its own education and training?

28 out of 35 employees (80%) felt that Swaziland has the capacity to provide its own tertiary education in Library and Information Management. The reasons given were that:

* Higher education institutions like the University of Swaziland and other local colleges are available and education in the field can be provided through them
* Adequately qualified professionals exist and can provide education and training
* The current high (senior secondary) school system of education has changed, requiring more use of libraries in schools for independent learning and research. This is widening the market for Library and Information Management workers, justifying investment in local education in the profession
* The country is encouraging decentralization and local government at community level, requiring more community libraries and information centres
* By deploying relevant professionals into training, the government would save a lot of money in local education and training

* The fact that more deliberation on the topic is currently taking place in some sectors proves that Swaziland has the capacity and is ready to initiate its own education in this profession
* Education and training facilities and infrastructure in higher education institutions are available for tertiary education in all professions, including this one
* Even if human resources are not there, they can be outsourced, as long as commitment or willingness (from the government and stakeholders) and infrastructure is available
* In terms of funds, the responses were that:
- If Swaziland could afford to fund outside education and training of Library and Information management, then she can afford to fund it locally as well
- Swaziland can afford to fund tertiary education at the moment, especially in local institutions
* Qualified professionals exist, but they lack the niche [focus] in education and training matters
* At least at semi-professional level:
- The country already has highly qualified personnel who could be deployed for this purpose
- Swaziland should copy experiences of other countries (like Malawi) where the Library Association uses certain periods in the year to conduct training Six employees (17%) felt that Swaziland is not yet ready for local tertiary education due to the following:
* There are few librarians in the country who qualify to teach at tertiary level. There could be enough to teach at certificate and diploma levels (Notes: contradiction)
* The country is not yet ready if one considers the current mode of service delivery in the libraries in Swaziland, i.e.:
- Mainly paper-based or book dominated information resources and services
- Senior library personnel are also involved in the management of book-based library and information services
- Libraries have not yet moved towards automated, electronic and digital information service delivery
- If Swaziland trains its own library and information personnel considering the above, they will only fit in the local market and not in the international market
* Inadequate highly trained professionals at Masters and PhD levels
* Lack of an educational policy on Library and Information Management training
* The perceptions of the Library and Information Management workers is all wrong and has to change first. They present the profession as nothing more than managing a collection of books, so the general public does not see anything about the profession beyond books and shelves and therefore does not see the need to invest more in it, or any potential for growth

Should Swaziland continue to fully depend on out-of-the country tertiary institutions for Library and Information Management education?

26 employees (74%) felt that Swaziland should stop depending on out-of-country tertiary institutions for Library and Information Management education. The justifications provided were as follows:

Is It Feasible To Establish A Library And Information Management School In Swaziland?

* Swaziland should establish her own schools because the library and information fraternity is growing
* It is expensive for the government, as the main funder, to send people outside the country for training
* It is also not easy for people to leave their families behind and attend out-of-country education and training
* Outside education and training can only absorb a few people
* Outside education and training is draining the economy financially
* Education and training should be provided locally and staff should be employed to facilitate this
* Local education and training is needed as more service centres (Tinkundla, (Notes: ?) local government, community centres, NGOs, parastatals, schools, etc.) are realizing the need for library and information services
* The market is slowly evolving and this necessitates supply in terms of local education and training
* Education should be provided locally to cater for people who cannot be able to leave their families to pursue their studies
* The library associations (Notes: are there more?) should play an active role in establishing training centres, going (at least) up to diploma level
* Local education and training in Library and Information Management should be introduced in local universities to save costs and widen access to training
* Foreign schools are expensive
* The country should move towards being self-reliant or self-sustaining in terms of the education and training of human resources
* Swaziland should start with a diploma program and with time progress to degree level
* Local education and training in Library and Information Management would attract more entrants to the profession from high schools
* The dependency syndrome has not done any good for the country. Dependency means we take what we are given as is and have no say or influence in the educational matters of the profession
* Capacity is there, but proper planning needs to be done. Swaziland cannot produce Library and Information Management personnel en-mass as is the case with teachers

20 percent of the employees felt that Swaziland should continue to import foreign education in Library and Information Management for the following reasons:
* Until there is enough trained personnel in Swaziland to take up the challenge
* Lack of existing policies on LIS training
* It is impossible to provide local education and training in this profession if the image of the profession locally is not portrayed accordingly [that is if local professionals act like they don't know much about the profession beyond books and shelves]
* Until there are fully established education programmes in Library and Information Management

Desired higher education and levels in Library and Information Management
Responses from existing and working Library and Information Management workers indicated the following:
* 2 workers required no further education in this profession
* 39 responses for education were in the following levels:

- Degree = 10
- Honours = 2
- Masters = 14
- Doctoral = 14
- Post-doctoral = 3

Existing Library and Information Management workers who expressed a desire for higher education indicated that they would appreciate the inclusion of the following courses or modules in the curricula:

- Information communication technologies (ICTs)
- Knowledge management, including indigenous knowledge management
- Children and youth literature
- Research and knowledge generation methods
- Records management
- Marketing
- Management
    * Management of people / human resource management / personnel management
    * Strategic planning and management
    * Conflict management
    * Leadership
- Digital and electronic information management
- Data mining
- Bibliometrics
- Information and user needs
- Quality Management and the benchmarking of information services

Feasibility in terms of relevance

Responses of employees and employers to whether local education in Library and Information Management would be fully relevant to the needs of the country were as follows:

30 employees (86%) felt that local education in Library and Information Management would best address the needs of the country because: (Notes: revise list)

Is It Feasible To Establish A Library And Information Management School In Swaziland?

* Swazis are in a better position to know what their country needs
* Local education would contribute to an informed nation
* It would better equip library and information personnel to face local challenges
* Libraries are still the best places to get information, and local education would strengthen this role of libraries
* The course syllabus would be applicable to the needs of the country and would boost information dissemination practices
* It would produce Library and Information Management personnel who fully know and understand the expectations of society in terms of information service delivery
* It would develop modules that are relevant to the profession in Swaziland
* It would address the pending and important issue of indigenous knowledge management in the country
* It would be built on the foundations of the localized system of high school education and recognize that products of local education should serve the needs of the local market (schools in particular)
* Local education and training would better address local needs that have been identified and articulated clearly by local institutions, employers and management
* It would contribute to local research generation in the field
* Local education and training would be conducted by locals who have local experience and exposure in information service provision
* It would develop better strategies of disseminating information and attaining the Millennium Development Goals (MDGs)
* It would allow easy access to education courses
* It would be more affordable
* Societal and economic development of the country is very dependent on the management of information as a resource. Local education and training would tap into that and emphasize the role of information in the development of Swaziland
* It would be influenced by the local market
* It would cut down costs of importing education and support the belt-tightening initiative of the country
* It would attract and encourage more young people to enter the profession
* It would introduce fresh perspectives and newer ideas to make the profession more interesting and appealing
* It would address the concerns of the country
* Research generated locally would be fully relevant and applicable to the country
* Local education would recognize what employers and the market currently needs and will be shaped by that from time to time
* It would be relevant, although the quality would be compromised as this is a developing country and there would be nothing much to expose the students to compared to developed or other countries

5 employees (14%) were not sure if local education in Library and Information Management would be relevant to the needs of the country.

Feasibility in terms of local market or demand for educated and trained products

Two local daily newspapers – The Times of Swaziland (Monday – Friday) and Swazi Observer (Monday – Friday) – were scanned spanning four years from January 2005 to December 2008 to determine the local market of Library and Information Management workers. Job advertisements were analyzed for prospective employers, necessary qualifications, and skills, attitudes and job descriptions. 1042 Times of Swaziland and 1042 Swazi Observer newspapers were scanned, resulting in 2084 papers altogether. The newspaper scanning produced 98 job advertisements (9%) from both papers for Library and Information Management personnel. Advertisements from the Times of Swaziland were 58, while 40 came from the Swazi Observer. A majority of these advertisements (46) appeared in the year 2005. 17 appeared in 2006, 19 in 2007 and 17 in 2008. Employers who advertised job offers included the following:

* University of Swaziland - 27
* Government through the Civil Service Board - 5
* Population Services International (PSI – Swaziland) - 9
* South African Development Community Secretariat - 4
* Swaziland Nazarene Health Institutions - 3
* PAN – African Parliament - 3
* Swaziland Sugar Association - 3
* The Media Institute of Southern Africa (MISA) - 3
* Swaziland Tourism Authority / Swaziland Standards Authority - 2
* World Health Organization (WHO) - 14
* International Baby Food Action Network (IBFAN Africa) - 3
* United Nations World Food Programme (WFP) - 4
* Macroeconomic & Financial Management Institute of Eastern and Southern Africa (MEFMI) - 2
* Food and Agriculture Organization (FAO Country Office) - 1
* Baylor College of Medicine Children's Foundation - 4
* Mananga College - 1
* European Union - 1
* Coordinating Assembly of Non-Governmental Organizations (CANGO) - 2
* SADC Parliamentary Forum - 4
* United Nations Development Program (UNDP Country office) - 4
* South African Customs Union - 1

Advertised posts in Library and Information Management were as follows:

* Documentalist
* Conservator
* Documentation Officer
* Records Management Officer
* Archives Assistant
* Information Officer

* Resource Centre Officer
* Information Programme Officer
* Information Assistant
* Librarian
* Research & Communications Officer
* Data & Information Clerk
* National Information Officer
* Publications and Networking Officer
* Public Information Officer
* Assistant Librarian
* Records and Registry Officer
* Communications Officer
* Trainee Assistant Librarian
* Senior Library Assistant

Required qualifications included:
* First degree – 25
* Diploma – 8
* Not stated on advert – 2
* Master degree – 6
* Post-graduate Diploma - 1
* Certificate – 1
* High School completion certificate and 3 years experience - 1

In almost all these advertisements, three years experience, computer skills and the ability to work under minimum supervision were a requirement. In special instances there were age restrictions for the applicants, such as no candidates over the age of 35. There were also advertisements where female candidates were preferred and encouraged to apply more than males.

Feasibility in terms of education and training infrastructure and resources in higher education institutions

Two higher education institutions were observed with respect to education and training infrastructure, namely the University of Swaziland's (UNISWA) main campus in Kwaluseni, Matsapha, and the Mananga Centre for Regional Integration and Development Management situated in Ezulwini, along Manzini–Mbabane road. Both institutions provide full-time, part-time and on-the-job training through diverse academic programs. Both institutions also admit local and international students who qualify to enter into their programs. UNISWA has three campuses, the main campus housing the faculties of Humanities, Education, Commerce, Science and also the Institute of Distance

Education (IDE). Mananga's main campus is in Ezulwini, and it has a sister college named Boston that has campuses in Ezulwini and Mbabane. Most of the full-time programs are offered by Boston through diplomas in business studies, information technology and hospitality management, among others.

The infrastructure, resources and facilities found in higher education institutions (with or without Library and Information Management education) were as follows:

- Training resources
    - Physical infrastructure
        - Lecture rooms
        - Examination rooms
        - Demonstration rooms
    - Equipment & furniture
        - Lecture room furniture
        - Teaching equipment

- Information and research resources
    - Library / resource centres
    - Computer laboratories
    - Internet Connections
    - Information databases

- Administrative facilities
    - Administration offices
    - Academic offices
    - Student affairs & welfare services

- Human resources
    - Academic staff
    - Administrative staff
    - Support staff

- Extra-curricular & sporting facilities

Library and Information Management makes use of the same infrastructure, resources and facilities as the above, in addition to suitably qualified educators and relevant practice measures.

The University of Swaziland was found to be appropriately equipped with all the relevant infrastructure, equipment and resources for higher education. UNISWA is the only university in Swaziland and therefore the highest of the tertiary institutions. It a parastatal that gets subventions from government through the Ministry of Education and Training. At the time of writing, almost all higher education colleges in the country were affiliated to UNISWA through the board of affiliated institutions (BAI) and had good

working relationships with the university. UNISWA is also equipped with academic staff in Library and Information Management who teach a module of library development and management in teacher-qualifying courses, such as the Bachelor of Education. The academic staff in this profession were full-time employees of the university on permanent and pensionable basis for locals and also on contractual basis for expatriates. The staff possessed post-graduate qualifications and had various specialization areas within the profession and the necessary experience in teaching at tertiary level.

Mananga was also found to have the physical infrastructure, equipment and furniture necessary for tertiary education and training. Five lecture rooms with a sitting capacity of 40 - 80 people, which also serve as examination rooms, were identified during observation. These were well furnished and contained audio-visual teaching equipment. A medium-sized resource centre that can sit 40 people contained a collection of print resources, and 14 Internet connected computers were available for use by participants and staff. Subscription to information databases was dependant on the courses offered, with a strong bias for management and related sciences. Mananga's human resources consist of full-time and part-time or externally outsourced facilitators. Since no full-time education programs exist in Library and Information Management in this institution, Mananga engages external consultants for short-courses or training programs in the profession. There are also excellent dining and catering facilities, as well as sporting and entertainment. Mananga boasts a unique approach to learning and development for regional integration that emphasizes the integration of academic and social interaction. It forms part of what the institution calls "the Mananga experience". The Mananga experience is meant to leave a long lasting impression on those who attend the institution. Student affairs and issues pertaining to welfare services are addressed weekly in Mananga through meetings between course representatives and staff.

Feasibility in terms of cost & funding

Cost of education in tertiary institutions was found to be lower than that of foreign tertiary schools. On average, it costs government E20 000 to E30 000 tuition fees for candidates at local higher education institutions. Lilangeni, denoted by the E, is equivalent to the South African Rand (7. 8 to the US dollar). All employers agreed that in terms of cost, local higher education in this profession would be more feasible than foreign imports. Workers also shared the same sentiments and noted the following:

* No cost of travelling to and from the home country within the academic year in local education
* No medical insurance is required in local higher education
* No costly study permits, applications, renewals and other related fees

Employers from the two ministries responsible for education and training emphasized that the government is willing to delegate funding for the pursuit of higher education in this profession within the country.

CONCLUSION

From the findings, it can be concluded that Swaziland is ready to host her own local education and training programmes in Library and Information Management. Existing and working Library and Information Management professionals in the country are in support of local education as they feel that it would not only be relevant, but also affordable and accessible. Local education also has the potential to attract more candidates into the profession. The issue of Swaziland hosting her own higher education programmes in this profession has been given a lot of deliberation by all stakeholders (the government, employers, higher education institutions, and workers through professional associations). It has also reflected on the University of Swaziland's five-year strategic plan. Some minimal efforts have already begun in some higher education institutions, and government is very supportive through funding. The Institute of Development Management [IDM - Swaziland] has started hosting a one year certificate in Archives and Records Management, two year Diploma in the same program, and plans are at an advanced stage to host the Diploma in Library and Information Management in January 2011. Deliberations on degree courses in the profession are set to continue.

RECOMMENDATIONS

From the findings of the study, the we recommend the following:

* Full-time education programs in Library and Information Management can be implemented at the University of Swaziland [as per their strategic plan]. The assumption is that by including the intention to host higher education in this profession, the university has planned for implementation, resources, targets and sustainability with respect to Library and Information Management education in their 5 year plan.
* Mananga Centre for Regional Integration and Management Development and the Institute of Development Management [IDM - Swaziland] could also host education programs in Library and Information Management, especially at semi-professional level (diploma and certificate), as they both have experience in hosting short courses and training in the profession.
* Due to adequate infrastructure, resources and experience in handling graduate and post-graduate courses and research, the university is better placed at hosting full-time degree and post-graduate courses in Library and Information Management.
* Collaboration of all stakeholders should be maintained to ensure the continued success of the higher education programs.
* Regional partnerships, collaboration and networking should be formed and maintained to tap into the experiences of those who have been hosting the programs for a long time and also to ensure the maintenance of proper standards and quality.
* Swaziland is a small country and therefore in hosting higher education in Library and Information Management, unnecessary duplication of hosts should be avoided in order to efficiently sustain enrolment or entrants to hosting institutions.
* The issue of relevance for local higher education in Library and Information Management should not be over-emphasized at the expense of robbing the field and its participants from regional and international exposure, participation and applicability in

other societies. It would not be wise for the country to produce higher education products that could only work in Swaziland in this dynamic profession.

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An Exploratory Study Of Infopreneurship As A Job Option For Library And Information Science Students: A Literature Review

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ABSTRACT
This paper reviews literature covering infopreneurship. The paper defines infopreneurship, discusses its importance and areas of infopreneurship, and explores its future. It further discusses how students can be motivated to be infopreneurs, the suitability of a curriculum for infopreneurship, and the challenges facing infopreneurship.

Keywords: Infopreneurship, economics of information, information brokerage, information consultancy, information intermediaries, Library and Information Science, LIS jobs

INTRODUCTION

The term 'infopreneurship' is a relatively new term in the discipline of Library and Information Science (LIS), although its function has been in existence ever since the beginning of information consulting and brokering. The term infopreneur is considered to be neologism portmanteau and is derived from the words 'information' and 'entrepreneur' (Infopreneur, 2010). 'Neologism' is a newly coined word or phrase that has not yet been accepted into mainstream language (Neologism, 2010). 'Portmanteau' is used to mean a blend of two (or more) words or morphemes and their meanings into one new word (Portmanteau, 2010). Coulson–Thomas (2000), in his article entitled "Developing and supporting information entrepreneurs", describes infopreneurs as information entrepreneurs. Berry III (1994) also refers to infopreneurs as information entrepreneurs in "Enlighten those Entrepreneurs", as does Du Toit (2000) in her article, "Teaching infopreneurship: students' perspectives". It is therefore to this regard that the study assume that there could still be challenges of coming up with one term for the field i.e. infopreneurs or information entrepreneurs.

Presently, the challenge that has arisen in the commercial field is to come up with a generally acceptable definition of what an entrepreneur is. A recent study conducted by Kobia and Sikalieh (2010) states, "The submission of this paper is that an agreed definition of entrepreneurship has yet to emerge." In another statement, they comment on, "another interesting observation arising from the lack of an agreed definition on entrepreneurship". The two quotes point to the fact that there is no universally accepted definition of entrepreneurship. As it stands, the only agreeable definition is that of the term 'information'.

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McCreadie and Rice in Ikoja-Odongo and Mostert (2006) describe information as a commodity or resource. They go further to characterize it as a physical commodity that can be produced, purchased, replicated, distributed, manipulated, passed along, controlled, traded and sold.

Because this is social science study, definitions from the social science field will be used in this paper. Du Toit (2000) defines the term 'entrepreneur' as that particular individual in society who takes the lead as well as the risk in mobilizing the production factors (natural resources, human resources and capital) in specific combinations to produce products and services for his or her community. In accepting this definition, we intentionally turn a blind eye on the challenges faced by professionals in the commerce field.

A closer look reveals that information is defined as a resource and an entrepreneur is defined as someone who mobilizes production factors to produce products and services. Combining the two terms shows the individual who is behind the whole process happens to be an information entrepreneur, also known as an infopreneur – the person willing to take all the risks (as alluded to by Du Toit, 2000) with information products and services. Berry III (1994) states that, "We are overrun with information entrepreneurs around here. They want to put everything we do at LJ in some new database and then bring it out as a new information product, usually on a CD-ROM". An example of such a people is researchers who use information to produce information products and services, often in the form of an article in journals.

Given this background, an infopreneur is therefore perceived to be an individual who sells information (Chandler, 2007). Thus, someone who sells information products and services. This concurs with Berry's (1994) assertion that infopreneurs produce information products and services. It is noted in the Wikipedia that an infopreneur is an entrepreneur who makes money selling information on the Internet (Infopreneur, 2010).

Information intermediaries (information brokers and information consultants) conduct their services in the same manner. According to Ocholla (1999), information brokers and consultants indirectly or directly receive material and moral remuneration for the provision of information products and services to consumers. He states that often, an information intermediary links information products and services to information consumers. It is believed that there is a strong link between infopreneurship and information intermediaries; it is also believed that the two are actually one and the same thing, particularly by those involved in the transaction of information products and services. Thus from this point in the paper, 'infopreneurs' will be used interchangeably with 'information intermediaries'.

This paper focuses on exploring the importance, areas, future and challenges of infopreneurship, the suitability of the curriculum, and how students can be motivated to be infopreneurs, as alluded to earlier.

IMPORTANCE OF INFOPRENEURSHIP

Infopreneurship is important and beneficial in many ways. The importance of information intermediaries (infopreneurs), as viewed by Christozov and his colleagues (Christozov et al., 2008), are as follows:

Cost and time saving. Generally one is likely to consult the library, Internet, newspaper, etc., in order to find the information one is looking for. Because of their expertise and experience in the field, an information intermediary or infopreneur saves the time and costs that would have been incurred by the user if another route were taken (Christozov, 2008). This is also confirmed by Frank et al. (2001), who opine that infopreneurs anticipate and assess information needs, and deliver value added information and services in a timely way.

Reliable. According to Kobia and Sikalieh (2010), "The need to survive drives individuals to engage in entrepreneurial activity thereby bringing about entrepreneurship." In so doing, they maintain a good reputation and are noticed by more potential clients. Christozov et al. (2008) explain that infopreneurs function in the business world where recognition through good service is a major asset. This means that they provide the right information to the right people at the right time. Trudell (2008) adds that information intermediaries or infopreneurs are those individuals clients turn to when there seems to be no way out.

Accurate information. As highlighted above, information is of great value; there are many studies in the field of Library and Information Science that touch on the issue of information value (e.g. Du Toit, 2000). Accuracy is a major factor in determining the value of information alongside reliability, relevance, timeliness, proximity, comprehensiveness and understandability. With the skills and knowledge that infopreneurs are supposed to have, the information they obtain to support user needs has to be accurate. According to Klanènik and Blazic (2010), "Information brokers traditionally aim to find and explore information offered by various information suppliers. They receive queries from users and strive to return the information required by the user."

Advice on certain pieces of information. The provision of advisory services is a major aspect of infopreneurship. It is well known that advisory services are often provided by knowledgeable and skilled people. Frank et al. (2001) is of the view that as an infopreneur, one needs to give advice and counsel to his or her clients based on their unique information needs.

Value of information provided. The amount of information provided by consultants has value because one would not charge a fee for providing a service unless one is sure that

the information is valuable. Frank et al. (2001) confirms that the kind of information provided by the infopreneur is value added information.

AREAS OF INFOPRENEURSHIP

According to Ocholla (1999), 'areas of infopreneurship' refer to projects that one may undertake if one decides to pursue infopreneurship. He describes the following areas in his paper:

- Research (exploratory and evaluative) in information and related fields such as user studies and market analysis
- Compilation of bibliographic lists
- Provision of current business information
- Compilation of directories
- Publishing
- Translation services
- Information repackaging
- Writing, editing and proof reading
- Collection management
- Records management
- Cataloguing

There are more areas of infopreneurship that can be identified today that were perhaps unknown when Ocholla (1999) wrote his paper, such as Internet providers, e-services, and m-services. In his book, Chandler (2007) emphasizes that the Internet in particular requires a new approach to infopreneurs. He mentions new areas such as the sale of e-books and e-publishing, business analyst consultants, web newsletters, access achieved through subscription, and online solutions through recorded videos, for example on how to reference, how to publish online, how to write a winning research proposal, or what career options there are in the field of Library and Information Science. Further avenues would include information intermediaries operating via chartrooms or offering online conferences through networking services such as Facebook and Skype.

At the University of Zululand, students have been involved in infopreneurship in the provision of computer troubleshooting services, helping junior students write research proposals, essays and reports, and proofreading and editing, to name a few as more will come when the campus survey results are received and disseminated by the end of 2010.

CHALLENGES OF INFOPRENEURSHIP

In his paper on intermediaries, Ocholla (1999) discussed some of the challenges faced by information intermediaries as follows:

Smallness. Most information brokerage undertakings are small, one man businesses.
Urban-centricism and elitism. What this means is that most information brokerage and information consultancy firms are located in urban areas. The market is a central issue because information is a commodity in a business-oriented environment and consumed

mainly by literate and elite communities that reside mainly in urban areas, particularly in developing countries. This projects a sense of exclusivity.

Temporality. The field of infopreneurship suffers from individuals who are not passionate with the idea of being an infopreneur. If one starts an information business and it fails, that individual will just give up his or her dream of being an infopreneur and just resolute to go for formal jobs. This therefore results in the temporality of the field.

Interdisciplinary factors. Most of the people who end up becoming information consultants and brokers are drawn from various professions and occupations that do not necessarily fall under traditional information disciplines such as librarianship, publishing, the book trade, archives and records management, communication science, and information and media technology.

Expertise. Good consultancy and brokerage is facilitated by extensive knowledge, experience, the right attitude and sufficient exposure to the subject. Thus, a great demand for expert knowledge and skills in the areas of information consultancy and brokerage services are required.

Setting up of clinics. If other professionals from other disciplines whom we equate ourselves with can do something that can stand the test of time, why is it difficult for information consultants to do so? If doctors can open clinics, then surely information intermediaries can too.

Part-time or full-time occupation. Whenever a client needs a service from a consultant, their availability is required. Arguably, engagement in consultancy and brokerage services on a part time basis creates the potential for permanent structures in the future. Even though consultancy and brokerage services may be loosely structured at present, there is a definite need for formally structured services.

CURRICULUM SUITABILITY

According to Du Toit (2000), it is important for infopreneurship to be included in the curricula of Information Science. Du Toit (2000) furthers her argument by saying that infopreneurship is action-orientated. The design of a curriculum based on infopreneurship according to Du Toit (2000) should encourage imagination, creativity and innovation, and address the issues of setting a balance between teaching entrepreneurial skills and managerial skills. Entrepreneurs identify needs in changing environments; they create and innovate using an active imagination (Du Toit, 2000).

It is imperative for infopreneurship to be included as a subject in the Department of Information Studies so that graduates from South Africa and all over the world under the Department of Library and Information Studies/ Science can opt to be infopreneurs (Du Toit, 2000). Christozov et al. (2008) from the State University of Library Studies and Information Technologies highlighted that designing and launching an entirely new program that leads to a bachelor degree is a challenging job for every school, especially if the program is a new one for the school and across the globe. Christozov et al. further highlights from their university highlighted above they included in their curriculum the

course of information brokerage or infopreneurship. The reason for this inclusion was to help unemployed information professionals find new career paths (Christozov et al., 2008). They argued that at the time, this attempt at offering information brokering or infopreneurship as a regular discipline was designed to meet demand. The growing interest in this burgoing field is an indication of the recognized need for such professionals.

Du Toit (2000) is of the view that people who design lectures for such a new discipline must be experts in the field as they need to provide sufficient information to enable their students to start their own businesses. When considering the curriculum of a course in infopreneurship, one should look at the knowledge and skills an infopreneur would need in order to be successful. The course content should focus on two aspects, namely the teaching of creative and analytical skills and the teaching of business basics. This serves to confirm part of what was said above: that it is a challenge to launch a new program in a university.

INFOPRENEURSHIP CURRICULUM AT THE UNIVERSITY OF ZULULAND

It is believed that the curriculum of Information Studies at the University of Zululand could potentially push students to pursue careers as information intermediaries or infopreneurs. It is indicated in the Faculty of Arts Prospectus (2010) that a module 'Infopreneurship' is offered to students (both students doing a BA in Information Science or a Bachelor in Library and Information Science) in their final year in the department. W believe that students from the Department of Information Studies at the University of Zululand are equipped with knowledge that could enable them to follow infopreneurship as a career choice, e.g. knowledge in general management, knowledge management, information seeking, information ethics, marketing and publicity, computer applications/literacy, electronic publishing, infoprenuership, which are also identified by Ocholla (1999) as areas of infopreneurship.

The module/course Infopreneurship aims to provide students with the knowledge and understanding of the economic and business implications of information services, transfer and use that can enable them to pursue infopreneurship. We believe that the module/course alluded to acts as a supporting system for those who seek to be successful infopreneurs.

Christozov et al. (2008) highlighted that the aim of the curriculum they use is to train students on specific qualifications needed by information intermediaries or infopreneurs. A list of the modules that make up their curriculum includes: information management; probability and statistics; system analysis; theory and practice of consulting; mathematical foundations of information brokerage; law and legal regulation; and information brokerage. The curriculum from the university in which Christozov and his colleagues are based differs from the one at the University of the Zululand. This suggests that the management of the Department of Information Studies from the University of Zululand should look at the curricula of other institutions in order to help strengthen the field of infopreneurship.

HOW CAN STUDENTS BE MOTIVATED TO PURSUE INFOPRENEURSHIP?

Literature (e.g. Ocholla 1999, Du Toit, 2000, and Frank, 2001) reveals many suggested ways to motivate LIS students to pursue infopreneurship. Frank and his colleagues (Frank et al., 2001) identified one motivating factor, that is interdisciplinary research which emphasizes familiarity with many fields. They note that information is no longer location dependent. Thus, essentially, one can operate a business anywhere and everywhere - in a garage at home or in the backyard - largely through the ICT enabled virtual space. Increased access to information has made everything possible for infopreneurs. Du Toit's (2000) motivating factors include a low economic growth rate as an enabling factor for infopreneurship. Ocholla's motivating factors (1999) also include unemployment. For example, a recent calamity in the corporate world was the 'recession', where many employees lost their jobs. The point is that if an individual is unable to find employment but has the qualifications and knowledge required to make it on their own, they tend to set up their own businesses. In this instance, unemployment could motivate them to become an infopreneur.

Ocholla also notes the willingness of information consumers to pay for the services of an information intermediary. Individuals, organizations and countries are increasingly accepting the importance of information and knowledge for their survival, and therefore invest a great deal in information as a commodity. One of the definitions of an infopreneur is an individual who takes risks by capitalizing on such an opportunity. He also notes the inability of existing information provision centers to cope with or provide the information services needed by clients. The best way to beat competition is to capitalize on areas where one's competitor is lacking or on the competitor's weak points. Traditional information providers or intermediaries such as libraries, bookshops and individuals with a traditional information service mindset cannot cope with present day information needs. For example, would a traditional library satisfy the information needs of a web/ library 2.0 or 3.0 user? Where do you think such a user will go for information services?

Ocholla also points to dead end jobs as a motivating factor. These are jobs that do not offer individuals the opportunity to expand the knowledge they have or to grow or develop their careers. People normally abandon these jobs and look for something else, such as infopreneurship. Increased demand for specialized information services, which is also mentioned by the same author, is closely linked to some of the factors mentioned. People who know what they want and can afford specialized services usually refer their problems to specialists. For example, if one suffers from an eye problem, one will go to an optometrist and not to a general doctor or a clinic. The same applies to individuals who need specialized information services that cannot be ordinarily provided. Other factors mentioned by Ocholla are the recognition that information is a commodity and can create wealth, and interest in self employment where people want to be their own

boss. Du Toit (2000) observes that students are more interested in being their own boss, a preference that is shared by many if they can manage self-employment.

FUTURE OF INFOPRENEURSHIP

According Tenopir (2006), users' expectations often grow faster than one can meet them, and the more one provides for people, the more new and progressive things they will expect. This means that the future of information intermediaries or infopreneurs depends on the users' needs and how they (infopreneurs) ensure that these needs are met. The better the services and products, the more customers will flock to their offices and vice versa. Coulson-Thomas (2000) is of the view that there are plenty of opportunities to make money as an information intermediary (infopreneur). Infopreneurship as highlighted by Du Toit (2000) above is action oriented. Du Toit (2000) argues further by saying that the driving force behind creativity and innovativeness is infopreneurship

Twenty years ago, Warner (1990) estimated that there were probably more than 1,000 information entrepreneurs in business in the U.S. and Canada, and this number must have exponentially grown since. A study by Bothma and Britz in 2000 observed that there was a very strong tendency towards entrepreneurship in South Africa, and many students preferred to set up their own businesses as information consultants, information brokers, or information analysts rather than to work for the government, parastatals, or big corporations. This is a positive attitude that should be encouraged by all stakeholders. More research needs to be done in this field in order to establish where we are at the moment and the challenges that need to be overcome.

CONCLUSION

The curriculum of LIS schools should provide space for infopreneurship and related disciplines in order to support this important domain. The content of infoprenuership should be spread across several related disciplines, particularly those in the management, legal and business domains, and therefore a well designed curriculum should not focus on an autonomous course or module only.

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Can Mobile Phones Be Used For Knowledge Management?

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ABSTRACT
The world has moved into what many scholars refer to as the knowledge era. The idea is that as with capital, knowledge is vital for economic growth. This notion has led to organizations and individuals' attempts to manage the knowledge assets (both tacit and explicit) at their disposal. Knowledge management involves the creation, storage, transfer and use of knowledge, commonly achieved with the help of ICTs. One ICT device that may prove especially useful in future transactions is the mobile phone. New models of mobile phones are capable of playing many important roles in the knowledge management process. This paper conceptualizes knowledge management and discusses the role of modern wireless technology, specifically mobile phones, in managing knowledge. Two case studies based on recent research conducted at the University of Cape Town and University of Zululand are used to explain this phenomenon. The case studies reveal that mobile phones are mostly used for information management.

Keywords: Mobile phones, knowledge management, m-learning, m-commerce, m-government

INTRODUCTION

Knowledge management is a hot topic in most organisations. It is believed that in order for organisations to enjoy greater competitive advantage, they have to use and manage their knowledge assets well. There are a number of strategies and tools that individuals and organisations employ to manage their knowledge. At present, technology seems to be taking over most knowledge management initiatives – hardware and software technologies such as, desktop, laptop, tablet, palmtop computers, mobile devices, databases, artificial intelligence and learning management systems are used for knowledge management purposes. Mobile phones are an excellent example of technological devices that have taken the world by storm. Mobile phones, like other mobile devices can be used for knowledge management. In 2008, there were about 3.3 billion mobile phone users around the world (Samkange-Zeeb and Blettner, 2009), and 301.7 million of those subscribers were in Africa (Africa and Middle East Mobile operator statistics, n.d.). Mobile phone technology (currently 3G) caters for both voice and data transmission. They provide access to the Internet and can capture, store and transfer multimedia information. This means that, they are capable of managing knowledge . However, the extent to which they are actually used for knowledge

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management is unclear. Therefore this paper conceptualises the role that mobile phones play in knowledge management by defining basic knowledge management concepts before presenting three case studies on how mobile phones are generally used and finally determines whether they are used for knowledge management.

DEFINITION OF DATA, INFORMATION AND KNOWLEDGE

It is important to distinguish and discuss data, information, and knowledge because these terms are often confused by readers and have created some problems in research circles. These terms are usually used interchangeably, suggesting that they mean the same thing, but they do not. While many researchers agree that these terms stem from one another, their hierarchy has not been agreed upon (Tuomi, 2000). Arguments in literature show that some researchers believe that information and knowledge stem from data, while others believe that data and information stem from knowledge.

Data

Data has a number of definitions depending on the context of its use (Hey, 2004). In the field of Information Science, data tends to be defined as unprocessed information, while in Computer Science, data is defined as streams or pockets of data. Data in this instance is conceptualised as a resource and as an object that can be manipulated. It is further described as bits and numbers, with no meaning, self-contained and in isolation (Rumizen, 2002). Tiwana (2002) provides a different view of data as a set of objective facts about an event or just structured records of a transaction.

Information

Data that has been processed into a format that can be used for decision making purposes is known as information. Chaffey and Wood (2005) describe information as data with value to the understanding of a subject in a given context. They also state that information is the basis of knowledge. Vance (as cited in Alavi & Leinder, 2002) defines information as data that is interpreted into a meaningful framework. Drucker (as cited in Tiwana, 2002:40) describes information "...as data endowed with relevance and purpose".

Knowledge

Knowledge is an abstract notion. There are two opposing hierarchical structures on how knowledge is generated. One shows that knowledge stems from data and information (Bierly, Kessler & Christensen, 2000), and the other suggests that knowledge does not stem from either data or information, but that data and information in fact stem from knowledge (Braganza, 2004). Proponents of the former argue that data (raw facts without meaning) is acquired first and then processed to create information (data endowed with relevance) and then knowledge (justified beliefs that help a person take effective action). Proponents of the latter state that knowledge has always been available.

Nonaka and Takeuchi (1995:58) define knowledge as "a justified true belief". Alavi and Leidner (2001:109) describe knowledge as "information possessed in the mind of individuals: it is personal information related to facts, procedures, concepts, interpretations, ideas, observation and judgment". They opine that knowledge is thus the result of cognitive processing triggered by the inflow of new stimuli. Information is converted to knowledge once it is processed in the mind of individuals and knowledge becomes information once it is articulated and presented in the form of text, graphics, works, words or other symbolic forms.

Knowledge can therefore be viewed from several perspectives, namely as a state of mind, an object, a process, a condition of having access to information, or a capability (Alavi and Leidner, 2001). Gupta, Sharma and Hsu (2004) suggest that knowledge is the full utilization of information and data coupled with the potential of people's skills, competencies, ideas, intuitions, commitments and motivations. Knowledge thus includes structured experience, value, judgement, comments and other values (Tsai, Chang & Chen, 2006)

Types of knowledge

Michael Polanyi is perceived to be the first person to differentiate between two types of knowledge, i.e. tacit and explicit knowledge (Polanyi, 1962). This idea is supported and expanded by Nonaka and Konno (1998).

Tacit knowledge

Nonaka and Takeuchi (1995) state that tacit knowledge is what the knower knows; it is personal knowledge that is context specific and hard to formalise and share. They state that tacit knowledge is derived from experience and embodies beliefs and values. There are two dimensions of tacit knowledge: the technical dimension and the cognitive dimension (Nonaka and Konno, 1998). The former encompasses informal personal skills and craft often referred to as know-how, and the latter consists of beliefs, values, mental models and ideals which are deeply ingrained in human beings and are often unnoticed or taken for granted. Tacit knowledge is connected and depends on the individual and the individual's understanding and experiences of a concept or phenomenon (Elfving & Funk, 2006). It is the elusive and subjective awareness of individuals that cannot be articulated in words (Li & Gao, 2003). Thus this type of knowledge is mostly applicable in problem solving, problem finding and predictions and anticipation (Leonard & Sensiper 1998).

Explicit knowledge

Nickols (2000) states that explicit knowledge is knowledge that has been articulated and (more often than not) captured in the form of text, tables, diagrams and product specifications. Nickols further describes explicit knowledge as knowledge that is formal and systematic. Nickols gives product specifications, scientific formulas and computer programs as examples of explicit knowledge.

Explicit knowledge is objective and rational knowledge that can be expanded in words, sentences, numbers or formulas. It includes theoretical approaches, problem solving, manuals and databases (Nonaka, 1997). Explicit knowledge refers to the codified component of knowledge that can easily be disembodied, processed and transmitted (Sambamurthy and Subramani, 2005). It can be exchanged during face-to-face communication at seminars and gatherings, and can be stored in a number of sources, such as paper and electronic databases (Rice and Rice, n. d.). Stenmark (2001) names researchers such as Choo, Spender and Blacker who have added other types of knowledge, such as cultural knowledge, individual and group knowledge, embodied, embrained, embedded and encultured and encoded knowledge. However, Stenmark acknowledges that they all stem from Polanyi's notion of tacit knowledge.

KNOWLEDGE MANAGEMENT

A lot of authors have argued that the world's economy is growing more knowledgebased. Drucker (as cited in Kakabadse, Kakabadse and Kouzmin, 2003:76) is said to have coined the term 'knowledge society' and stated that: "The basic economic resource is no longer capital, natural resources or labour but is and will be knowledge." Marr and Schiuma (2001:321) are of the view that organizational capabilities are based on knowledge and therefore knowledge is an organisational resource that acts as the foundation of the company's capabilities.

In the words of Suresh and Mahes (2006:14), "Knowledge management is the strategic management of people and knowledge representations along with associated content and information in organizations, using technology and processes, so as to optimize knowledge sharing and utilization, by transferring knowledge directly between people or indirectly through systems, to derive overall benefits to all aspects of the functioning of the organization." Most knowledge management research focuses on organisations and not individuals (Efimova, 2005). Knowledge is also managed at individual level. Personal knowledge management includes retrieving, evaluating, organising, analysing, securing, and presenting information (Kora, 2006). Individuals manage knowledge to improve their thinking capacity and to deal with knowledge overload. From this viewpoint, knowledge management has been with us all the time and therefore has existed with or without us giving it a name.

Knowledge management processes

Knowledge management has four main processes, namely knowledge creation, storage, transfer, and use/application (Alavi and Leidner, 2001). Knowledge creation is the process of acquiring or developing new knowledge from information or existing knowledge. Dalkir (2005:43) defines knowledge creation as "...the development of new knowledge and know-how". Knowledge creation involves the conversion of tacit knowledge to explicit knowledge and vice versa (Nonaka and Takeuchi, 1995). Knowledge storage involves storing knowledge so that it can be used in the future using

some form of memory base/ storage facility, e.g. databases and human memory. Knowledge transfer involves the movement of knowledge from one knowledge source to the other. Major and Cordey-Hayes (2000:412) state that: "Knowledge transfer is the conveyance of knowledge from one place, person, ownership to another." Knowledge application is the process of applying knowledge in different contexts and situations. For example, knowledge can be applied in organisational routines and processes (Alavi and Leidner, 2001). Knowledge management is also applicable at individual level. Individuals create, store, transfer and apply knowledge. Nonaka and Tacheuchi (1995) and Hedlund (1994) state that knowledge is created and transferred at individual level through the interplay between tacit and explicit knowledge. Individual knowledge can be stored in print and electronic formats. Knowledge is stored mainly in textual formats such as notes, in documents, databases, CDROMs, as emails, and on disk (Martin, n.d.).

MOBILE PHONES (CELL PHONES)

The mobile phone is a widely used communication device that can also be used as a knowledge management tool. This means that it can be also be used for knowledge creation, storage, transfer and use. Mobile phones are devices that establish voice (sound), text and graphic links between people in order to exchange information (Benta, Cremene & Padurean, 2004). Mobile telephones work by using radio waves to communicate with radio antennas placed within adjacent geographic areas referred to as cells. According to Benta el al. (2004), a telephone message is transmitted to the local cell by the mobile telephone and then passed from antenna to antenna – cell to cell - until it reaches its destination, where it is transmitted to the receiving telephone. Older cellular systems were analog, but newer systems have gone digital (Laudon and Laudon, 2006). Mobile phone technology has evolved into three generations - the 1st (1G), 2nd (2G) and presently 3rd (3G) generation (What is the History of Cellphones, n. d.); 3G is the technology that is presently used by mobile phones. 3G has significantly improved features by providing access to faster Internet and email and improved multimedia transmission, such as video and audio from digital cameras (Frenzel, 2007). 3G technologies are continuing to improve, and new innovations, such as streaming radio and television as well as WiFi, are currently breaking into the market (What is the History of Cellphones, n. d.).

Major mobile phone features and services

Mobile phones' features and services have been extensively developed since the first mobile phones were used.

Voice services

Earlier mobile phones were invented to transmit voice/sound only. Today, mobile phones have a number of voice functions embedded into them. 3G-enabled phones have voice capabilities such as voicemail, push-to-talk, and speaker phones.

Messaging services (SMS and MMS, Email, Email2SMS, SMS2Email)

Mobile phones offer a number of text messaging features and services. The short messaging service (SMS) and the multimedia messaging service (MMS) are the most

common. Mobile email is also gaining popularity. A short messaging service is a text message that can be sent to a recipient. SMSs are popular because they provide a simple and cheap way of communication. MMS allows text, colourful images, video and voice clips and animations to be sent with a text message (Prensky, 2004). Email2SMS and SMS2Email are a service that allows mobile phone users to open an email account with one of the service providers. Users then use their PCs or mobile phones to send either an SMS to email or email to SMS (MTN Website).

Internet Browsers

3G enabled mobile phones have the ability to browse the Internet. Instead of using traditional Internet browsing methods (using PCs), mobile phone owners have the privilege of accessing the Internet anywhere and at any time via their mobile phones.

Multimedia functions (cameras, video clips, video mail, music player, radio)

These features can be referred to as multimedia because they allow different media to be transmitted through mobile phones. The camera is used to take static pictures, record video clips, and is also used for video calling. Music files can be downloaded and played on the mobile phone. Mobile phone owners have the privilege of listening to FM radio.

Global Positioning System (GPS)

GPS is a satellite navigation system that is capable of giving precise directions and finding locations. GPS can be used for directions to specific sites such as cities landmarks, rivers and mountains (Prensky, 2004).

USES OF MOBILE PHONES (M-COMMERCE, M-LEARNING, M-GOVERNMENT)

Mobile phones have been used in a number of instances for information, and to a certain extent, for knowledge management. Key areas in which mobile phones have been used are mobile commerce (m-commerce), mobile government (m-government), and mobile learning (m-learning). M-commerce is any business transaction that is performed using wireless mobile devices such as mobile phones, PDAs and tablet PCs (Song, Koo and Kim, 2007). Mobile commerce transactions include mobile banking, advertising, downloading music, and other business transactions. M-government is the use of mobile technologies, devices, services and applications to deliver content to citizens (Kushchu as cited in Ghyasy and Kushchu, 2004). Mobile phones have been increasingly used in mobile learning. Mobile learning (M-learning) is using mobile devices for learning purposes. This involves transmitting electronic learning (e-learning) material to mobile devices such as personal digital assistants (PDAs), mobile phones, tablet PCs, pocket

PCs, and palmtop computers (Ally, 2004). Keegan (2005) defines mobile learning as the provision of education and training through mobile devices.

The use of mobile phones by the government (m-government)

A number of case studies have reported examples in which mobile phones were used in m-government. Naqvi and Al-Shihi (2009) report on the case of Oman, where different organisations use different mobile services to transmit information to citizens. They provide the example of the Royal Oman police who use SMS services to notify people about their traffic offences. The Muscat municipality also uses SMS services to notify citizens about parking in the city. Ghyasy and Kushchu (2004) report on a number of cases in developing countries where mobile phones are used in m-government. For example, the government of Malaysia uses SMSs to notify farmers about increasing water levels, thus enabling them to take action to avoid damage to their farms. Citizens in Ireland can send MMSs to police if they suspect that terrorists might be in their midst. In South Africa, mobile phones are increasingly used by the government to remind traffic offenders of outstanding traffic fines, tax payers of tax-related information, TV licence holders of licensing and payment related information, and much more. The Department of Home Affairs has introduced an m-government service for citizens to access information from the department. Citizens can query their identity document, passport and/or certificate application status by sending an SMS to the department. The department sends the feedback via SMS to citizens (http://www.doh.gov.co.za). The South African Broadcasting Corporation (SABC), together with the Department of Education, launched an SMS service for Matric students to access their results. Students had to SMS 'results' and their identity numbers in order to obtain their full results. In 2004, the Department of Health launched the Dokoza System Project. The aim of the project was to improve citizens' access to vital health information. The system uses mobile phones (SMS) to provide health practitioners with interactive health capability anytime, anywhere, and in real time (Komna, 2007).

The use of mobile phones for business activities (m-commerce)

There are a lot of SMS- and MMS-based services being provided by South Africa's private and public organizations. Such services include news, dating, mobile-banking (m-banking), job applications and health services. All mobile phone users have to do is to SMS a certain number to the service provider in order to acquire that service. For example, a user can SMS a certain number to the South African Broadcasting Corporation (SABC) and get the latest news (Goldstuck, 2007).

The use of mobile phones for learning

Several studies have been conducted on mobile learning. Most of the studies report on the use of mobile phones as learning tools. Benta et al. (2004) conducted a study in a biology lesson where a class of students had to recognize a plant. A text description of the plant was submitted by SMS and the picture of the plant was submitted by MMS. The students were required to access an encyclopedia and send a plant picture to an artificial intelligence image service that detected the plant. Students were using the Wireless Application Protocol (WAP) and MMS enabled mobile phones to access

information. The aim of the study was to present a new mobile-learning service that allowed for interactivity between the students and access to information sources via WML and MMS.

Nakahara et al. (2003) conducted a study to investigate whether iTree (a Java application that encourages learners to participate in online bulletin boards, systems and forums) does indeed motivate learners to be more involved in collaborative learning. Because of the high mobile phone penetration rate, many educators believe that mobile phones have the potential to act as learning tools, and some educators have incorporated mobile learning into their curricular. They also list various uses of mobile phones in learning. For example, students can send course evaluations and comments via their mobile phones. Mobile phones are now also capable of running language study materials, such as drills and educational game applications. The authors also cited Yamaoka, who noted schools that distribute official notices to students regarding class cancellations, scheduling changes or job seminars via mobile phones. Their study found that the program encourages learners to engage in forum exchange in a positive light, and that many learners have come to regard the program as a useful learning tool. Nonyongo, Mabusela and Monene (2005) also carried out a study based on the SMS service. They investigated whether communication is possible between distance education students and their university using SMSs. Their study found that students would be very pleased if their institution would communicate to them via SMSs.

Lindquist, Denning, Kelly, Malani, Griswold, and Simon (2007) note that mobile phones have become ubiquitous on university campuses, and it is natural to ask whether they can be used to improve education. They believe that mobile phones hold promise for enabling large scale participatory learning. The authors' suggest that SMSs and MMSs can be used to support text and photo messaging for in-class communication. The researchers conducted a study to investigate the effectiveness of using a mobile phone on learning. Students submitted their tasks using SMS and MMS. The SMS was used for text only submissions and MMS for photo submissions. During the study, students were given multiple choice questions, short answer problems, mathematical problems, code writing, and diagrammatic problems which they answered using the mobile phone.

Derballa and Pousttchi (2004) conducted a study that examined the capabilities and limitations of mobile technology usage in order to support knowledge management. They identified mobile devices that can be employed in knowledge management, such as tablet PCs, PDAs and mobile phones. The authors believe that mobile technology can be applied in a number of situations in knowledge management, including knowledge transfer. It can be used in mobile information exchange, which includes data transfer and information transfer, and in the operational systems used in organizations.

According to Derballa and Pousttchi (2004), mobile technology can also be used in mobile business intelligence, which refers to the access of processed enterprise data using mobile devices, and lastly in mobile communication techniques in conjunction with mobile devices that are employed for the creation, validation, presentation, distribution and application of knowledge. They went on to identify four cases in which mobile technology can be applied: knowledge creation through virtual teamwork, knowledge validation in the case of a 'lessons learned database', knowledge distribution through case based reasoning (CBR), and knowledge application with virtual reality (VR).

THE CASES

Case one: use of mobile phones for e-learning

A study was conducted at the university of Cape Town in South Africa. The aim of the study was to investigsate whether mobile phones can stimulate knowledge transfer among students doing projects. Three groups were studied; group one consisted of Construction Economics and Management students. Their project was to design, prepare and present a business plan. Other than this particular project, this group of students was previously involved in a number of other construction-related projects. The second group was from the Departments of Information Systems and Computer Science. This groups' project was to identify a real world problem and solve it by developing a system (software) that would solve it. The third group was from Civil Engineering. Their project was on the dynamics of both transportation and human settlement. Each group had to research and report on which implementations can be employed by municipalities and government bodies in the pursuit of providing an efficient transport system that is environmentally friendly.

The results were that all the groups used their mobile phones for knowledge transfer. All groups reported that they used text, voice, graphics and video to transfer knowledge between group members. Mobile phone features and services that were widely used include SMS, MMS, voice (voice calling), email, chat services (Mxit) and video calling. All groups used the SMS to send and receive ideas from other group members, especially when they were physically separated. They also used the SMS to send notices and arrange group meetings. Voice calls/ services were used for the same reasons. They called each other to share project ideas and to set up group meetings. Email and chat services also served the same purpose for all groups. The MMS and video was mostly used by the Construction Economics and Management students. They used their mobile phone cameras to take pictures of buildings. That is, each group member would take pictures and present them to other group members for further analysis or simple send them by MMS. Students would also take videos of buildings and send these to their group members or keep them for further analysis. Surprisingly, some individuals had mobile phones with advanced features such as GPS, live TV, and word processing functions. But these features were hardly used for learning purposes.

Case two: multiple uses by selected lecturers/ faculty members in a South African university

Case two consists of eight small cases. Lecturers from a South African university were asked to state whether they received messages on their mobile phones from different organisations. They were also asked to indicate the contents of these messages and how they felt about them. The purpose of the exploratory study was to investigate whether those messages amounted to knowledge or just simple data or information. The cases provide insights into the nature of the messages they receive (whether they are knowledge or information). All the messages received were SMSs.

Lecturer one

Lecturer one was a part-time lecturer and a librarian by profession. She stated that she received messages (SMSs) from students, lecturers, banks, insurance brokers, the South African Revenue Services (SARS), flight companies and the South African Broadcasting Corporation (SABC). Students sent her messages to enquire about how to use electronic databases and perform electronic referencing. She replied by sending back the instructions to students or lecturers by SMS. She also received messages from SARS (South African Revenue Services). The messages were usually about tax related information. Most of the time, she received adverts from insurance brokers, banks, flight companies and service providers (MTN). Messages from insurance companies, banks and service providers were about promotions, updates, competitions and products and services offered by these organizations, most commonly "access to credit up-to R10000" or "reminder to pay credit card".

This respondent indicated that she did not have a problem receiving messages from students, lectures, banks, flight companies, and service providers. She said that she hated calls and messages from insurance companies because, "They don't care where you are or what you do, they keep on calling." Sometimes she used her mobile phone to follow up on some of the messages that she received (she called to get more information using the sources of those messages).

Lecturer two

Lecturer was also a librarian by profession. He stated that, he received messages from banks, employment agencies, furniture shops, service providers, jewellery shops and from unknown sources. The bank usually sent him messages about his loan and bank account balances. Employment agencies also sent him feedback about job applications. Service providers sent him information about the conditions of his mobile phone contract. Lecturer two also received messages from unknown people and organizations. These messages were usually about prizes and business transactions. Some of the messages would indicate that he had won a prize, e.g., "You have won a Range Rover, contact this number to claim your prize." Such messages are annoying to the lecturer because they are unsolicited. Messages from banks and other commercial organizations were informative

to him because they updated him on promotions, sales and other transactions. Lecturer two used his mobile phone to read news on the Internet and acquire bank account balances.

Lecturer three

Lecturer three was a senior lecturer in the department of information studies. Lecturer three said that she received messages from banks, SARS, security messages, and messages from service providers. The messages were usually reminders, advertisements, tax information and warnings. She did not receive unsolicited SMSs and said that she found most of the messages informative.

Lecturer four

Lecturer four was a lecturer at the department of information studies. Lecturer four said that he received messages from insurance companies. These were usually adverts. He said that he got sent at least two messages per week, one every Monday. He did not receive anything from the government and did not use his cell phone to acquire information from any organization. He believes that the messages are unsolicited and extremely annoying. In his words, “These messages are a pain.”

Lecturer five

Lecturer five was a librarian by profession. Lecturer five said that she mainly received messages from the bank (about credit card updates), her service provider (Cell C), and her holiday club. She did not receive any messages from the government. Nor did she use her cell phone to acquire information from these organizations directly because they usually use call centers. Her belief was that the messages received are informative but at times annoying, although she found her holiday club messages informative.

Lecturer six

Lecturer six said that he received information from insurance brokers and service providers. These messages were usually adverts and offers. He stated that they were annoying. He did not use his mobile phone to acquire information from any organizations.

Lecturer seven

Lecturer seven said that he received messages from the church, business associates, children, school, banks, and unsolicited messages from unknown sources. Church messages helped him grow spiritually and motivated him. He also received messages from his children’s school. The messages were about their academic progress and behaviour. Business associates sent him messages about business issues, while the bank sent him account information (balance & transactions). Junk messages fell into the category of promotions. Lecturer 7 said that he found most of the messages informative, but some were irritating, especially unsolicited messages. Lecturer 7 used his mobile phone to request and access information from the bank (account balances) and from the government (tax information).

Lecturer eight

Lecturer eight said that he received messages from the South African Police Service (SAPS) regarding pending traffic fines, status, how and where to pay, and the penalties for non-compliance. He also received messages from SARS regarding tax returns and deadlines for submission and possible help, and the SABC regarding his TV license payment status and instalments. Further messages were received from the bank regarding car loan and house mortgage information and updates as well as credit related information (e.g. reminders of payments due, outstanding payments, and loan availability). Insurance related information (new products and services), car insurance, insurance claims (car, mobile phone, house, personal) and settlements were sent to his mobile phone by his insurance company. He also received messages from veterinary services about pet vaccines and treatment from his vet. Lecturer 8 was also sent messages from service providers about promotions, reminders and competitions. Some of the messages he cited were: "Win 1 million Rand and other great prizes every week with Yebo millionaires [,,,,] get 2 free SMSs every week with Yebo millionaires"; "Pay your outstanding balance by the 28th of August on MTN account to prevent legal actions"; and "Telkom reminder: our records indicate that telephone account number is in areas." Lecturer 8 was of the view that some of the messages are pleasant and some are negative.

Case 3: personal experiences

Case three stems from the author's personal experiences. I also receive a few messages from banks, furniture shops, the SABC and from unknown sources. Messages from the bank are usually about bank account balances and transactions. For example, when the I receive my salary, a message is automatically sent to my phone stating the deposited amount. All bank transaction information, such as deposits, withdrawals, transfers and airtime purchases, are sent to the phone. Messages such as "transaction successful" are common. Messages promoting services and products such as "you qualify for free ASDL data every month!" are also common. I also receive messages from furniture shops, clothing shops, and other shops promoting their products. For example, from a furniture shop, "Win one of 3 Samsung ES 10 digital cameras from Electric express", while another one from a clothing shop read: "Huge sale at Shadows field str!! Get 50% off on selected items". Other business organisations such as MultiChoice send reminders about subscriptions. One message from Multichoice read: "MultiChoice reminder, a/c xxxxxx, R179.53 due 25/08. Visit DStv.com for payment options. Thanks 4 pmt if already done". Messages from SABC are usually about TV licence reminders and confirmation of payments: "Thank you for your payment on television licence.."
See Table 1 for a summary of the results

IMPLICATIONS

The literature and case studies provide evidence that mobile phones can be used not only for communication, but also for information and knowledge management. The three cases show how mobile phones are used in m-commerce, m-government and m-

learning. In m-commerce, mobile phones are used for business transactions such as mobile banking (balance enquiries, airtime purchases, payment of bills, money transfer, etc.), mobile advertising and other business transactions. These transactions are communicated to people through their mobile phones (SMSs or voice). The aim of the study was to determine whether mobile phones can be used for knowledge management (knowledge creation, storage, transfer and application). A careful analysis of the messages led the us to conclude that they cannot be classified as knowledge but as information. Knowledge is "what we know: knowledge involves the mental processes of comprehension, understanding and learning that go on in the mind and only in the mind, however much they involve interaction with the world outside the mind, and interaction with others" (Wilson, 2002, n. p)**.** Information is data endowed with relevance and purpose (Tiwana, 2002**).** This means that mobile phones are mainly used to disseminate, store, and retrieve information. The SMS service is mainly used for information dissemination and the inbox for information storage. The only context in which mobile phones can be deemed to be used for knowledge transfer is in m-learning. Students use mobile phones to exchange ideas and instructions and use other features to analyse and create and store knowledge. In m-learning, students use functions such as SMS, phone calls, MMS, email and chat services, and their inboxes to transfer, create and store knowledge. Other studies (Nakahara et al., 2003; Lindquist et al., 2007; Benta, 2002) have also assessed how mobile phones are used in learning environments. In all these studies, the SMS and MMS services were used to transfer knowledge. Information and knowledge management is mostly practiced at organisational level. A mobile phone, on the other hand, is used for information and knowledge management at individual and group levels.

While the cases and literature suggest that mobile phones are mostly used for information management, there are other features and services that can be used to manage knowledge that are underutilised. Such functions include voice services. The voice is widely used for communication purposes. Voice services include voice mail and the speaker phone. One of South Africa's mobile network providers provide a voice service referred to as 'conference calling' (MTN website). This service allows up to five people to communicate with each other at the same time. Such a service could be used to share tacit knowledge. Voice mail can also be used for knowledge storage and transfer. A sender can leave voice messages (ideas, instructions, etc.) when the recipient is unavailable. The recipient could use this knowledge at a later stage. Another service that is underutilised is the mobile Internet. Instead of using a computer, mobile phone users could use the mobile Internet to create and retrieve knowledge. This would enable them to have access to knowledge anywhere and at anytime. The radio is also another good source of knowledge. It is useful in creating, retrieving and transferring tacit knowledge by providing access to informative programs. Other functions that are underutilised but that could be used for knowledge management include email, and GPS and live TV. The email can be used to transfer much larger amounts of explicit knowledge than SMSs. The GPS can be used to locate sites of special interest and to inform users about an area and its terrain. Like radio, mobile TV can also be used for knowledge creation and transfer purposes. Users would watch informative programs, and in doing so create knowledge.

CONCLUSION

Mobile phones are used in m-commerce, m-learning, m-government, communication, etc., but it is only in m-learning that mobile phones are used to create, store and transfer knowledge. Mobile phones are currently used to create and transfer knowledge at individual and group levels, not at organisational levels. The SMS is a widely used service for both information retrieval and dissemination and for knowledge transfer. The MMS is also used but at minimal level for knowledge creation and transfer, especially in learning environments. Essentially, mobile phones could be used for knowledge management if all their functionalities are known and used. Mobile phones can support all the knowledge management processes (knowledge creation, storage, transfer and use), but most of the features that could support these processes are underutilised by mobile phone users. Functions such as the Internet, voice services, email and GPS could be used in the knowledge management process and thus support knowledge management.

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The Challenges and Opportunities of Records Management at the University of Zululand

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ABSTRACT
Records management is the process of using organizational resources to achieve specific goals through the functions of planning, organizing, leading and controlling records. The aim of this paper is to examine records management opportunities and challenges at the University of Zululand. The paper will outline the significant of records management in the institution of high learning and the different types of management that must be used in managing records. The paper will discuss, through a literature review, findings on the opportunities and challenges of records management facing academic institutions, discuss the gaps noted, and provide recommendations.

Keywords: record, records management, electronic records, paper records, records centre and universitie

1. INTRODUCTION

Records management is the systems that were originally created by hand, but this changed with the introduction of printing and the typewriter, and later computers in the 1950s. What remains consistent from then till now is organizing records properly in a filing system. Records management is a vast department in organizations because it oversees all the organizational information or data that can be used in the future or if/ when the need arises. Records may be stored in different formats; information can be stored manually (paper files) and/or electronically (databases or programs created or used by that particular organization).

The ISO (International Organization for Standardization) 15489 is a standard for records management policies and procedures. The purpose of the standard is to ensure that appropriate attention and protection applies to all records and that the evidence and information they contain can be retrieved effectively and efficiently using standard practices and procedures. Standards help records management possible in organizations by clarifying the purpose and value of the records. There are two elements that affect records management: the transformation of traditional records because of changes in technology, and the legislation related to how businesses should operate and keep their records.

Literature was reviewed according to the study objectives listed below:

- To identify and describe what records centres are and the types found in universities

[18] Nonhle Mtshali is an Honours student in the Department of Information Studies. This paper is based the literature review in her research project.

- To determine who is responsible for records management in universities
- To determine the types of records created by universities
- To explore records management opportunities in universities
- To determine the challenges facing records management in universities

To suggest how to manage universities' records effectively

2. **CONCEPTIONS OF RECORDS MANAGEMENT**

To understand the system and process of records management, certain concepts need to be understood as, they have a critical role to play in the process of managing records effectively. The definitions below help to explain the workings of records management.

2.1 **What is a record?**

According to Azada (2008:103), a record is a file that provides an evidential account of either a whole incident or part of an incident that occurred in the past. A record provides factual information concerning that incident. Robek et al. (1995:4) define a record as recorded information regardless of its medium or characteristics. A record can thus consist of traditional paper documents (manual or traditional paper filing) or electronically stored information (e.g. databases, emails, etc.). These authors emphasize that a record can be any information produced by an organization that can act as a reference of what the organization has done. A record is an important document in an organization because it can be used for future reference.

2.2 **What are records centres?**

According to Kemon (1998: 55) "records centre is a low cost storage facilities housing semi-active and non-active records of the organizations." He further sate that can be also a building designed and constructed for maintenance and communication of current and semi-current records, pending their disposition. He further argued that records centre is a temporally storage for a records before they are transferred to national archives.

A records centre can also be a place where all records' processes take place in the organization, and this may include the records' lifecycle as stated in the records manual. For a record to be managed effectively, it needs to be classified then stored in a good environment.

Service rendered by records centre (stated by Kemon: 1998:57)

- Interpretation and implementation of the public Archives
- Planning and coordination of records management programmes
- To survey and appraisal of non current records
- Conducting records management seminars for heads of departments and officers in charge of registry.
- Process of new accessions

- Provision of reference services to government officials amd members of the public
- Disposition of non current records
- Disposition of advice to records creating agencies on roper records management practices.

The classification of records, according to the business directory (2000:n.p.), is defined as the process where the records are identified and categorized for filing on the basis of their subject matter and subject category before being assigned a file number for efficient retrieval. According to Read and Ginn (2007:6-7) there are three types of classification. There is classification by type of use that is created manually or electronically and can use the organizational Internet. They also include reference documents that contain information necessary to carry on the operations of the organization over a long period of time. This includes previous decisions, quotations on items to purchase, and the organization's equipment. The second type of classification is by place of use, and this includes the external and internal records of the organization. Internal records contain information needed to operate an organization and these records are created inside the organization. These records are created through e-commerce systems, which more often than not use databases and server applications. The last type of classification is classification by the value of the records to the organization, where for example the manager of the organization determines the value of the records to the organization. This includes the development of a records retention schedule which determines how long to keep a record in the organization. The basic overview of the classification of records by these two authors clearly indicates that for records to be stored in the organization there are elements that need to be checked first in order for the records to be stored in the right place. This needs to be done to ensure that order is maintained in the records department, for example finance records need to have their own shelves or columns so that they can be easily accessed when necessary. In the electronic format, records need to be organized by creating folders and subcategories under different departments.

2.3 **What is records management?**

Read and Ginn (2007:4) define management as the process of using organizational resources to achieve specific goals through the functions of planning, organizing, leading and controlling, as information is an important and valuable business resource. They further emphasize that in order for the business to survive, organizations must have up to date information that is in the right form and at the right place in order for management decisions to be effective.

Records management, as defined by ARMA International (an association for information management professionals), is stored information, regardless of media or

characteristics, made or received by the organization that is evidence of its operations and has value that requires its retention for a specific period of time. ARMA also state that it can be information created, received or maintained as evidence or information kept by the organization for legal protection.

ARMA further emphasizes that records management is the systematic control of all records from their creation or receipt through to the methods of processing, distributing, organizing, storing and retrieving them. Because information is also an important aspect in organizations, records management also includes information management. Records management is also known as records and information management (RIM). Robek et al. (1995:8) state that records management is the application of systematic and scientific controls to the recorded information required in the operation of an organization. Adding onto what ARMA state, records management is where all organizational files are stored and managed effectively so that the organizational information is under control. The RM department determines the records' cycle, i.e. where records have to be in the circulation stage, when they will be disposed, and when and where they should be returned if they were in use. The researcher need add here that for manual records, each organization must have an office with enough space for the storage of organizational files, or an archival centre for records.

2.4 **The relationship between records, records centres and records management**

These three terms are interwoven. A record is the file that needs to be stored in the records centre responsible for the filing system. The management process includes the creation, retention, disposal, etc., of records; the main task of records management is to guide the records operation.

3. **RECORDS MANAGEMENT AND UNIVERSITIES**

In universities, a lot of records are produced because there are a number of different departments that each produces their own records. All academics, administrations and supporting staff also produce records. Harvard University thus states that records management services provide professional guidance and assistance to the university community on a wide range of records management issues.
There are numerous types of records that are found in the university organization which vary according to the department. For example, financial records are produced by the finance department, academic records are produced by all the departments, admission records are produced by the administrative department, supporting staff records are produced by the housing department, and much more. In actual fact, every department that is recognized in the academic institution produces its own records.

3.1. **The types of records created by universities (paper vs. electronic records)**

As stated earlier, two types of records can be produced by an organization, i.e. electronic records and/or paper records (traditional records). Paper records, as stated by Waegemann (1983n.p), are a type of records that take place using filling system. There

are three methods used in paper records management to determine the retention period, the first being periodic activities. These are the records that are most frequently requested by the organization. Lastly is the case activity, whereby filing covers a wide range of equipment and documents are arranged like books on shelves with the side edge facing the person looking at it. Shelving is the most economical and efficient form as it can be done by individual tiers that can be arranged in sections. Industrial shelving is commonly used for economic storage applications. Literal shelving saves space when compared to drawer files (Waegemann, 1983). In manual storage, record paper is used to create records of the organization which are then stored in a filing system. With this form of storage, problems arise in terms of the way of protecting them or in terms of disaster management, such as what would happen to the records in the case of a flood.

According to Read and Ginn (2007:12-1), an electronic record is a record that is stored on electronic media that can be readily accessed or changed. There are certain requirements necessary to view electronically stored records. Kelvin (2007:21) defines electronic records as created records, housed or transmitted by electronic rather that physical means, and that satisfy the definition of a record. A record may consist of one or more objects, e.g. web page, file folder, e-mail or word document. Kelvin argues that there must be an electronic records management system that can manage electronic records throughout their lifecycle from creation and capture to their disposal or permanent retention that retains their integrity and authenticity while ensuring that they remain accessible. Systems in place include electronic document management, electronic document and records management, and enterprise content management. Robek et al. (1995:202) explains that electronic records can be documents that contain machine readable information. Read and Ginn (2007), Kelvin (2007) and Robek et al. (1995) all concur that an electronic record is a record or information that is stored electronically, meaning that all records that are created using a computer are electronic records. As most organizations now use computers, it would seem as though electronic records are ultimately going to dominate when it comes to how records are created. For example during registration, university students have to fill in all their details in manual form first in order for the details to be stored on the university's database. Electronic systems allow for records to be preserved in a backup system, unlike manual records which are susceptible to loss during natural disasters.

3.2. **Who is responsible for their management?**

Most universities have a records management department (registry) that deals with the overall management of records; although each and every department in universities produces and has its own records, all records ultimately have to be stored in one place. A records manager may be responsible for overseeing the operation of the records, which includes the records' lifecycle (retention, disposal, etc.).

University of South Africa's (Unisa) website outlines the following responsibilities of a records manager.

- Implementation, management and maintenance of the procedures corresponding to the organizational policy and associated records management policies and procedures
- Assist in the correct identification, classification, retention, access, destruction and use of records
- Co-ordinate the implementation of the records management initiative within the organization and records management training
- Manage an annual records management budget
- Review and update the file plan to reflect any changes in organizational functioning areas and activities
- Review any requests for file plan updates as submitted by employees through the system change request form
- Update the master copy of the file plan on a monthly basis. The master copy contains all approved subjects and indicates how files are opened
- Regularly update and maintain the retention schedules to reflect any changes in legal and operational retention requirements
- Provide proper care and storage for inactive records on and off site
- Regulate the transfer of inactive records to the records management centre
- Promote the regular inspection of records and monitor compliance with this policy
- Implement measures to ensure the security and protection of records
- Train employees with respect to records management procedures

4. **ELECTRONIC RECORDS MANAGEMENT**

As stated above by Ginn (2007), Kelvin (2007) and Robek et al. (1995), electronic records include all information or records that are created using a computer. Because of safety issues (fraud and theft), new procedures for retrieving electronic records have been developed. Under electronic records, there is electronic mail (e-mail) which is the system that enables users to compose, transmit, receive and manage electronic documents and images across networks. E-mail has become an extremely popular communication tool because it is quick and easy to use. The increase in the number of e-mail records in organizations requires a lot of improvement in terms of storage capacity. Some organizations are in the process of changing paper records to electronic records by using document imaging and scanning, storing and retrieving paper records.

The critical issue behind electronic records management pertains to legal practice, i.e. the privacy of the data stored, because the use of information on the Internet is virtually uncontrollable and private information needs to be protected and preserved. The law on electronic technologies and the Internet is still unsettled when it comes to organizations that are using e-records. The use of the Internet and computer networks presents a lot of opportunities for criminals as there are various viruses that can destroy data and overload servers. Viruses can also hijack computers and attack other computers

or networks to sabotage them and steal information. Sampson (2002:201) stated that some organizations are hiring data protection officers to implement and enforce regulations and policies on stored data and the manner in which data flows in and out of the organization. Sampson also noted that the issue of litigation remains a risk in electronic records and the email system.

5. **OPPORTUNITIES INVOLVING RECORDS MANAGEMENT**

According to Hughes (2003), since the launch of ISO-15489, there have been more opportunities available to the records management department to help staff and students align themselves with the strategic direction of their institution, raise their profile, and increase the general awareness of their role. He emphasizes that this is particularly true in all organizations where key drivers are increased market share and greater competitive advantage. He indicated that the skill sets originally developed for knowledge managers have resonance for records managers to aid their personal development and as a tool for the strategic development of records management programs. He includes an example of this as the marketing of records management services, which is a critical opportunity to increase awareness and build profiles, and assist with records management education and adoption. He said that by viewing the records management function as a business serving internal clients, the records manager has a great opportunity to sell those services to clients.

What follows is a list of the records management jobs on offer in a number of organizations:

- Records supervisor - direct the work of several records clerk specialists, responsible for operating the records center, supervising the design and use of business forms and directing the creation and use of microfilm records
- Records center supervisor (record analyst)
- Micrographic service supervisor (micrographic technician)
- Reports supervisor (records clerk)
- Operation level, which includes those workers responsible for routine filing and retrieval tasks and assisting with vital records and records retention work

6. **CHALLENGES OF RECORDS MANAGEMENT**

The first and the most important challenge in records management is that of technology; the rapid growth of technology used worldwide has caused a drastic change in the way in which things are done in organizations. Electronic records management came about because of the increased use of technology in the global information society. The challenge is that this technology requires proper skills sets and supporting systems in order to work effectively. The organization would have to spend a lot of funds on supporting and purchasing all the necessary programs, the training of the staff in the

records department, and also the scanning of existing manual records to electronic format.

The cultural challenge, as stated by Kampffmeyer (2008:n.p.) The records management landscape is now changing because of the interaction of various social communities, digital immigrants and digital natives, new ways of communication and interaction, and rights management and data protection issues The last challenge is the issue of information growth in the era in which we live; there is an incredible amount of information that needs to be documented and managed. The bits and bytes of information mustn't reach the point of uncontrolled redundancy. Identifying the value of information and the growing dependency on the availability and accuracy of information requires the proper preservation of this information, meaning that records management needs to address the lifecycle of records.

7. **IMPLICATIONS AND WAY FORWARD**

Records management in the next decade will grow because organizations are realizing the importance of keeping records. Records management in the future will be in demand, meaning that there will be requests for professionals who specialise in records management. By all appearances, the use of manual records by organizations is losing momentum because of the electronic system. Most organizations are turning to electronic records management because it is easy to use and saves time. Some organizations don't understand how records are managed and what type of information in the organization can constitute a record. In future, it is likely that such organizations will bring in a records specialist or professional to conduct workshops on the management of records in their organization.

8**. CONCLUSION**

Records contain vital information about the organization that needs to be kept and protected for future reference. Records can be managed either manually or electronically. Manual management is when records are stored in paper files and shelved. Electronic management is where records are created and stored electronically using a computer system. Most organizations are turning to using electronic records management because of the rapid growth in the number of records produced. Records in most organizations are produced on a daily basis and are all important so they need to be preserved. Each organization may draft its own records management policy that can be used internally for the purposes of determining retention, disposal, etc., of the records. The lack of professional managers of records in organizations may result in the poor management of records.

9. **RECOMMENDATIONS**

- There must be a degree, diploma or certificate specifically for records management; records management should not be confined to modules only.

- Every organization must have a records management department in which all records are stored.

- Backup for electronic records needs to be done by those organizations that use electronic methods.

- Each organization must have an archive to manually store records that are no longer used and haven't reached the disposal stage.

- When records management jobs are advertised, one of the requirements should be a degree or diploma, and not just matric and computer experience.

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Some Realities of Web Information Seeking Behaviour among Students and Academic Staff: A Case Study Of the University Of Zululand and the Durban University of Technology

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ABSTRACT

Today's online experience has literally added a new dimension to our information seeking activities, presenting users with a vast array of options. A considerable amount of information has migrated from the print world and is now available electronically. Thus a lot of people immediately associate the World Wide Web (WWW) with information and its related activities. This association partly prompted this study on the web information seeking behavior of students and staff at the (rural-based) University of Zululand and the (urban-based) Durban University of Technology. The selected institutions were assumed to be at different levels of development because of the country's history and the institutions' locations. Both quantitative and qualitative research methodologies were employed in a survey. The main research instrument was a questionnaire, supported by limited interviews. The results show that the web is a platform that people in academia have come to rely on, although only a few of its many channels are used significantly. A number of challenges were identified, chief among them being connectivity problems. Bandwidth was particularly problematic and made worse by the two institutions' large student populations. Relevant infrastructure (computer laboratories, computers, etc.) seemed available, although inadequate. The study recommends comprehensive training programs that address the skills' deficiencies noted. It is also necessary to institute mechanisms that improve both physical and intellectual access to web resources.

Keywords: Web information seeking, online information seeking, higher education, information seeking behavior, information seeking trends

INTRODUCTION

Today, the Internet and WWW are positioned as one of the main sources of information for students and staff alike, which is why web searching has become one of

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the most active information tasks in higher education. Kari and Savolainen (2001:5) explain that the skills necessary to search for and find information are fundamental because there is often a wide selection of potentially relevant information sources on the web. Technological reforms are also matters of great importance in education as they affect the information seeking habits of its patrons, and the Internet and web are one of the latest reforms to impact on education**.**

Understanding users' information seeking behaviour has always interested information science professionals. This understanding is crucial in attempts to provide better services to users and improve the design of information systems. According to Cutrell and Guan (2007:2), "Understanding how users search for information on the web has enormous practical implications for both commercial and academic endeavours." Allen (1997:111) also observes that understanding the information needs of users is the first and most indispensable step in designing and building effective information systems. Fourie (2002:62) suggests that substantial web information seeking/searching studies are necessary to refine our knowledge of web information spaces, their design and maintenance, and training-related issues. In the emerging electronic environment, knowledge about the information seeking behaviour of students and staff on the web is crucial for those wishing to help them effectively meet their information needs online. In this study, we hope to add to existing knowledge by revealing how students and faculty members currently use the Internet or web to aid them in their studies, research and teaching in Higher Education Institutions (HEIs). We believe that the study adds value to existing knowledge for the development of quality web services, thus placing institutions in a better position to respond appropriately with technology, information content and services that maximize the web as an information seeking platform.

PURPOSE OF THE STUDY

The aim of the study was to examine the web information seeking strategies of students and staff in two academic institutions in order to understand the human and behavioural processes through which web information is enacted or engaged (sought). Furthermore, the study sought to determine whether there are any differences or similarities in the web information seeking behaviour of students and staff in universities of technology, which offer practically-oriented diplomas and degrees in technical fields, and students and staff in comprehensive universities, which offer both theoretically-oriented degrees and practically-oriented diplomas and degrees. The study addressed the following research questions: What are the web information needs of students and staff in institutions of higher learning? How, when and where is web information sought? What are the channels used when searching the web for information? What are the challenges faced by students and staff when searching the web for information? How and to what extent has the web affected the information seeking behaviour or habits of students and staff in institutions of higher learning?

METHODOLOGY

Surveys are popular research designs in information seeking studies (Best and Kahn, 2006:271). Both qualitative and quantitative phenomena can be explored in a single survey study through the use of mixed methods or triangulation, as noted in a recent study by Ndwandwe, Mokwatlo and Ngulube (2009). Surveys also enable one to obtain many views on a phenomenon and to generalise these views/ results onto a larger population. The data collection tools in this instance consisted of questionnaires, interviews and general observation. The target population of this study consisted of students and academic staff from two institutions, i.e. the University of Zululand and the Durban University of Technology. Of 8613 students from the University of Zululand, 103 were sampled for questionnaire responses and 84 (82 %) responded. Ten students were sampled for interviews and all 10 (100%) responded. The Durban University of Technology had 21316 registered students; 256 were sampled for questionnaire responses (139 or 54 % responded) while 15 were sampled for the interviews (8 or 53 % responded). UZ had 281 members of staff; 11 were sampled for the questionnaires (9 or 82 % responded) while 6 were sampled for interviews (5 or 83 %) responded. At the DUT, we targeted 595 academic staff; 24 were sampled for the questionnaires (14 or 58 % responded) while 12 were sampled for interviews (4 or 33 % responded).

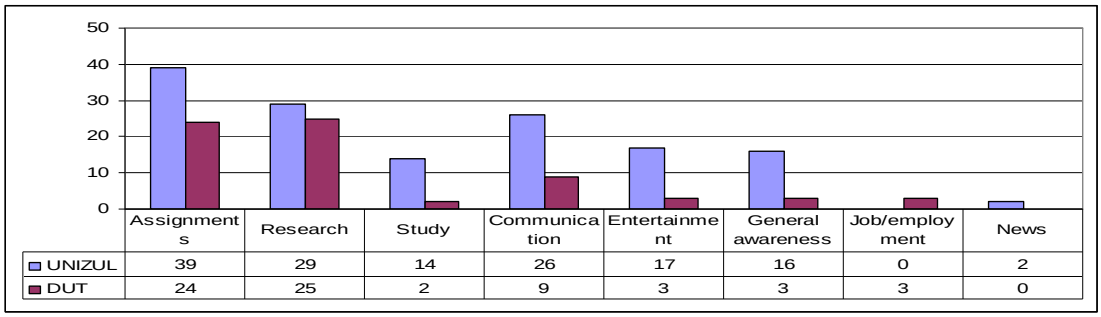
Several problems were encountered during the course of this study. Often with research that involves institutions of higher learning, problems of access are bound to occur and complicate matters. We had to wait for authorization in order to conduct the study at DUT, and this delayed the commencement of data collection. Interaction with some respondents in an outside institution like DUT also proved difficult because some individuals were openly hostile. During data collection, it was difficult to access certain elements of the sample; particularly the postgraduates at DUT (as already pointed out, most of their postgraduate students, e.g. BTech and MTech, are also working and only come to college in the evening). The collection of data at the DUT coincided with the university's exams, and for this reason, students and staff were busy and could not respond sufficiently to the interviews. A critical problem arising from not having enough time and resources was that we could not get a sample of optimum size, as was the case in students' interview responses at DUT.

RESULTS AND DISCUSSIONS

The results and discussions are organised by the research questions in Section 3. The research questions were addressed by reviewing literature and analyzing empirical (survey) data. Specifically, Questions 1, 4 and 5 were addressed by analyzing empirical data, while Questions 2 and 3 were addressed by reviewing literature and analyzing empirical data

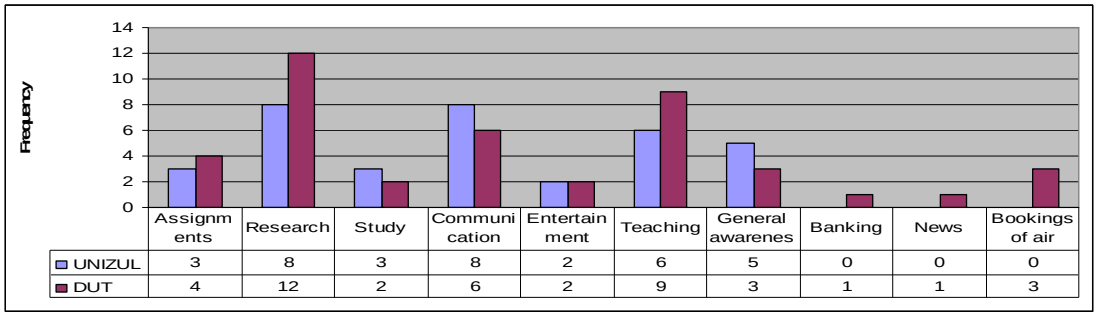
What are the web information needs of students and staff in institutions of higher learning?

The information needs that students and staff wish to fulfill online, as revealed in the findings, are multifarious, which explains the popularity of the topic (students' and academics' information needs) in the Library and Information Science field (Ocholla, 1999; Fidzani, 1998; Bates, 1996). Generally, the use of the Internet by students and staff has grown. The typical information seeker in a university setup uses the Internet and the web for all thinkable reasons, ranging from scholarly work to communication and entertainment. Information needs can generally be grouped into three major categories, i.e. study or research, work or teaching, and communication and entertainment. Academic orientation does not appear to affect web information needs, as the needs of the respondents from Unizul and DUT coincided. While the needs of students and academics overlap, they also differ; the information the student respondents searched for online mainly related to their studies, research, communication and entertainment, while work (teaching), research, communication and general awareness were the dominant needs expressed by staff.



	Assignments	Research	Study	Communication	Entertainment	General awareness	Job/employment	News
UNIZUL	39	29	14	26	17	16	0	2
DUT	24	25	2	9	3	3	3	0

Fig 1: Students' reasons for searching the web



	Assignments	Research	Study	Communication	Entertainment	Teaching	General awarenes	Banking	News	Bookings of air
UNIZUL	3	8	3	8	2	6	5	0	0	0
DUT	4	12	2	6	2	9	3	1	1	3

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Fig 2: Staff members' reasons for searching for information on the web

Commercial activities such as banking were uncommon, although the online booking of airlines and hotels by members of staff appeared to be on the rise. This, together with entertainment, signifies the growing social role of the Internet. Students

affirmed their reliance on the web for both study and entertainment-related purposes, which certainly indicates that the web is now more than just an academic or educational tool. This trend was confirmed by Huang et al. (2007:n.p), who wrote: "The web can act as an instrument of communication, education, business, entertainment, finance, staying informed, passing time, relaxing, escape, socialization, work, surveillance, etc."

The growing number of activities that students and staff now engage in online perhaps indicates the medium's growing acceptance in academia. This, together with increased home access, means that more activities can be performed with better success. The governance and control of use and access, however, has tended to limit activities in most institutions to academic-related functions only. Commonly, institutions filter information or try to limit respondents' online movements to ensure that they only engage in scholarly activities. Therefore popular social websites and programmes such as Facebook, Skype and Google chats are blocked amid considerable protests from students. We believe that instead of ignoring these channels, institutions should identify their strengths and use them for academic purposes. Over the past few years information transfer, particularly in the case of the youth, has evolved from websites, email and chat rooms, to blogs, Skype and discussion forums; presently, social websites (Facebook, You Tube) are the most popular channels. Progressive institutions tend to be proactive and desist from sticking to traditional service methods or models while ignoring trends that have proliferated across all spheres of life and changed how people search for and handle information. Because of the multiplicity of channels, any channel information service providers may choose will only ever reach a fraction of the population they intend to serve. It is therefore imperative that service providers reach out to more users by using as many avenues as possible. More progressive educational institutions have started using mobile supported learning, having noticed the increased use of mobile technologies by students. Molotech (2007:n.p) points to the Meraka Institute in South Africa which aims to explore these opportunities within the field of youth education both in and out of schools, and reports that there has been keen interest in the project from the educational sector. The idea has been successfully piloted three times in South African schools; the first two involved basic mobile phones and the Audiowiki, which was first seeded with content relevant to the pilots. The third pilot looked at the use of more advanced mobile phones with multimedia capabilities. Matthee and Liebenberg (2007:n.p) also report on the use of Mixit for teaching mathematics in some Eastern Cape schools in South Africa.

The Internet revolution together with electronic publishing is therefore transforming the way students and scholars communicate and search for information. Consistent with current trends in online behaviour, the results illustrate that the use of the Internet is generally increasing as more and more people become web literate. On average, most people can now use a wide variety of web information sources or channels.

How, when and where is web information sought?

Both institutions were found to provide respondents (students and staff) with physical access to the Internet. Registered students presently access the Internet/ web mainly through university facilities (e.g. computer and departmental laboratories,

libraries, etc.), while staff members have access through workstations with Internet access. Generally, the status of access is remarkably high.

However, there are numerous challenges that hinder effective access, such as ballooning student populations, restrictive opening hours, and erratic Internet connection speeds (bandwidth). Consequently, the effective use of the web is not achieved because the provision of online information presupposes the existence and access to appropriate ICT infrastructure. Arguably, academic institutions with a strong ICT infrastructural background would take the lead in the uptake of web information services. During fieldwork observation, we noticed that while the status of infrastructure at Unizul and DUT appeared to be almost at the same level (no correlation of infrastructure per student/ staff member was obtained), students and academics at DUT seemed better off in terms of the ICT resources availed to them. Of course, this could stem from South Africa's historical imbalances - Natal Technikon, which was adequately resourced, merged with Sultan Technikon, which was inadequately resourced, to form the current, urban-based Durban University of Technology. Thus, DUT had a stronger foundation than Unizul, particularly after the merger of the two. Amazingly, the general tone when interviewing students concerning the provision of access was that it is poor at both institutions. The number of facilities available at DUT generally serves a much greater population of students and staff, suggesting that even while DUT may be better resourced, its large student population tends to make it impossible to cope with infrastructural needs, therefore creating another level of poverty. Conversely, although itself large, most of the student population at Unizul resides on campus, which gives them the opportunity to juggle their time and access the Internet facilities at odd times, such as late at night. In fact, it appears as though the DUT has more access problems than the University of Zululand, which battles more with connectivity, suggesting that a university that is predominantly residential with standard/ normal resources is likely to provide better web access, particularly where Internet access in domestic environments is poor. Generally, historically advantaged and urban institutions have access to better ICT infrastructure. However, it is noted that good infrastructure must be supported by manageable student enrolment.

From these results, we argue that in today's South African educational environment, the role of ICT in information seeking is profound. In terms of awareness and the use of ICTs, the two institutions look to be more or less at the same level. Almost a matching range of all the ICTs (methods of Internet access and Internet connection types) available at DUT were also available at Unizul see Tables 1, 2, 3 & 4 below.

Tables 1: How students access the Internet

How access to the Internet is obtained	**Unizul N=75**	**DUT N=133**
Wired office terminal	10 (13%)	20 (15%)
Wired computer laboratory	46 (61%)	94 (70%)
Wired home PC	2 (3%)	5 (4%)
Wired dormitory PC	-	1 (1%)
Wired both home PC & office PC	2 (3%)	-
Wired office & wired computer laboratory	6 (8%)	-
Wired computer laboratory, wired home	1 (1%)	3 (2%)
Wireless computer laboratory	-	8 (6%)
Wireless dormitory	-	1 (1%)
Wireless office	1 (1%)	1 (1%)
Cell phone	1 (1%)	-

Table 2: How staff members access the Internet

How access to the Internet is obtained	**Unizul N=7**	**DUT N=14**
Wired office terminal	5 (71%)	5 (36%)
Wired computer laboratory	-	4 (29%)
Wired home PC	-	1 (7%)
Wired home PC & office PC	2 (29%)	4 (29%)

Table 3: Internet connection types used by students

Internet connection types	**Unizul N=71**	**DUT N=133**
Dial up/ regular modem	9 (13%)	5 (4%)
DSL (Digital subscriber Line)	1 (1%)	-
ADSL (Asynchronous Digital Subscriber Line)	-	4 (3%)
Cable Modem Connection	11 (15%)	4 (3%)
Wireless	2 (3%)	-
I don't know	45 (63%)	117 (88%)
Dial up, cable, wireless	1 (1%)	-
Dial up & cable	1 (1%)	-
ISDN (Integrated Services Digital Network)	-	1 (1%)
Institutional line	-	1 (1%)
Dial up, wireless	2 (3%)	-

Table 4: Internet connection types used by staff

Internet connection types	**Unizul N=11**	**DUT N=16**
Dial up/ regular modem	2 (18%)	-
DSL (Digital subscriber Line)	-	-
ADSL (Asynchronous Digital Subscriber Line)	1 (9%)	3 (19%)
Cable Modem Connection	3 (27%)	6 (38%)

Wireless	1 (9%)	-
ISDN (Integrated Services Digital Network)	1 (9%)	1 (6%)
I don't know	2 (18%)	5 (31%)
Institutional line	-	1(6%)

Both universities were dominated by wired access to the Internet (access was provided via cable modem); most of the respondents were still unaware of the technicalities of Internet access. Although a moderately wide range of access options exist, only a few are used by both students and staff. Satisfaction with the access and connection types is also moderate.

In comparison to other countries in Africa, the educational ICT landscape in South Africa is healthy and the institutions are well resourced. The Council of Higher Education (2007:4) went as far as to state that: "Computers have become a ubiquitous feature of South African universities." The ICT infrastructure at both institutions was found to be of reasonably high quality. However, while it is appreciated that basic facilities such as computers and computer laboratories are 'ubiquitous', connectivity or actual access to the web is still inadequate. With respect to the latter, the main problem stems more from connectivity (bandwidth) and less from physical access - a hurdle that institutions have seemingly subjugated. Physical access, at least as the status of infrastructure reports, is fairly high, while connectivity is generally poor. This highlights a trend that is common to most developing countries, i.e**.:** "A tendency to overlook other logistics in favour of hard and software in the wrong assumption that integrating ICT in development means precisely installation '[sic]' of computers and networks full stop. End product. The right approach now is to invest in connectivity without losing sight of other salient factors supportive to the transfer of technology**"** (Mohamed, 2006:10).

Moving onto media preferences, research into the impact of media trends on information seeking behavior allows one to draw from a large pool of studies in LIS literature (Bilal, 2000; Dresang, 2005; Ocholla 1999; Siatri 1998; Marchionini, 1997). Generally, media trends have had a huge impact on academic institutions.

Most respondents' preferred medium when searching for information was the hybrid combination of electronic and print media. There were no outright differences in the media preferences of students and academics from a university of technology or a traditional comprehensive university, suggesting that one's academic dispensation does not play an influential role on one's choice of an information medium. While both print and electronic sources remain the most favoured medium by academics, electronic or web resources were also popular. Web popularity is mainly a result of the ease of use associated with search engines, channels most users visit when online. Respondents'

comments were in the vein of, "You just log on to Google and you are done.**"** The relatively low placement of electronic media by students from both institutions is inconsistent with results from similar studies (Mgobozi and Ocholla, 2002; Harley et al., 2006; Miller, 2000). In most of these studies, electronic sources were rated highly. It is quite likely, particularly in the case of students, that the low rating was influenced by retrieval difficulties (mainly due to low bandwidth or poor connectivity). Students, unlike staff members, are also more likely to use the library in search of recommended books and articles for their courses, while staff members generally prefer material to be availed to them in their offices and thus seldom make trips or visits to the library. The interviews with both students and staff, however, painted a slightly different picture. While the combination of electronic and print media still recorded the highest preference, the sole use of electronic media was elevated above the sole use of print media. Notably, electronic media was not favoured by some because it is regarded as transient - here today, gone tomorrow - while its incorporation of multimedia and its currency were generally cited as advantages. Print media is thought of as reliable and authoritative, albeit that it is often out of date. This perhaps explains why the respondents opted for the balanced use of both print and electronic media.

That said, the shift in preferences from print to electronic information sources has many implications for academic institutions, especially the facilities responsible for information provision (i.e. libraries and information centres). They are not only expected to integrate new formats with traditional ones, but also review their collection development policies and balance resource allocation to suit what users want. It should be reiterated that the use of traditional print-based information sources is still relevant and important in spite of the growth of digital media. Most respondents from the two institutions cited the unreliability of going 'totally digital' given the lacklustre nature of Internet infrastructure and connectivity. It is as though the respondents were suggesting that one is better off with print sources than with nothing at all. Increasingly, as the findings suggest, students and staff will go online when they require information even though critical factors still limit effective use.

To a lesser extent, the study also reaffirms assertions by earlier scholars (e.g. Nicholas et al., 2000:98) that the Internet has become the information world's primary obsession. However this obsession has not gone unchecked given the Internet's relatively measured use. It must also be stated that factors that have checked this headlong thrust towards going online or solely using electronic sources are fortuitous and unplanned by both institutions. Students stated that were it not for retrieval difficulties or poor bandwidth, they would rely more on electronic material.

By all appearances, there seems to be little difference in how students and staff from a comprehensive university and those from a university of technology search for information on the web. For the most part, both students and staff opted to search the web independently and with no assistance. Assistance with help from colleagues was the second most frequently cited measure when searching the web. The respondents

suggested that they did not follow a predetermined pattern or set of steps, but rather meandered from one step to next.

While there was no clear pattern emanating from the results, it appears as though the factors that affect how one would search for information online play an important role. For instance, staff members from both institutions were generally more knowledgeable about the web than students and tended to use more Boolean logic and more evaluative techniques. Although this may not indicate much because of the minor differences (see Table 5 below), it does suggest that their knowledge and web experience could be a mitigating factor. To a lesser extent, DUT students appeared to have an edge over their counterparts at Unizul in terms of search processes and how they are done - a likely indicator of how their urban background puts them at an advantage.

Table 5: **How often users perform information seeking steps**

Step	**Frequency by institution**							
	Very often		**Often**		**Seldom**		**Never**	
	Unizul	**DUT**	**Unizul**	**DUT**	**Unizul**	**DUT**	**Unizul**	**DUT**
Identify a need	29;48%	41;46	25;41%	41;46%	5;8%	4;4%	2;3%	3;3%
Choose a channel	25;41%	35;40	24;39%	45;51%	8;13%	5;6%	4;7%	3;3%
Define search query	22;37%	24;30	13;21%	36;44%	16;27%	14;17%	9;15%	7;9%
Combine terms using natural language	14;23%	24;30	23;39%	26;32%	8;13%	19;23%	14;23%	12;15%
Combine terms using controlled vocabulary	17;30%	13;16	14;24%	21;26%	13;22%	27;33%	14;24%	21;26%
Evaluate results	21;34%	22;28	19;31%	33;42%	12;20%	16;20%	9;15%	8;10%
Synthesize & use information	21;36%	21;2%	21;36%	34;44%	7;12%	12;15%	9;16%	6;8%
Redo the steps again	16;28%	20;25	16;28%	3241%	13;23%	11;14%	12;21%	14;18%

Attempts to model what exact steps information seekers take when gathering information from an information system are numerous in literature. Researchers agree that the steps taken by users differ and are dependent on a number of factors, such as experience, knowledge and information needs (Marchionini, 1989; Hsieh-Yee, 2001). Hansen and Karlgren (in Hansen, 1998:n.p) are of the opinion that: “The users' information needs, knowledge, experience and goals may vary and influence the

information seeking process within information retrieval (IR) systems, and need to be identified and supported in the user interface design, especially when offered via the WWW." Sridhar (1984:5), in turn, suggests that: "The three clusters of factors which affect user's utilisation of information are psychological factors, effectiveness of available services and characteristics of the user and his environment."

The findings of this study concur with observations by the Research Information Network Consultative Group on Librarianship and Information Science (n.d:n.p), which surmises that web searching does not follow the "neat stepwise progression from a state of unknowing ("information need") to one of knowing". The results dispute the thinking that information seeking is a tiered process with users moving from one logical step to next. Perhaps what this serves to confirm is that there are multiple and diverse ways to reach meaningful results.

What are the channels used when searching the web for information?

Overall, a high level of familiarity with various web channels was indicated, although use was mainly concentrated on a few channels. The most popular channel by far in the students' case was search engines, followed by email and general websites. In the case of staff, search engines and online databases were very popular channels. The high level of familiarity shown is indicative of the growing use of the Internet and web services in the educational environment. Online information seeking is proliferating in unprecedented ways, as most of the respondents had supposedly encountered all or most of the eight web information channels cited. Low use was probably recorded for channels that have to be paid for or specialized services (e.g. document delivery services). The only channel some respondents claimed they did not know about was subject portals, and this was mainly because of poor marketing by the libraries at the respective institutions. Students were interested in finding out more about the various web information channels, particularly online databases. Arguably, this indicates that students understand the value of databases in research. It could also stem from incessant calls by members of staff on students to use more scholarly information.

The institutional differences between Unizul and DUT in terms of academic orientation and historical background played no significant role in the students' and staff members' levels of familiarity with web information channels, particularly in the questionnaire responses. Although there was no marked difference in the interviews, the impression was that students from DUT were more familiar and comfortable with various web information channels than their counterparts from Unizul. Again, this can be attributed to a greater familiarity with the Internet and the web owing to their urban educational upbringing.

One of the often mentioned advantages of the web has been its ability to present a wide variety and diversity of information. This obviously suits students and academics that have at their disposal a diverse range of information choices for their studies, research and work. The results confirm this assertion. Respondents reported that one of

the reasons they used the web was because it collates all the online channels through which they can access information. This is concurred in Koneru's (nd:1) observation, i.e.: "Proliferation of information in varying formats and amounts made the contemporary era 'information intensive' with manifold choices to information access and retrieval."

Literature reviewed for this study shows that students and staff use many different channels and their choices are motivated by a variety of factors. The results show no significant deviation from earlier studies by Mugwisi (2002) and Tenopir (2003), which report that emails, search engines and general websites are heavily relied on. The younger generation, mostly students, showed that they were comfortable and familiar with the various media and technology, asserting the findings by Radom (n.d:n.p) that younger users find it much easier to use the web. The ease of use of some channels (e.g. search engines) was a motivation for many, while for others the comprehensiveness and authoritativeness of the content (of specific channels, e.g. online databases) was the primary motivation.

The frequency with which a channel was used revealed a lot about the channel itself and the user in particular. Respondents appeared selective about the channels they opted for. For example, staff members stated unequivocally that they generally did not use discussion lists and newsgroups. This tells us a lot about the channel; for example discussion lists contain information that is 'newsy', and academics consider this kind of information to be subversive to research. This suggests that the use of channels depends on what the channel is built for and how its contents meet the needs of the user. Upon evaluation, most respondents opted for channels that satisfied their immediate needs. For example, although online databases are more authoritative for research, many students said they would rather use search engines. This brings to the fore questions about the usability of the channel, ease of use, and assumed benefits when deciding what channel to use.

WHAT ARE THE CHALLENGES FACED BY STUDENTS AND STAFF WHEN SEARCHING FOR INFORMATION ON THE WEB?

Various challenges were identified in the two institutions. Although these took on many shapes, they seemed to revolve around the central question of how to provide adequate support for the information seeking process.

Regarding web searching skills, most of the students claimed that they could effectively search the web. However, these claims did not transfer to meaningful results in class, with lecturers arguing that they (the students) were not, in fact, very competent users of the web. There are many skills-related challenges that students and staff face when searching for information online. In various questions regarding skills, positive responses at DUT were consistently higher than those at Unizul, although by a very small

margin (e.g. possession of Net skills by both students and staff, receipt of formal web training by both students and staff, usefulness of training received by students and staff, etc.). This would suggest that there are more skilled web users at DUT than at Unizul. These findings are consistent with earlier findings that suggest that there are slightly more web information seeking skills at DUT than at Unizul.

An earlier study comparing historically advantaged and historically disadvantaged higher education institutions by Davis (2005) showed that students and staff from the former institutions were more skilled than those from the latter. Although the study did not investigate the skills difference between rural and urban students, the fact of the matter is that generally institutions with students from urban areas tend to have better skilled students than institutions with students from rural areas. The earlier that one is introduced to the Internet and mandatory web information and communication channels, the greater the chances that one would know how to use them. Certain scholars (Mathee and Lindberg, 2007; Davis, 2005, etc.) have argued that the university is not the first level at which Internet skills should be introduced to students; earlier introductions (in primary and high school) are necessary, justified by how urbanites (DUT) tend to perform better than rural dwellers (Unizul).

Going back to the contradiction noted regarding claims by students that they are capable of using the web and the staff's subsequent refusal of these claims, the most frequent criticism cited by the latter is the questionable quality of Internet information and the supposed inability of users to evaluate that information. Further disparities are in contradictory comments that cite the independent use of the Internet and simultaneous claims that Internet use is difficult and most successful when mediated by a librarian. The general complaint of most of the staff members was that the students' use of online resources and information is alarmingly un-informed. This is surmised in observations by Millard (2000:220), who suggests that: **"**[T]oo much attention is paid to the "button pressing" aspects of ICTs and insufficient attention to 'usage skills'. Too many people are taught how the technology works rather than how to use the technology to achieve results." This idea is reiterated by The Research Information Network Consultative Group on Librarianship and Information Science (n.d:n.p), which noted that most research about acquiring information skills focuses on information retrieval rather than on information management. In order for people to be deemed proficient computer users or computer literate, emphasis should not only be placed on button pressing skills, but also on higher level search competencies and the ability to use the information retrieved. All this highlights the growing importance of information literacy skills among students, particularly more advanced search skills

Training is important for web searching. Significantly, large numbers of students claimed to have received training on how to find and use online information (47; 59% - Unizul, 65; 46% - DUT). Conversely, 33 (41%) students from Unizul and 77 (54%) from DUT stated that they hadn't received training, as did large numbers of academics (6; 75% - Unizul, and 11; 79% - DUT). There was consensus among both students and staff (including those who never underwent training) that training, if or when received, is

useful. The results therefore attest to the fact that training is very valuable. Students and staff with formal training have a foundation on which they can later build through self teaching.

Insufficient facilities (computers, laboratories) are frequently cited as a major challenge to web information seeking**.** The expanding student population is straining the available resources at both institutions, more so at DUT which has a much higher student intake than Unizul. There are not enough computers for all the students to access the Internet simultaneously. Students are presently forced to schedule their times according to when laboratories are free, such as late in the night. However, since not all students stay in campus residences, some are inconvenienced. Departmental laboratories can ease the pressure or congestion experienced in the main computer laboratories, but not all departments have them. The DUT goes as far as to penalize students with fines to deter them from staying in the library laboratories for long periods. However, these fines are very minimal and are in fact, ineffective as a deterrent measure.

On many occasions, the user-friendliness of intermediaries (lab assistants) was cited as a major challenge**.** There were calls for more user-friendly computer laboratory officials; a student at DUT stated that if lab assistants were more user-friendly, more students would approach them for assistance. Respondents complained that when they made requests for assistance, the lab assistants made fun of them. To avoid this treatment, they stated that they would rather work alone for fear of being ridiculed. For this reason, many would rather ask a friend for assistance or find their own way through trial and error. These findings are substantiated by results obtained on the measures that respondents take when they search; very few respondents solicited help or assistance from intermediaries during a search [see Tables 6 and 7]. Although intermediary unfriendliness is not the only reason users don't seek assistance, it was identified as a significant deterrent.

Table 6: Statements defining how students search for information on the web

Statement defining students web seeking behaviour	**Unizul N=79**	**DUTN=123**
I usually seek information with the assistance of a librarian	4 (6%)	8 (7%)
I usually get assistance from a friend or colleague	9 (11%)	8 (7%)
I usually do the searching myself	63 (80%)	97 (76%)
I usually do not seek information from the web	2 (3%)	13 (10%)

Table 7: Statements defining how staff members search for information on the web

Statement defining staff's web seeking behaviour	**Unizul N=8**	**DUT N=14**
I usually seek information with the assistance of a librarian	-	-
I usually get assistance from a friend or colleague	1 (13%)	1 (7%)

I usually do the searching myself	7 (87%)	13 (93%)
I usually do not seek information from the web	-	-

In order to successfully access and use information, adequate evaluation skills are required**.** A useful comment was provided by one student, who intimated that: "In my department especially, I find that people usually tend to perceive information on the net as the 'gospel'." This thinking is not only confirmed in the responses, but also apparent in global trends. Agee and Antrim (2003:474) report that: "Many students assume that the Internet satisfies all their information needs, as confirmed by The Pew Internet and American Life Study (2001)." Already highlighted was the over reliance of students on web information with little or no critical evaluation. One lecturer at DUT voiced concerns about the need to teach students how to use online information without plagiarism. A notable group of the interviewed respondents felt that the referencing of Internet sources was very difficult. Hur-Li Lee (2008:211) noted that in previous studies of undergraduates' information seeking behavior, two common themes emerged, the first being the enormous challenges they faced in finding the right information to meet their needs, and the second, that they would prefer to make the least possible effort when searching for information. Perhaps this explains why success is not often achieved and why the use of search engines is so rampant.

Access restrictions and web filtering were another major challenge as alluded to earlier. Restricting access to certain sites whose content is deemed inappropriate (e.g. pornographic sites) or unimportant, such as social networking sites, is a noble endeavor, but if done with no proper consultation can be detrimental as well. For instance all sites that contain nudity - all versions of which get blanketed as pornography, including health-related sites - are blocked denying students and staff access to scholarly information. Although governing the use of the web is encouraged, it needs to be readdressed and viewed from a more objective stand point. For example, a lecturer at DUT indicated that some sites dealing with HIV/AIDS have been blocked, making it difficult to obtain HIV/AIDS-related information. The lecturer suggested that the university needs to upgrade its filtering system and engage in consultations with various departments before making decisions about such issues. Social media, on the other hand, appears to be the latest trend in information access.

Equally disturbing is the lack of access to specific or relevant information and information overload**.** One student intimated that, "Sometimes I feel like I have gathered enough information from the Internet only to find out that most of what I get is irrelevant." This quote captures the dilemma that students face on the web - abundant yet irrelevant information. As noted by Shafi and Rather (2005:n.p), the web has grown from an esoteric system for use by a small community of researchers to the de-facto method of obtaining information by millions of individuals, many of whom have never encountered or have no interest in retrieving information from databases. This raises a lot of questions about the relevance of the information that these users retrieve. Shafi and Rather continue: "A plethora of search engines ranging from general to subject specific are the chief resource discoverers on the web. These engines search an enormous volume of

information at apparently impressive speed but have been the subject of wide criticism for retrieving duplicate, irrelevant and non-scholarly information." A considerable number of respondents from Unizul and DUT complained that although large volumes of documents were retrieved, most were irrelevant. The over reliance on search engines means that users usually gain access to general information--search engines often index information in the public domain. However, information of value is often stored in subscription databases that users can't access. Tied in with the inability to evaluate information, respondents decried the fact that when they used search engines such as Google, too many results were displayed and it took them a lot of time to sift through them. A student at Unizul said that when searching online, particularly using Google, enormous volumes of documents are retrieved without knowing which are relevant. The main problem with search engines, as Shafi and Rather (2005:n.p.) argue, is that they "…do not sift information from a scholar's point of view, though some search engines like Google have developed separate applications for disseminating scholarly information like 'Google Scholar'". The researcher did not determine to what extent applications like Google scholar were used by the respondents, particularly students, although the assumption is that few use them.

A consistent problem associated with the popular search engines students rely on is that of information overload, or in the students' exact words, 'too much information'. Atsaros, Spinellis, and Louridas (2008:44) conclude that, "As the Internet is sharply increasing; the amount of data available via the web is increasing as well. That is why Internet users use search engines in order to locate the data they want, without wasting much time and avoiding the risk to get lost in the immense amount of data available through the net." It appears in this case that using search engines has not thwarted the problem of students getting lost in the maze of information they obtain.

Hardware incompatibility is another obstacle. There are still a number of workstations using Microsoft Word 2003, which is a problem because new Microsoft packages, particularly Microsoft Word 2007 and Microsoft PowerPoint 2007, cannot be opened in [Microsoft 2003] and earlier versions.

How and to what extent has the web affected the information seeking behaviour/ habits of students and staff in institutions of higher learning?

The web and other e-information sources are growing increasingly popular. Ernest, Level and Culbertson (2005:93) are of the view that electronic access has dramatically affected information seeking behavior. Individuals now have the option of checking electronic resources in addition to consulting friends, visiting an information site such as a library or government agency, and communicating by phone or sending mail electronically. There is no doubt therefore that the web has engineered a shift in the

way people visit and use other information sources. The networked environment has already changed the way libraries and librarians serve readers. This study sought to determine the potential impact of the web on the use of and visits to other information sources, such as libraries. Although significantly high uses of the web were recorded, it appeared to have had no significant impact on the respondents' use of or visits to traditional information-service providers. Hybrid use was the order of the day, with both traditional print-based environments and the new environments given almost equal attention. This is interesting because earlier ICT authors mooted that one of the implications of users' experiences and sentiments of the web would be that they would eventually have to decide whether to continue using other information sources or not. It is this kind of thinking that saw people predicting the demise of the paper, and terms such as the 'paperless office' were coined. Given the Internet's unique characteristics and the scientific community's need to access information and rely on electronic communication, it is conceivable why this view was held. In a report by OCLC (2005:vii), De Rosa and others wrote: "It has become increasingly difficult to characterize and describe the purpose of using libraries because the relationships among the information professional, the user and the content have changed and continue to change." This thinking has been popularized by the growing dissonance between the environment and the content that libraries provide, and the environment and the content that information consumers want and use.

There is a lot to read from the suggestion by Agee and Antrim (2003:474) that: "The university library is a quiet place, not because students are studying but because very few of them are there. Students use library resources; they just do not come into the building for them". If we are to go by the responses obtained, there is some credence to this statement at the two institutions. A sizeable number of the respondents agreed that they no longer frequented the library as much as they used to because of the web. The web purportedly satisfies people's voracious appetites for information; instead of strolling through library stacks to find a book, people can stay put in their homes and offices and retrieve full texts with a single click of a button. However, responses show that this has not resulted in drastic changes or a total disregard for the print medium. Most respondents believed that the web had not affected their use of other information sources. Students and staff also unanimously agreed that electronic sources make it easier to gather and use information. Evidently, increased Internet and web connectivity in all of the students and staff's daily activities (work, research, study, entertainment, etc.) will ultimately change the nature of how they view and use other information sources, although print sources will obviously remain a vital channel for information. In the words of Tenopir (2003:32), "Print remains important for at least some information for all subject disciplines and as part of the research process." It would be interesting to study if or by how much student and staff numbers are dwindling in libraries. Unfortunately this was outside the scope of this study.

Although the use of library resources appears to be dwindling, the library is still highly regarded as a place for study. Some of the reasons cited for the continued use or

non-use of the library/ traditional print resources because of the web are summarized in Table 8 below.

Table 7: Reasons for the continued or discontinued use of the library/traditional print resources because of the web

Library	**Web**
Conducive environment for study	General information/ irrelevant
Print resources are easier to reference	Quick to find information on the web
Outdated information	Ease of use of Internet resources
Often material is relevant	Currency of Internet sources
Help or assistance from librarians	Difficult to reference
Comprehensive information	Information overload
Responsible use/ rules/ governance	Wide subject/ topic coverage/ sometimes the only source for certain information
Credible sources	Entertaining/ savvy
-	Links to related sources
-	Irritating pop ups/ adverts
-	Viruses
-	Lack of local content/ African and South African material
-	Multimedia - text, video, pictures and sound
-	Unreliable content
-	Access restrictions/ licensing/ subscription/ filtering
-	Sometimes slow
-	Often ungoverned use/ hate speech, pornography, etc.
-	Lack of help (human factor)
-	Need for evaluation skills

CONCLUSION

Students and staff search for information on the web to fulfil needs pertaining to research, teaching, studies (assessments, tutorials, etc.) and communication. Gradually, the web is also being used to fulfil unscholarly needs such as banking, searching for employment, or making hotel and travel arrangements. The nature and type of information sought online is not in any way different to what students and staff members normally seek from traditional print-based sources. However, the motivations behind web use appear to have changed. Some of the earlier concerns that discredited web content, such as the widely held view that web-based information lacks credibility, are gradually losing ground. In the early days, this view saw a number of people (scholars in particular)

shunning the web's use. Although questions about the quality of web information are still prevalent, they appear to have little effect on its utilization. The one concern noted was the lack of students' desire to evaluate online information or their inability to do so. Increased engagements with the web have, however, gone a long way in generally improving the skills of students and staff. The learner-oriented teaching model that institutions now follow encourages students to search for information themselves.

Consistent with literature, this study showed that more and more people are independently searching the web and there is less consultation with intermediaries. The steps to determine how these independent seekers go about their work were modelled around Kuhlthau's information seeking steps. The results demonstrated no clear pattern, but it was clear that users typically locate information by using a search engine, particularly Google, as frequently as daily. Relevant infrastructure for the use of the web and its diffusion is available albeit insufficient to cater for growing populations. Some of the existing infrastructure is also in bad shape and needs to be renovated. On the whole, both universities seemed to have the basic infrastructure to facilitate web access, although the DUT had slightly better facilities than Unizul. Some of these disparities in infrastructure and support are direct descendants of apartheid. There is a general need for improved access to these facilities.

While familiarity with web services has grown, it is still used mainly for its most basic services, such as communication via email and acquiring general information with the help of search engines. There was generally limited exploration of channels that host scholarly material (e.g. databases and subject portals). Experienced web users such as postgraduate students and academic members of staff showed a greater appreciation for other, more 'complex' information channels such as online databases and electronic document delivery services. Refreshingly, print sources were still cited as important.

Inadequate infrastructural resources (computer laboratories and computers), skills shortages (lack of skilled personnel to assist with information seeking processes and lack of skills on the respondents' part to search for and evaluate information), lack of time (to use web facilities) and expertise (to determine the most useful sources), and lack of access to computer facilities (restrictive opening hours or overcrowding) were identified as the key challenges. There were also challenges relating to access to resources on the web because of control or governance issues. Certain useful sites were blocked, passwords for some journals were unavailable, and institutions did not subscribe to some journals.

We recommend for mechanisms to be instituted that improve both physical and intellectual access to web resources. Also, comprehensive training programs that would address the skills deficiencies noted in students and members of staff should be provided. Other recommendations are as follows:

Significant investment in ICT infrastructure (e.g. computer laboratories and computers) to ease up congestion.

Information literacy or web literacy training: infrastructural investments should be followed up by training to impart high-end information seeking skills on all members of the university community. There should also be a greater emphasis on information literacy to mould students into responsible users who are concerned about the value of the information they use. IT skills are the precursor to or the foundation of effective web information seeking strategies.
New and more creative connectivity types offering greater mobility and ease of access, such as wireless technology, need to be instituted (this could expand Internet access to residences).

Bandwidths need to be increased for greater Internet speed.
Computer courses must be included in all aspects of curricula development, and should perhaps be offered in every program.

Web information seeking courses need to be offered at regular intervals (training programmes can be offered on weekends).
There should be more workshops for staff at regular intervals. The professional development of academics has received sparing attention. It is often taken for granted that they know how to effectively work online. A large contingent of the staff members interviewed was untrained; how effective are the web information seeking skills that they impart on students if they themselves never had any proper training?
More information about all the various web information channels should be provided, particularly details about those that proved unpopular (e.g. databases).
Proper marketing and education or awareness. Libraries are urged to engage in bigger orientation drives to educate users and to generally increase the university community's awareness of their services. Libraries also need to improve their image; it is alarming that users would prefer not to visit them simply because they are not cool or the library environment is deemed old fashioned.

The conclusions drawn from this study are that educators' lives and the lives of students are rapidly being altered by the diffusion of the web in mainstream education. The impact of the Internet on the two institutions has been quite profound, with impressive levels of awareness and use of various web technologies. The web is generally perceived to provide genuine benefits while satisfying diverse needs. A lack of critical evaluation, however, is the antithesis of all the web's perceived benefits. For all the hype about the web, the use of other sources has not been adversely affected, although how they are perceived has. A number of significant barriers to utilization were identified. High on the list of the changes users might like to see were support for greater access and training. Further research could broaden the criteria of the study and explore how students and staff from other colleges and universities behave online in their endeavours to meet their information needs. The study population in later studies could also be

widened to get clearer indications of the web information seeking behaviour of students based on their levels of study and their faculty affiliations, and staff members by their designations and faculty affiliations.

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Are there significant differences in Information and Communication Technologies' access and use by staff and students at the University of Zululand between 2002 and 2009?

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ABSTRACT

The use of information and communication technologies (ICTs) in institutions of higher education has had a significant influence on teaching and learning processes. Academics have adopted new methods when delivering lectures, with the chalkboard a thing of the past in most institutions. The information behaviour of teaching staff has now changed from traditional visits to the library, to electronic (office) access. Communication among academics and publishers has also been influenced by new technologies. 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. Although the library still retains its role as the epicentre 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 two studies were carried out separately for the submission of MA theses in Library and Information Science and were themselves comparative studies with other institutions in Zimbabwe and South Africa. The purpose of this paper is to explore any changes that have taken place from the period of the first study to the period of the second. These changes include infrastructure, hardware, access, and the adoption of the Internet and the Intranet in teaching, research and learning.

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

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Are there significant differences in Information and Communication Technologies' access and use by staff and students at the University of Zululand between 2002 and 2009?

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. The first study by Mugwisi (2002) looked at: "The Internet as a resource for research, teaching and learning: a comparative study between the University of Zululand and the University of Zimbabwe". The study investigated how students and staff were using the Internet as an information source while also evaluating their computer and Internet skills. It also explored the ICT facilities at 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) looked at: "A comparative analysis of the web information seeking behaviour of students and staff at the University of Zululand and the Durban University of Technology". The emphasis in the second study was the web information seeking behaviour of students and academics. Both studies addressed issues of access and use by staff and students. Using data related to the University of Zululand only, this paper looks at whether there have been any significant changes in access and use from the period cited in the first study in 2002 and the second study in 2009. Besides the present study there are other publications (Mugwisi and Ocholla 2003) from the dissertations.

The University of Zululand (hereinafter referred to as Unizul) is located in KwaDlangezwa, 20 kilometres 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 focus of the current study is ICT use by the staff and students of Unizul as reflected by the introduction, study background above and subsequent sections.

2. LITERATURE REVIEW

Various studies have been conducted focusing on the use and application of ICTs, particularly the Internet, in higher education. These studies have focused on specific aspects of ICTs and Internet applications, or have generalized by addressing broad issues. For example, Lazinger, Bar-llan and Paritz as cited in Mugwisi (2002:2), divide these studies into three categories: studies on Internet use by information professionals; studies on Internet use by the general population; and Internet use among college and university faculty members. Examples of these studies include: Applebee et al. (2000), who focused on academic use in Australia; Bell (1997) and Harter (1998) who focused on the use of electronic journals; and Johnston (2001), who looked at the implications of e-learning as it applies to the custodians of the information resources required to support teaching and learning (Mugwisi, 2002:2). Studies by Bell (1997), Garoufallou (1999) and

Zhang (2001) all found that there was consistent use of the e-mail, the World Wide Web (WWW) and discussion groups among academics for communication and the dissemination of research results (Mugwisi, 2002:2).

Current literature points to the growth and penetration of ICTs in higher education and in particular, their impact on students and academics and the role of libraries in information delivery. Resnis et al. (2010), for example, looked at students' information literacy practices, including information search processes, preparation, and differences among students' information literacy levels. The study provided an insight into students' high preferences for online resources such as Google and Wikipedia, although preference for print or online library resources remained higher. Woo Park (2009) investigated South Korean universities and observed that new digital technologies, including the Internet, 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. E-learning, e-lectures, e-campus, e-research, blended learning, e-science and e-studies are some of the emerging terminologies are increasingly encountered (Woo Park, 2009; Mutula, 2002; Ketterl, Mertens and Vonberger, 2009).

Adogbeji and Akporhonor (2005) established that students were coming into university with more technology backgrounds and were increasingly using the Internet to support instruction and research needs in addition to extensive communication using e-mail and access to databases and other sources of information. Aiken et al. (2003) looked at college students' Internet use in the United States, and found that of the 104 million people with access to the Internet, college students were one of the most Web connected of the demographic groups something that we think has not changed. Tella (2007) looked at undergraduates' use of the Internet at the University of Botswana and the derived consequences on academic performance. The study observed that the Internet was increasingly changing the learning environment by allowing students to broaden their academic experience, access important information, and communicate with others within the academic community. He established that two-thirds of the students had access to the Internet for up to 5 hours per week, with one third accessing the Web for up to 20 hours per week. Osunade (2003) evaluated the Internet as a knowledge acquisition tool and its impact on academic performance on students from five science-based courses selected from two state universities in Nigeria. The study found that there were significant difference in the academic performances of students with Internet access and those without. Most of the respondents spent 2 to 3 days per week on the Internet, with e-mail being the most used Internet service. Selwyn (2008) investigated the differences in undergraduates' academic use of the Internet as a source of academic information for their studies, and in particular, how academic use of the Internet is patterned by a range

of potential influences, such as students' wider Internet use, access and expertise. He established that students' academic use of the Internet was most strongly patterned along the lines of gender and subject specialism rather than other individual characteristics or differences in technology access or expertise. The most popular Internet services were e-mail (always), blogging, chatting, and Facebook. Other uses mentioned included e-banking, e-gaming, and e-shopping, among others, while the most significant challenge highlighted in the studies was incompetency when browsing the Internet, mostly stemming from lack of computer and Internet skills (Selwyn, 2008; Tella, 2007; Adogbeji and Akporhonor, 2005).

The implication this has on academics/faculty is fundamental. Al-Aufi and Genoni (2010) looked at digital scholarship at Sultan Qaboos University, Oman, with a specific focus on disciplinary differences in the use of networked information for research and scholarly communication. The study established significant differences between respondents in the science disciplines and those in the humanities and social sciences regarding use of and attitude towards digital information services. Those in the science disciplines showed an overall longer and more frequent use of networked information, while those in the humanities and social sciences showed a more positive attitude towards library networked resources. Hinson (2006) conducted a study on the Internet for academics in which he proposed the Internet Adoption Model for Academics (IAMA). The model provides a framework for thinking on how academics can utilise the Internet across the academic divide. He conceptualises Internet utilization in five spheres, namely: Internet for research, Internet for teaching, Internet for policy making, Internet for administration, and Internet for consultancy. Talib in Al-Ansari (2006) identified five categories of Internet use by faculty members, i.e.: i) Informational Internet use; ii) Supplemental Internet use; iii) Essential Internet use; iv) Communal Internet use; and v) Immersive Internet use. Categories i) – ii) primarily represent basic uses of the Internet with no interactive setting, while categories iv) - v) represent a high level of Internet integration where virtual class meetings take place (Al-Ansari, 2006:791).

The internet has also its implications on libraries. According to Obeidat and Genoni (2010:385), at the heart of any university's development and implementation of digital information services is the library. The authors observe that university libraries in developed countries have been more successful in establishing their role in delivering digital information, while those in developing countries have recently began to play a similar role. Deng (2009) investigated the extent to which electronic resources are utilised among students in higher education in Australia, more specifically patterns and trends of accessing and using electronic resources in a university library. Lippincott (2010:208) observed that academic 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. Lippincott (2010) observes that

most academic libraries already offer e-book content, with some experimenting with loaning such materials. Google, through 'Project Gutenberg', already offers access to limited content of books online under the Google Books feature. According to Saeed in Hui-Chun Chu et al. (2008:305), the growth of e-learning where education is delivered and supported through computer networks, has raised new research issues for library services. Both e-learners and traditional learners now have access to a universe of information on the Internet, especially from well structured and managed contents of e-libraries. The development of new technologies to support teaching and learning activities has therefore become paramount. Hui-Chun Chu et al. (2008:306) list the learning materials in an e-library, which may include courseware material, lectures, lesson plans, educational software, access to remote scientific material, research articles, images and videos, to name a few. The University of Zululand library offers online information services through subscription to electronic resources and has recently began building its own digital institutional repository. These are accessible through the library website (http://www.uzulu.ac.za/res_library.php) through password authorisation and the open access institutional repository (http://uzspace.uzulu.ac.za/).

Gender studies on Internet use have also been prominent. Oguntuase and Akinyosoye (2007) looked at Internet access and use by female academics in selected Nigerian universities. This approach revealed that junior academics (graduate assistants and lecturers) made greater use of the Internet than senior academics. The Internet was mostly used for e-mail and research by 84% and 81% respectively. Selwyn (2008) considered gender and educational backgrounds, among other variables, while Adogbeji and Akporhonor (2005) looked at the browsing pattern of male and female students in Nigeria, finding that female students tended to use the Internet during the day while male students used the Internet at night. Osunade (2003) found that gender did not impact on Internet browsing in terms of hours and days per week. In contrast, Selwyn (2008) found that female students were significantly more likely to use the Internet for academic tasks than male students.

Conceptualising new technologies

Lippincott (2010:205) observes that technological changes, such as the introduction of web browsers, have had a major, some would say revolutionary, impact on higher education as well as on broader society. Mobile devices can be termed to include laptops, netbooks, notebook computers, cell phones, audio players such as MP3 players, cameras, smartphones and e-book readers. A single, handheld device enables one to perform the following activities: voice and video calling, sending and receiving e-mail, SMS, searching the Internet, searching databases of scholarly information, organising citations, reading and listening to books and articles, accessing a course management system, making and playing videos, and using the GPS navigator system, among others (Lippincott, 2010:208).

E-learning

In the last few years, web lectures have become important, and more and more lecturers and universities want their lectures to be recorded as more students ask for lectures to be available online (Ketterl, Mertens and Vonberger, 2009). Students and lecturers are increasingly 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 (Ketterl, Mertens and Vonberger, 2009; Mutula, 2002). According to Hey et al. in Lippincott (2010:211), 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. Librarians can teach students how to access information from their mobile devices in the field in order to support their research. E-learning may also include filming live lectures and disseminating these via digital interactive television (DiTV), satellite to PC terminals, and VHS cassettes (William, Gunter and Nicholas, 2006).

The introduction of e-learning in China has largely been a response to students' failure to secure admission in traditional universities. According to Wang et al. (2009), e-learning in China can be explained within the context of three formats, i.e.: a) ***E-delivery,*** which aims to increase the number of students' access to resources and satellite receiving facilities; b) ***E-teaching,*** which enables students to learn anytime, anywhere by using emerging ICTs; and c) ***E-education,*** which enables distance learning. The University of South Africa (UNISA) is modelled along similar lines (Mutula, 2002).

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. Studies on e-learning have mostly dealt with the effects of ICTs on the following areas of learning: traditional teaching; bridging on-campus and off-campus realities; distance education; integrating the computer, radio and television; virtual campuses and universities; and wireless communication as a mode of teaching (Gulia and Maji, 2008; Tynjala and Hakkinen, 2005).

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

According to Donnely (2009), 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. 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).

Demetriadis and Pamborstis (2007) classify the various types of technology-delivered lectures into three categories, namely digital lectures, live digital lectures, and e-lectures. The concepts have been inferred in the course of the discussion and are briefly reiterated here. ***Digital lecture*** refers to any lecture delivered through digital technology, either online (live transmission) or on demand, via streaming or optical storage technology (CD or DVD). A ***live digital lecture*** refers to any learning resource that captures the experience of lecture-based instruction in the classroom with students participation. ***E-lecture*** refers to any digital learning resource in a lecture format captured in the studio with the purpose of engaging students in the e-learning experience.

Flexible learning

Khan (2007) defines flexible learning as an innovative approach to delivering well-designed, learner-centred, interactive learning environments to anyone, anyplace and anytime by utilising the attributes and resources of the Internet, digital technologies and other modes of learning in line with instructional design principles. 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 and below. 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).

We can therefore observe that 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, 2008:298). The implementation of such initiatives could bear fruitful results for Unizul and the idea of hiding lecture materials for easy access should be a thing of the past.

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3. METHODOLOGY

The study compares empirical evidence provided by the two studies while also sourcing new literature. Most of the discussions are conceptual and based on observation (applying our advantage of presence onsite).

The methodological approaches of the earlier studies are outlined below.

Table 1a: Methodological comparisons (2002 and 2009)

	Mugwisi (2002)	Nkomo (2009)
Methodology	Both quantitative and qualitative	Both quantitative and qualitative
Methods/research design	Survey	Survey
Instruments	Questionnaire, interviews, content analysis & existing statistics/ records	Questionnaire, interviews and systematic observation
Areas of investigation	University of Zimbabwe (ZIM) vs. University of Zululand (SA)	University of Zululand (SA) vs. Durban University of Technology (SA)
Target populations	Students (undergraduates and postgraduates), librarians and academics (cross cut)	Students (undergraduates and postgraduates) and academics (cross cut)
Sampling methods and size	Non probability (stratified)	Non probability (quota and convenience)
Pilot studies	Conducted	Conducted
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
Data analysis	Qualitative and quantitative (Statistical Analysis Software - SAS, Excel & content analysis)	Qualitative and quantitative (Statistical Programme for Social Sciences – SPSS, & content analysis)

Table 1a above compares the methodological approaches employed in the two studies, from the research design and sampling methods, to the methods employed in data analysis. Although two sets of questionnaires were distributed in 2002, this paper only examines responses to the one sent out to students and academics.
The present study followed the methodological approach outlined in Table 1b.

Table 1b: Methodological application 2010

	Mugwisi & Nkomo (2010)
Methodology	Largely qualitative (informed by observations and literature)
Methods/research design	Survey, old (empirical evidence from the two studies) and new literature (e.g. Network Services data, new studies, etc.)
Instruments	Content analysis (Mugwisi 2002 against Nkomo 2009) and observation
Areas of investigation	University of Zululand (SA)
Target populations	Students (undergraduates and postgraduates) and academics (cross cut)
Sampling methods and size	None
Data collection procedures	Retrieving content from earlier studies and locating new literature
Data analysis	Qualitative (content analysis)

The study was therefore mainly qualitative because it sought to analyse content from the two studies, focusing solely on the University of Zululand.

While conducting the study, it became apparent that there were a few problems affecting the methodology. We, however, felt that the problems were not that significant and would not derail the project. The highlights of these challenges are provided below:

- The danger of comparing "goats and cows"; we have two studies that are related but not the same. Both studies compare Unizul with other institutions, but the motivations for each comparison differ. Although this is the case, we feel that in both instances, the studies looked at ICT access and its use, of which Unizul is a part (Each study focused on Unizul and another institution).

- Regardless of the focus of the studies, they both provide an indication of any significant changes over the projected period (2002 - 2009)

- Difference in target populations: the researchers did not use matching populations. While Mugwisi (2002) focused on students, academics and librarians' use of the Internet, Nkomo (2009) generally looked at students and academics, but the focus was web information seeking behaviour, which is only one aspect of the Internet.

- Quantification is not provided in some discussions. This is because they were not there in the original studies. The semi qualitative nature of the two studies means in some instances that data is presented and analysed qualitatively.

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4. COMPARATIVE FINDINGS

The findings are summarised in sections 4.1 – 4.11 below.

4.1 Introduction

The comparisons are based or adapted from new data obtained from NSU (Networking Services Unit) and what the two studies could provide. The study by Nkomo (2009) did not provide a detailed analysis of technical facilities such as hardware, laboratories, campus-wide networking and Internet connectivity. This section compares the responses of both staff and students with respect to access and Internet use at the University of Zululand. Discussions follow thereafter.

4.2 ICT Facility status

ICT facilities have an influence on access to computers and the Internet by students and staff. We therefore sought to determine what facilities were available and what changes occurred between 2002 and 2009. The identified facilities were mainly in the form of student labs, staff access workstations, and lecture or classroom presentation technologies.

4.2.1 Student access

Table 2a: Student labs and seating in 2002

Student labs and seating in 2002		**Total student population 4510**	
Location	Seats	Workstation configuration	Other facilities
New PC Lab Room 1	152	Celeron 300, 32 MB Ram, 2.1 GB HD, 14''SVGA monitor, Windows NT4.0 workstation	Data projector, simultaneously on two projection screens, white board
New PC Lab Room 2	40	HP Vectra PIII500, 64 MB RAM, 6.4 GB HD, 19'' monitor, Windows NT 4.0 workstation	Data projector, whiteboard
New PC Lab Room 3	52	HP Vectra PIII500, 64 MB RAM, 6.4 GB HD, 19'' monitor, Windows NT 4.0 workstation	Data projector, whiteboard
Library Basement	64	Pentium 133, 32MB RAM, 2.1 GB HD, 14''SVGA monitor, Windows NT4.0 workstation	Data projector, whiteboard
D-Block	20	Celeron 300, 32MB RAM, 2.1 GB HD, 14''SVGA monitor, Windows NT4.0 workstation	Whiteboard only

Table 2a provides an indication of the access facilities available to students in 2002. This includes physical locations, seating capacity, and machine configuration, including operating systems and additional facilities available for both research and teaching.

Table 2b: Student lab seating 2009

Student labs and seating 2009 (adapted from data from ICT department)		**Population 8613**	
Location	Seats	Workstation configuration	Other facilities
HP Academy (3 rooms)	Total approx seating 500	Mainly Pentium 4s	Data projectors white board markers
B-Block) with 4 laboratory rooms		Mainly Pentium 4s	Data projectors white board markers
Other facilities in the library (LIS Dept & Library Lab), D-Block (computer science) & other departmental facilities	Each 20- 50 seating	Mainly Pentium 4s	Data projectors white board markers
The Richard's Bay campus (opened in January 2010) with a projected capacity of approximately 180 PC lab seats in 6 labs; initial total of 250 workstations (including presentation machines in all classrooms and conference venues)	Initially total of 250 workstations (incl. presentation machines in all classrooms &conference venues).	Mainly Pentium 4s	Data projectors white board markers

Table 2b indicates locations that were added since 2002 minus those that are no longer available, for example the library basement. It approximates the sitting capacity and does not indicate the machine configurations because these were not central to the 2009 study. What has changed? In summary:

- The library basement facility has since been closed
- The Richard's Bay campus opened
- 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 departmental labs with workstations estimated at over 1500 serving over 8613 students.

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 seeing as a population of 8613 was now served by 1500 computers a ratio of one computer for six students(1:6).

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4.2.2 Staff access

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 2002- 2009

2002	**Population 239**	**2009**	**Population 281**
Approximately 500 workstations		Above 1500 workstations	
Capacity - 486 to current		-DX6120/7300/7400/2400	
Brands varied		Standardised on HQ Compaq	
• Beginning 2006, the ICT department standardised 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).			

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

4.3 Networks and Internet connectivity

Bandwidth (connectivity) is key to effective connection to the Internet. Talk of connection often always refers to how much bandwidth an institution has. 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 Unizul (2002 - 2009).

Table 4: Networks and Internet connectivity

2002	**2009-**
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 fibre connection with the South African National Research and Educational Network (SANReN), February 2010
Connection to the Internet not guaranteed for all users (Internet access subject to usage quotas)	Access always depending on availability of venues
Network-standard fast Ethernet switched backbone feeding to departmental level 10 base-T hub, running on fibre optic cables	Cisco three-tier campus backbone network. Provides switched 100Mbps connections to the desktop, with a layer 3 Gigabit fibre optic backbone - has the capacity to host Voice over

	Internet Protocol (VoIP)
Source: ICT department	

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 2010). The changes in connection have been particularly notable, to the relief of many in the university community.

4.4 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. Mugwisi's study therefore meant that those who did not have access to the computer could not possibly have access to the Internet and were not probed further. 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? Table 5 shows the patterns of computer and Internet use.

Table 5: Computer and Internet access

Access 2002	Access 2009
• 48% of the undergraduate & 8% postgraduates did not have access to the Internet	• Nearly all students had access to the Internet from computer labs • Cell phones (1%)
• No access from halls of residence indicated No wireless at all	• Claims of access nothing tangible • Wireless minimal but efforts being made • Guest Houses & Bhekuzulu Hall have wireless • Dominant connection type cable modem and many just don't know
• Staff access was fairly extensive, 33% home & office access 13% no access	All staff have access 29 % home & office None not having access
• Few to average desktops	Number of students with laptops increased (mere observation)

The findings of both studies reveal that academics have multiple access to computers in the office and at home. Recent technological developments like 3G have increased access to the Internet outside the office to homes, and to a lesser extent, residences. The earlier study showed few staff members with no access at all while with respect to office access, all had access. Among students, access was mostly in computer labs for the two periods; a limited number of postgraduates indicated access from the

office and a significantly small number had no access. Newer access options, such as the cell phone, were cited by a small number, but our feeling is that they are used much more. Internet use based on quota allocation significantly reduced access in 2002, in that once a student's quota was exhausted, he/she had nowhere to turn to. It also favoured 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. The dominant connection type for both students and staff in 2009 appeared to be cable modem connections with very insignificant levels of wireless access. Most students did not know their type of connection. From observation, there has been a gradual increase in the number of students with access to laptops at the University of Zululand. To tie up with Nkomo's study, increased wireless access would benefit students, especially if the facility is extended to halls in residences. According to the University's ICT Department (2010), efforts are being made to expand wireless communication to these halls. Currently, guest houses and Bhekuzulu Hall have wireless connections.

4.5 Time spent on the Internet

Time spent on the Internet can reveal the amount of access (availability) students and staff have, and is a platform for skills attainment (more time spent on the computer and online enhances skills). Table 6 below provides comparisons.

Table 6: Time spent surfing

Time spent on the Internet	
2002	**2009**
Time spent on the Internet for students determined by the booking system as well as credits available in the student account	Barring clashes with lectures/ overcrowding, access is moderately adequate
Hours spent decreased with the level of study, with 36% of undergrads spending an hour/week, 56% of post grads up to 2 hours / week	71% of students and 87% of academics had enough time and sufficient access
Opening hours restrictive	Opening hours a bit flexible - main labs close at 11pm term time & the library lab at 10pm

The average times spent on the Internet in 2002 were low, but seem to have improved by 2009. However, facilities' opening and closing times have yet to change, and even while facilities have been increased, overcrowding persisted then and still persists now. The factors at play include greater student enrolment, growth in use, increased incorporation of computers in teaching, incompatibility of systems, and poor Internet connectivity. These problems could be partly addressed by extending the opening hours of the computer labs on campus, including the library lab which in our eyes is closed most of the time. One weakness noted in this study was that the time spent on the

Internet is generic and is not measured against the actual times when facilities like labs, the library, etc., were open, as this would impact on the time spent surfing.

4.6 Computer and Internet skills

Computer skills enable one to comprehend and manipulate computer functions in order to save files, change formats, etc., while Internet skills enable one to navigate websites, evaluate content, and download files. In essence, Internet literacy combined with computer literacy enable users to search and analyse data on the Internet with speed and efficiency, thus maximising the time spent and saving money - better skills translating to faster Internet surfing. We also asked how the computer and Internet skills were acquired. The acquisition of skills comes about through some form of training, either formally or informally. Table 7 provides a comparison of both computer and Internet skills.

Table 7: Computer and Internet skills

Computer and Internet Skills	
2002	**2009**
• 50% of the respondents indicated having good to very good computer skills, 30% with average, while 9% considered their skills to be poor • By status, 13% of undergraduates showed poor skills compared to 4% of academics with no postgraduates in this category • 54% of the total respondents required computer & Internet skills training, while 15% did not • Most users (27%) had been using the Internet for less than 6 months, while 28%, more than 3 years • 27% had learnt through self study, followed by 20% who had learnt through in-house training, of whom 31% were undergraduates	• 67% of students & 71% of academics had good computer/ Internet skills • Observed that students are generally familiar with e-mailing, web browsers & web processing • How staff & students acquired Internet skills • 59% of students received formal Internet/ web training. On the contrary, 75% of academics had not

The challenge of measuring cows against goats alluded to in the limitations is reflected in Table 7 above. In some instances, the discussions are holistic while at other times the respondents are broken down into two (students, staff) or sometimes three groups (undergraduates, postgraduates and academics), making comparison difficult. On average, computer and Internet skills in the first study reflected poorly, but seem to have improved massively by 2009. A challenge noted with the response in 2009, however, was that claims of competence do not tie up with observations or on the ground experience. Presently, we feel general manipulation of user commands, familiarity with e-mailing, web browsers and web processing, and the speed with which users deal with given tasks to be fairly good, but advanced information retrieval skills are still low.

Concerning how training was acquired, Nkomo (2009) found that there were more students who received formal Internet or web training than academics. In this respect, academics appear to face neglect. Receiving formal training was perceived to be useful by both groups; those who had not received formal training indicated that training would have made a difference.

4.7 Preference between print and electronic sources

The preferred format of information access has drawn a lot of debate. Notwithstanding what medium is preferred, knowledge of these choices is vital for decision making. The findings of both studies show more in favour of electronic sources than traditional print sources. This highlights the concept of 'just in time' over 'just in case'. Electronic use has, however, been rather checked. Perhaps the retrieval difficulties (bandwidth and lack of skills) of users act as mitigating factors. The balance lies in that while electronic sources are more accessible and up to date, print sources are more dependable in terms of quality. The attention that electronic sources receive stems from other factors as well:

- Electronic resources are more flexible and easier to use
- Electronic sources are immediate while print sources are sometimes not available in the library
- Electronic sources are globally current and vast, but better read when printed, while print sources are limited but better to browse
- Print sources are rather static; new research is published regularly in electronic sources which stimulates discussion and further research
- Print sources are more reliable because of editorial policies
- Print sources are usually full-text, while electronic sources provide mostly abstracts

4.8 Purposes for which the Internet is used

The studies sought to establish the purposes for which the Internet is used, as shown in Table 8 below. Mugwisi's study did not analyse the use of students and academics separately, as was the case in Nkomo's study in 2009.

Table 8: Purpose of Internet use

Purpose of Internet Use	
2002	**2009-**
• Mugwisi's study revealed that 33% of the respondents used it for research, 33% for learning and 20% indicated both (institutional response)	• Nkomo found that students searched the Internet for information on their studies (27% assignments, 20% research) • Staff research was 23%, teaching 17% and communicating 6% • Use for communication and entertainment is also significant

Looking at the overall responses (all respondents), Mugwisi revealed three key purposes, namely research, teaching, learning. Nkomo also noted that studying (learning), research or teaching and communication were the main reasons for searching for information. The shift in the two periods to a more significant utilization of the Internet for communication is also revealed in literature. Communication at present includes social networking, which has taken the youth by storm.

4.9 Internet channels/platforms present

The popularity of the Internet lies in its ability to present information through a diverse range of channels or platforms. We sought to determine which channels are used, to what extent and why. Table 9 below shows the levels of use of the different Internet services. Data was presented holistically in 2002 and in separate categories in 2009. From the ensuing table, the researchers will discuss the frequency and importance of the channels selected.

Are there significant differences in Information and Communication Technologies' access and use by staff and students at the University of Zululand between 2002 and 2009?

Table 9: Internet services used and frequency

Channel	Status 2002	Status 2009
Electronic mail	56% of the respondents daily; 20% weekly; 3% never	• Students - 41% daily; 27% weekly; 27% never • Academics - 87% daily; 13% weekly
The web (WWW)	46% daily; 32% weekly; 4% never *Fair amount of use (web popular)*	Academics - 62% daily; 25% never Students - 44% daily; 34% weekly
Online Public Access Catalogues	11% daily; 21% weekly; 21% never *Maybe once people know which corner to locate their material, it becomes unnecessary to consult the catalogue*	Students - 12% daily; 24% weekly; 21% never Academics - 13% daily; 25% weekly; 25% never *** Low use***
Online databases/ online journals	17% weekly; 14% monthly; 28% never *Electronic journals were surprisingly the least used service* 53% never; 12% weekly; and 15% monthly.	Students - 56% never; 3% daily; 19% weekly Academics - 29% never; 43% once a month; 29% weekly *no daily usage *
Discussion lists and newsgroups	36% never used this service; 18% weekly	75% never used the service *Regarded as newsy*
Subject portals	37% never; 16% weekly	24% used them *Least used service, little knowledge about what they are*

A comparison of the two studies suggests that there's been growth. This growth in use underlines the importance of the Internet in academia today. The reasons for use have generally diversified and increased. Table 9 above shows that although Internet services were used less, respondents still considered them to be important (see discussions below). The WWW was considered very important, followed by e-mail services, a trend that has been observed in many related studies.

4.9.1 Importance of Internet services

There is no doubt that the Internet is important to the academic community. Internet services' frequency of use in 4.9 above reveals that there is general familiarity and/or

knowledge of the services on offer, although use is limited to a few. The general consensus among respondents from both periods is that the large spectrum offered by Internet platforms is very useful. It is, however, mind boggling that they are used less. Factors such as retrieval skills and the effort needed to access these platforms may play a role. Teaching trends also guide how students read and learn. A classic case is of lecturers who inculcate in students that they don't need to worry about using databases until postgraduate level. With little independent/ unguided reading, students tend to rely on module guides and lecture PowerPoint slides and rarely venture beyond Google. Discussions of the importance of individual Internet channels are highlighted below.

- **Email**

E-mail generally almost always crops up as the top, most used Internet feature or the second most used in information seeking studies (Osunade, 2003; Selwyn, 2008). Email conversance is standard practice, regardless of user group. Although other newer communication methods have come up and challenged email dominance, such as social networking media (Facebook, Skype, Mix it) for the younger generation, it has and continues to remain popular in academia.

- **(WWW)**

Of the Internet channels, the web has an unusual overarching ability. While channels such as email, databases and OPACS can be browsed on the Intranet and on CD-ROM, many have become web-based. The advantage with web-based services is their global appeal. The web can now be understood to mean a collection of Internet channels, a move away from its early, sole association with search engines.

- **Online Public Access Catalogues (OPAC)**

Despite its importance, OPAC is a channel that receives a lot of unfavourable attention. One of the reasons for this could be that there is little independent reading at undergraduate level. The library image may also play a role, as few visit the library, and even less visit or use Online Public Access Catalogues. There is also a tendency to associate the OPAC with traditional (print/ book) material and less with online/ electronic sources, as the statistics on databases show. To satisfy online information needs, respondents simply Google. One advantage of searching using OPAC over search engines (Google, Yahoo) is being able to retrieve scholarly material from subscription databases. When asked, a respondent quotes Google or Yahoo (what they visited) and yet the databases statistics reflect otherwise. This is because search engines are now linked to scholarly databases which means although the access point is a search engine database material is retrieved through registered database IP recognition.

- **Online databases/e-journals**

Databases are stores of scholarly material (e-journals, conference proceedings, etc.), although other less scholarly publications may be kept. The one expectation about databases and e-journals which statistics always prove wrong, is that because they are

scholarly in nature, their use should be high. Again, as an area into which institutions pour large amounts of money, there is always a need to justify spending. A seasoned librarian commenting on this trend spoke of a noted reluctance to introduce databases and e-journals to undergraduates and a low acceptance rate among academics. Literacy levels (computers and information) also contribute to shying away from databases.

- **Subject portals (gateways)**

Subject gateways bring together information resources on a given subject and provide a specific search point for information on the Internet. They are usually made visible via the library websites of universities. One senses that respondents do not exactly know what subject gateways are. Perhaps there is comfort in the fact that by searching using search engines, the browser also trawls subject gateways. Most search engines have assumed the meta-search status, which allows them to retrieve material from many indexed sources.

- **Search engines**

The most popular and most used web tool for many is the search engine. The popularity of Yahoo and Google has catapulted these search engines to the top - they are the default search engines of many users, both new and old. The reasons for search engines' dominance are often highlighted in literature: ease of use, ability to crawl many public documents (meta-search), natural language searching, full text access to articles through open source initiatives, spelling suggestions, etc., all of which have endeared them to the public.

4.10 Influence of the Internet on information seeking

The earlier discussions in 4.9.1 gave ample evidence of the importance of Internet channels for information seeking. Below follows a discussion of their importance with respect to teaching, research, study and communication, the four chief reasons for which the Internet is sourced (see 4.8). Also discussed is how their presence has led to shifts in information seeking habits, such as moving away from the library to the web based on the certainty that the Internet has impacted on other information sources.

4.10.1 Impact of Internet information on teaching, research, study and communication

Students and staff go online mainly for teaching, research, study and communication, in no particular order. This shows the impact the Internet has on the above activities. For instance, teaching relies significantly on online resources, and even recommended text books come with a soft copy equivalent. Of late, many have come to talk of e-scholarship, which is the electronic equivalent of traditional scholarship. An example of e-scholarship would be a researcher relying on electronically available scholarly material to produce articles through the latest office technologies. Borgman (2008:32) defines e-scholarship as new forms of scholarship enabled by cyber infrastructure that are more information-intensive, data-intensive, distributed, collaborative and multidisciplinary. Communication between researchers and publishers,

researchers, researchers and students, and students is mainly electronic (email, sms, social media chats, etc.). With respect to teaching and learning, more and more people read online, and browse and download relevant material which they read without any printouts. Through e-learning, teaching is conducted online, and assignments are posted and submitted online as well.

4.10.2 Impact of Internet information on other information sources

There are reports of changes in behaviour as a result of the Internet. In 2002, 62% of the students and 74% of the academics indicated changes in the patterns of their behaviour, while in 2009, 44% of the students and 71% of the staff reported likewise. The responses appear misconstrued, particularly in the case of the students, in that the increased acceptance of the Internet in academia is generally expected/ predicted to lead to its increased use over other sources. There were many lobbyists for the Internet in its infancy, which perhaps explains the reported higher impact, but once it was assimilated and people started to understand its pros and cons, the louder voices grew quiet. We also see this trend with technology lobbyists, who of late have changed tune and are now calling for the adoption of technology but with greater consideration of other important factors.

Some of the reasons cited for the trend outlined above were:

- 'Availability of current online text reduces the time spent searching'
- 'Quicker access to information without having to physically leave your office'
- 'Have resorted to the Internet because quite often, the library does not have current journals'
- 'Most information sought can be found in a short space of time'
- 'I get all the information I want on the Internet' (student)
- Because of the Internet, information science has changed in terms of information availability, access, timeliness and dependability, etc.
- Electronic sources are preferred over print sources

4.11 Challenges affecting ICT usage

ICT usage is not without its own 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 who and how facilities were accessed: "You exhaust your quota you pay." 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 while laboratories do not grow/ expand at a similar rate.

- **Connectivity**

A cursory look at connectivity as a layman points to improvements (see 4.3 above). Connectivity options have grown to include broadband, 3G, 4G, and wireless. This suggests a certain level of network expansion. Institutionally supported growth of these new networks and connectivity include the recent availability of low wireless access. Individuals take the initiative to connect using 3G.

- **Skills**

Skills were noted to be generally low in 2002, perhaps because information and communication technologies were still a new thing. A slight paradox is noted in 2009, where respondents claim to know how to use technologies but experts disagree; overall the skills levels are much better. A lot of factors could be contributing to these improved skills, although these have not been adopted across all the departments. Incorporation of ICT into many modules, e-learning and the introduction of computers in high schools are some of the factors.

Members of staff also appear to face hurdles as far as skills are concerned, and there seem to be few attempts to target them. Where it happens sparingly, they shy away.

- **Support**

Support is in two forms, namely hardware and software. The support-related problems identified include poor virus management, lack of dedicated hardware repair, delayed software upgrades, and constant 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 (bandwidth) - 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 letdowns. 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 2009, Unizul has seen a lot of positives in technical infrastructure growth (see Tables 2a, b, 3 and 4). Perhaps the most notable is the increase in computer seating capacity from 328 in 5 labs to over 1500 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 2003). 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 and 2009 against 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 both studies is connectivity. Both authors in their separate studies allude to the lack of sufficient bandwidth for 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 recognise 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 scepticism, 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 its 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.

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), an additional 7 facilities in the library (LIS Dept and Library Lab), the D-Block (computer science) and other 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 786Kbps access to the TENEX/SAIX backbone, in addition to a switch from Telkom Internet to a dark fibre 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, skills levels and utilization have correspondingly grown. It is difficult to say whether this is as a result of better institutional training or a case of more self training, given that the web can no longer be ignored by students and staff for their continued survival in education.

The negatives noted include limited exploration of newer forms of Internet connectivity, such as wireless access. The 2009 study and recent literature revealed that there are few places where wireless networks can be accessed at the institution. Bearing in mind the potential of wireless technology in broadening access, the researchers feel that this area is highly neglected. Wireless access could really come in handy in alleviating overcrowding. In 2002 students were limited by quotas, while in 2009 access to the Internet was unlimited. However, student populations continue to grow and overcrowding remains a serious problem, further compounded by the use of the same labs for classes.

The two studies concur that the influence of the Internet and World Wide Web on information seeking in higher education is considerable and continues to increase. There is conformity as well in that it has influenced how students and staff access and use information. Its influence extends to various areas, including research, teaching, and communication, acquisition, and collection development, among others.

Are there significant differences in Information and Communication Technologies' access and use by staff and students at the University of Zululand between 2002 and 2009?

The variety, forms and formats of the Internet services used have not changed much since 2002, but the degree or extent of utilization has, on the main, increased. We believe this is perhaps an indication of how previously shunned services gain acceptance as the Internet exponentially permeates academia and as familiarity increases. Many users no longer worry about some of the earlier concerns about the Internet in general, such as transient media. It has instead become the preferred medium of communication, research and study for students and staff alike.

A last problem worth mentioning is 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.

We recommend that a greater exploration of connectivity options, in particular wireless technology to increase access need immediate attention. Expanding access to student residences and the creation of hotspots is essential. In addition, training demands of students and staff need to be intensified as poor skills limits access and increases digital divide. Areas that require special attention include skills on the use of electronic databases and the correct referencing of electronic sources. 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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A Study of the Role and Effectiveness of E-Learning at the University of Zululand

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ABSTRACT
This paper analyses the factors that influence the adoption of e-learning technologies at universities. The study assesses the utilization and effectiveness of electronic learning (e-learning) as an open-source learning management system (LMS) by academics and students in institutions. The application of information and communication technologies (ICTs) has become so attached to contemporary educational delivery worldwide that it has virtually become impossible to deliver or receive formal education without the application of such advanced technologies in teaching and learning. While the University of Zululand has invested in costly technologies in order to keep up with the rapidly changing technology in order to enhance the quality and relevance of education and research in the social and natural sciences, the utilization of these technologies has not spread campus-wide. This paper will expose the types of e-learning platforms available for use at the University of Zululand and the benefits of e-learning, as well as investigate whether there is any policy that governs e-learning within the university.

***Keywords*:** e-learning, University of Zululand

INTRODUCTION

This paper reviews literature on the role and effectiveness of e-learning for academic purposes at the University of Zululand with reference to learning management systems (LMSs) like Moodle. Due to the need to access and disseminate information, technologists have created LMSs so that information can easily be transferred from lecturers to students. This helps students interact with their subject matter in greater depth before class.

Education and constant skills development, as far as computer literacy is concerned, have become a priority in most organizations operating in developed countries as well as in countries searching for new development approaches. Most organizations will now require well trained and skilled workers to meet the increasingly sophisticated demands of the workplace. E-learning plays a major role in developing the skills and competencies needed in the 21st century, in particular to ensure that learners have the digital literacy skills required in their discipline, profession or career. Bates (2009:n.p.) states that a major argument for e-learning is that it enables learners to develop essential skills for knowledge-based workers by embedding the use of information and communication technologies (ICTs) within the curriculum. He also argues that using e-learning in this way has major implications for course design and the assessment of learners.

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Traditional approaches to training are no longer successful in keeping up with increasingly different groups of students from diverse geographic locations and ethnic groups. In a quest to produce skilled and computer literate students, institutions of higher learning should incorporate the use of ICTs to optimize the learning environment (Anouk Janssens-Bevernage, 2006:n.p.). Whilst there is potential for major benefits for all concerned, ICTs also continue to set challenges for providers to develop new strategies for teaching and learning and raise fundamental questions about the learning process. The significance of this is that a variety of approaches and models have evolved on an international level, the scope of which requires clarification and understanding.

The use of learning management systems unseals avenues to the world of e-learning, which is mainly about learning online, and also contributes towards part-time learning - students who study part-time can make use of the Internet to access lectures and information which they miss out on because of being unable to attend classes full time.

This paper argues and describes the types of LMSs and their benefits, the infrastructure needed for e-learning, policies that govern e-learning, and the challenges and opportunities associated with the use of e-learning for both students and lecturers. Through this review, the we aimed to gain a perspective on some of the assumptions she made about the role and effectiveness of these technologies to achieve good learning and teaching practices. I believe that the technological progress of e-learning is at a stage where it can be used effectively and efficiently to support student learning.

INTRODUCTION OF CONCEPTS

E- Learning can be broadly defined as the field of using technology to deliver learning and training programs. It is typically used to describe electronic media such as the CD-ROM, Internet, Intranet, and wireless and mobile learning (Kruse, 2010:n.p.). Knowledge management is also included as a form of e-learning. It took awhile for the right term to come about; since 1995 it was referred to as ‘Internet-based training’, then ‘web-based training’ (to clarify that delivery could be on the Inter- or Intra-net), then ‘online learning’ and finally e-learning, adopting the in vogue use of "e-" during the dot com boom.

An LMS can be defined as a program that manages the administration of training. It typically includes improving the functionality of course catalogues, launching courses, registering students, tracking students’ progress, and assessments (Kruse, 2010: n.p.). Siemens (2004:n.p.) states that learning management systems are often viewed as being the starting point (or critical component) of any e-learning or blended learning program. This perspective is valid from a management and control standpoint, but antithetical to the way in which most people learn today.

Blended learning is often referred to as a mixed mode of learning - a blend of conventional face-to-face lectures, workshops, and tutorials with learning online through activities like emailing, discussion forums, tests, quizzes and announcements (Obringer, 2010). In this type of learning, students receive their feedback from online quizzes and tests which help

them identify loopholes in their knowledge and ways to fill them. Almost all reputed online institutes offer blended learning for the overall benefits of the learning communities.

Collaborative learning is defined as learning through the exchange and sharing of information and opinions in a peer group. Computers excel in mediating collaborative learning for geographically dispersed groups (Kruse, 2010:n.p.).

HISTORY OF E-LEARNING

Most studies have shown that e-learning can be traced to the beginning of the 19th Century. According to Aranda (2010:n.p.), e-learning began at just about the same time that the first practical computer was developed for personal use. In fact, the concept, and practice of distance learning, he narrates, predates the computer era by almost 100 years. For example, during the 1840s in England, shorthand classes were offered by correspondence courses through the mail. The improvements to the postal service made this method of distance learning popular in the early part of the last century. This led to a large number of 'through the mail' type of educational programs. The computer only made distance learning easier, faster and better. Television, video recorders and even radio have all made a contribution to distance learning (Aranda, 2010:n.p.).

Although e-learning has grown to be at the forefront of contemporary issues today and the most researched area of late, there is empirical evidence that the use of ICTs in instructional delivery is not new. Educators have used computers and other information technologies as tools to increase student learning for over 30 years in the USA - since the 1960s when computer-assisted instruction (CAI) was introduced into schools (US Department of Education, 1996). CAI was developed to help students acquire basic skills, practice them, and measure learning gains. Likewise the use of videodisc technology has long been used for instructional delivery and, in its basic form, combines the features of video with the flexibility of a computer. It can either be used in a tutorial or an exploratory way (Aranda, 2010: n.p.).

TYPES OF E-LEARNING

Evans from the University of Zululand's e-learning portal (2008) identifies four types of e-learning, namely:

Informal - where a learner could access a website or join an online discussion group to find relevant information.
Self-paced - refers to the process where learners' access computer-based or web-based training materials at their own pace.
Leader-led - as the name suggests, this refers to an instructor, tutor or facilitator leading the process. This type of learning can further be divided into two categories: learners accessing real-time (synchronous) learning materials, and learners accessing delayed learning materials (asynchronous).

Performance support tools - which refer to materials that the learner can use to help perform a task (normally in software), such as using a wizard.

According to Pesic (2010:n.p), there are various kinds of online learning models that students can use as per their preferences. Each of these types is well-defined and linked to study resources and useful articles. Some of the models of online learning are described below:

Synchronous e-learning/ live. In this type of learning, communication between the participating individuals occurs instantly and the participants can access the information at the same time. Some examples of synchronous e-learning include virtual classroom or video/ audio conferencing and real-time chats. One of the major attributes of synchronous e-learning is that it offers instant feedback of the participant's performance. The only disadvantage of this type of learning is the fact that it does not offer self-paced learning and the logistics of scheduling.

Asynchronous e-learning. This is also known as store and forward e-learning, wherein the communication between the participants does not occur instantaneously (Obringer, 2010). Some examples of asynchronous learning include taking up self-paced courses, posting messages to various discussion groups, and exchanging e-mail messages with one or more mentors. However, one of the major disadvantages of asynchronous e-learning is that a student may feel isolated or less motivated because in the process, there is no opportunity for real time interaction with other participants. Additionally, unlike synchronous learning, asynchronous learning does not offer instant feedback on the student's performance.

BENEFITS OF E-LEARNING

The vast move towards e-learning is clearly motivated by the many benefits it offers. But however much e-learning is praised and innovated, computers will never completely eliminate human instructors and other forms of educational delivery (Kruse, 2010:n.p.). According to Bonk and Kyong-Jee (2006:n.p.), although e-learning has definite benefits over traditional classroom teaching, most researchers question its benefits. The most obvious of e-learning are flexibility and the savings made from not having to travel or spend excess time away from work. According to Kruse (2010:n.p.), there are also others that might not be so obvious. For example:

It offers **improved performance**. Most surveys have found that higher education students in online learning generally performed better than those in face-to-face courses.

It can be **self-paced**. Most e-learning programs can be taken when needed. The "books" that are set up using e-learning software create a module-based design allowing the learner to go through smaller chunks of training that can be used and absorbed for a while before moving on. Of course there will be time frames for finishing the course, but the student is still expected to work at their own comfortable pace (Moon, 2010).

It moves **faster**. According to an article by Jennifer Salopek in the "Training and Development Magazine," e-learning courses progress up to 50 percent faster than traditional courses. This is partly because the individualized approach allows learners to skip material they

already know and understand and move onto the issues they need training on. Students can benefit from supplementary material and primary sources.

It provides a **consistent** message. E-learning eliminates the problems associated with different instructors teaching slightly different material on the same subject. For company-based training, this is often critical.

It can work from **any location and any time**. E-learners can go through training sessions from anywhere, usually at anytime. This just-in-time (JIT) benefit can make learning possible for people who would never have been able to work it into their schedules prior to the development of e-learning

It can be **updated easily and quickly**. Online e-learning sessions are especially easy to keep up-to-date because the updated materials are simply uploaded onto a server. CD-ROM-based programs may be slightly more expensive to update and distribute, but still come out cheaper than reprinting manuals and retraining instructors.

It can be **easily managed** for large groups of students. Trainersoft Manager allows corporate training directors, human resource (HR) managers and others to keep track of the course schedule or assign training for employees and track their progress and results. Managers can review a student's scores and identify any areas that need additional training.

Increased access. Instructors of the highest caliber can share their knowledge across borders, allowing students to attend courses across physical, political and economic boundaries. Recognized experts have the opportunity to make information available internationally, to anyone interested, at minimum cost (World Wide Learn Website, 2010).

Convenience and flexibility to learners. In many contexts, e-learning is self-paced and the learning sessions are available twenty four seven. Learners are not bound to a specific day or time to physically attend classes. They can also pause learning sessions at their convenience (Wikipedia, 2010).

Skills development. E-learning allows people to develop the skills and competencies needed in the 21st century, in particular to ensure that learners have the digital literacy skills required in their discipline, profession or career. Bates (2009) states that a major argument for e-learning is that it enables learners to develop essential skills for knowledge-based workers by embedding the use of ICTs within the curriculum. He also argues that using e-learning in this way has major implications for course design and the assessment of learners.

According to Mutula (2002), e-learning allows administrators to compare strategies, assess the impact of ICTs, and make decisions. Through e-learning databases, the university community can share information resources by easily extracting full documents, synthesized

documents, details of contact persons, and links to other relevant sources. He further states that e-learning can also assist administration and management in saving money, streamlining operations, and monitoring students' progress. Administration can use technology to achieve cost savings by eliminating unnecessary travel. In an e-learning environment, databases can be maintained longitudinally, showing costs and other inputs. They can also be used to monitor student outcomes and academic improvement efforts.

INFRASTRUCTURE NECESSARY FOR E-LEARNING

Despite these positive developments, in South Africa today the majority of learners and schools do not have access to ICT infrastructure. The use of ICT in education is a recent phenomenon, mostly because of the history of apartheid education in the country and the subsequent under development of the majority of the population. It is this history that gives rise to the challenges as far as infrastructure is concerned.

The range of web-accessible technologies and services useful to learning, education, and training can be classified broadly into three categories, namely:
Infrastructure specifically purposed to support learning, education, and training;
Infrastructure that is not specifically purposed to support learning, education, and training, but is still essential in enabling it; and
More widely deployed infrastructure that may be useful for learning, education, and training.

In a much broader sense, infrastructure is widely applied to the totality of technologies and services that make up large scale deployments for particular learning, education and training communities. Given the complexities of capturing the conceptual models underpinning infrastructure development, there is no simple way to provide a succinct overview of current trends and initiatives.

POLICIES THAT GOVERN E-LEARNING WITHIN THE UNIVERSITY

For e-learning to take place, proper infrastructure has to be in place and has to be managed efficiently so that it is properly regulated. Each model and all equipment have to have certain policies to guide users on how to use or maintain them. In addition to the university's standard software applications, additional software may also be installed, such as CDRW burning software, Adobe Acrobat Reader, and other plug-ins that would assist with the use of the equipment.

In any e-learning environment, students should have a clear understanding of what the instructor expects from the students, and conversely what they expect from the instructor. The following policies are what the instructor might consider posting:

- E-learning policies in the syllabus
- Student privacy policies
- Email policies
- Software standard policies
- Submission of guidelines
- Assignment policies

CHALLENGES ASSOCIATED WITH THE USE OF E-LEARNING FOR BOTH STUDENTS AND LECTURERS

While there are a number of visible benefits and drawbacks of e-learning, it is not the be all and end all of every training need (Kruse, 2010:n.p.) It does have limitations, among them:

Up-front investment required for an e-learning solution is larger due to development costs. Budgets and cash flows will need to be negotiated.

Technology issues that play a factor, such as whether the existing technology infrastructure can accomplish the training goals, whether additional technical expenditures can be justified, and whether compatibility of all software and hardware can be achieved.

Inappropriate content for e-learning may exist, according to some experts, although they are limited in number. Even the acquisition of skills that involve complex physical/ motor or emotional components (for example, juggling or meditation) can be augmented with e-learning.

Cultural acceptance is an issue in organizations where student demographics and psychographics may predispose them against using computers at all, let alone for e-learning.

As e-learning evolves, challenges ranging from lack of equipment or computer literacy to deep-seated organizational resistance are being faced and resolved. However, there will always be new challenges. Mapuva (2009:n.p.) suggests that to meet them, learners, instructors, developers and managers need the following characteristics:

- A realistic understanding of the strengths and weaknesses of e-learning
- Complete dedication to transform the e-learning function successfully
- Creativity, flexibility and the diligence required to adapt e-learning to the specific needs of individuals and organizations
- The conviction to say no when they think e-learning is not the right solution to a business performance issue

Other issues that must be taken into account in using technology to provide information services in the university include equitable distribution of infrastructure across the country. Some geographic areas are not yet connected to the national power grid and such issues cannot be ignored. Other problems with power are fluctuations and surges that may be dangerous to electronic equipment. Because of this, there would be a need for backup power supplies and power stabilizers to protect the costly equipment that will be put into place. Within the country, tariffs relating to Internet connectivity, telephone and power supplies are reviewed from time to time and are not low by local standards.

CONCLUSION

The use of e-learning contrasts widely across universities in South Africa, and can range from the simple provision of course content online (handbooks and lecture slides), to the use of content management systems or virtual learning environments (VLEs) to provide synchronous or asynchronous learning and assessment (Ruiz et al., 2006). Many institutions have seen a steady rise in the use of VLEs. Of the institutions (41 %) that responded in a 2005 HE survey, over half claimed to use at least 1 VLE, with the numbers of registered staff and student users increasing year on year (Jenkins et al., 2005).

E-learning can be a very effective instructive tool for organizations and institutions that need to improve staff development and enhance learning processes. It can also be of great assistance in compliance training--making sure that the staff have the knowledge and skills they need to comply with relevant legislation and regulations. However, e-learning can also be a disaster if it is not managed correctly. It is not a panacea, but a means to an end. This type of training must be exactly the right fit for the institution in order to be successful. It should be chosen because it is the most efficient and effective way to meet the identified learning need. Like most organizational change implementations, a successful e-learning strategy requires very careful planning and execution. Generally, the use of e-learning should be encouraged in all fields of study to enable high interactivity between lecturers and students, although there are still a number of people that cannot recognize its benefits.

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Deploying Development Informatics in Bridging the Digital Divide: Challenges & Opportunities

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ABSTRACT
The paper discusses the inextricable link between ICT and development and opines that 'development informatics' has the potential to bridge the digital divide in developing countries. Current approaches to bridging the digital divide, particularly in third world countries, have failed to yield the intended outcomes, presumably because technology has been thrust onto communities without being integrated in their socio-cultural and economic milieu. The objectives addressed in this paper are twofold, namely to: demonstrate the inextricable link between ICT and development, and propose a development informatics model for bridging the digital divide.

Keywords: Development informatics, ICT4D, digital divide, economic development, participatory processes

INTRODUCTION

Governments the world over are preoccupied with bridging the digital divide because they believe there is a direct correlation between lessening or reducing digital inequalities and economic development (Dutta et al., 2004; World Economic Forum, 2003). In Botswana, for example, the government has promulgated a national ICT framework to drive social, economic, cultural and political transformation (Ministry of Communication Science & Technology, 2007). Development informatics is a new discourse covering a broad range of fields, including but not limited to health informatics, community informatics, social informatics, e-governance (government informatics) and e-learning (Matavire, 2010). Development informatics as a discipline provides new kinds of ICT systems that are socially relevant to remote communities - whether geographically or socially separated - by making life easier for individuals. For this reason, the World Bank (1998) recommended a systematic approach to deploying ICTs to meet the needs of rural communities. Development informatics ensure that before any ICT is deployed in rural communities, the needs and priorities of the people, in agriculture, education, commerce, natural resource management, health, etc., and gaps in the information needs and the actual information available must first be identified. This would make it possible to work out how ICTs can meet and address the community's information needs.

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Development informatics requires ICT solutions to be designed through the joint participation of all stakeholders in order to support the developing society's economic mirror the economic and socio-cultural exigencies and traditions of societies. In the context of this paper, development informatics is used as an all-inclusive term to refer to the application of information and communication technologies (ICTs) to enhance development. In this respect, the concept is used synonymously with Information Communication Technologies for Development (ICT4D). The term ICT4D has been used to mean the application of ICTs within the field of socioeconomic development or international development. Development informatics therefore concerns itself with directly applying information technology approaches to poverty reduction. Well applied, ICTs can benefit disadvantaged persons or aid organisations, non-governmental bodies, governments and businesses, and improve general socio-economic conditions (Sutinen and Tedre, 2010). The link between ICT and development cannot be overstated; Paliwala (2003) notes that the root cause of the global divide is the lack of economic development. Kofi Annan (2001:n.p) also goes on record to say that the new technologies changing our world are extremely powerful tools in aiding development because they create jobs and transform education, health care, commerce and politics, aid in the delivery of humanitarian assistance, and also contribute to peace and security.

However, in order for ICTs to positively transform the lives of people or communities, they must be deployed wisely. Bill Gates suggested that community centres or similar ventures are distractions from real problems of development. He noted that 99 % of the benefits of having access to a PC are gained when the person who sits down to use the technology has been provided with reasonable levels of healthcare and education (The Economist Newspaper and The Economist Group, 2005). According to Goode (2001), in order to use computers as tools for development, they must have relevant applications in the user's life. This view is shared by Peters (2003), who notes that installing computers and connections in underdeveloped communities is necessary to put ICTs to use for socio-economic development. In Botswana, an e-readiness assessment of SMEs (Mutula, 2008) found that rural communities prioritized government-initiated programmes that would enhance access to anti-retroviral drugs and/or provide information about where people could fetch good market prices or information on how to track lost cattle as opposed to interventions that were aimed at helping people gain access to the Internet or computers. Similar observations have been reported in South Africa where people were found to be more preoccupied with issues of security, shelter, access to clean water, electricity and access to health facilities (Geness, 2004) than consummating ICT for its own sake. This is in sync with Fink and Kenny's (2004) observation that in many developing countries, people face far more immediate, critical challenges, such as lack of access to water, food, medical treatment and education. Consequently, international aid needs to be directed to addressing basic needs.

In the developing world, especially in Africa, the thirst for socio-economic development to improve the living standards of people is dire, as reflected in some development statistics. For example, Dlamini (2004) observed that poverty in Africa appeared to be on the increase; the continent's GDP in 2004 accounted for only 1.5 % of global GDP. Likewise Africa's share of trade during the same year was estimated at 2.1 %. Although Africa epitomizes the challenges of development, other parts of the developing world are also affected. This is based on a statistic that showed that a person in a high-income country was over 22 times more likely to be an Internet user than someone in a low-income country. Secure Internet servers, a rough indicator of electronic commerce, were also over 100 times more common in high-income than in low-income countries. It was found that in high-income countries, mobile phones were 29 times more prevalent and mainline penetration was 21 times that of low-income countries. Relative to income, the cost of Internet access in a low-income country was 150 times the cost of a comparable service in a high-income country. With these statistics, UNCTAD concluded that greater use of technology in business, schools and homes could raise people's standards of living and prosperity. The Millennium Declaration through the Millennium Development Goals (MDGs) also acknowledges ICTs as essential ingredients for socio-economic transformation and key enablers of poverty reduction. In the context of Africa, the EU Strategic Partnership goal is in line with the MDGs in promoting the application of and access to ICTs, particularly in health and learning (EU, 2008).

UNPACKING THE ICT-DEVELOPMENT NEXUS

There are various models linking ICT and development from world bodies such as the World Bank, the International Monetary Fund, the United Nations Development Programme, and the World Economic Forum. These models make weak attempts to unpack how ICTs help socio-economic development. A more recent model that gleans from these models, proposed by Maung K. Sein and G. Harindranath (2004), analyses the role of ICT in national development. Their model was intended to correct the frequently held view that ICT is a monolithic or homogeneous "artefact" (Maung K. Sein and G. Harindranath 2004: 17). They argue that seeing ICT simplistically as a development-friendly artefact is an obstacle to understanding "exactly how ICT affects national development" (Maung K. Sein and G. Harindranath 2004: 15). Thus their original contribution was to unpack ICT as a development tool in order to understand it better and improve its chances of success. The S-H model consists of three principal levels, namely how ICT is used, how ICT is viewed, and how ICT impacts on development. Each level has different sub-levels. For example, 'how ICT is used' can be broken down into four categories, i.e. "as a commodity", "as supporting development activity", "as a driver of the economy", and "as directed at specific development projects". As a commodity, "ICT is seen as a product to be used to earn foreign currency through export." As a support for development activity, ICT helps in activities related to development, e.g. " … planning […] management […] training" (Maung K. Sein and G. Harindranath 2004: 17-18). As a driver of the economy, "ICT is conceptualized to have a macro-level influence (e.g., in infrastructure […] education [… and] the private sector.)" (18); and as directed at specific development projects, ICT is "conceptualized as having developmental impact […] within the context of targeted […] initiatives." (18) (Sein & Harindranath, 2004).

STATEMENT OF THE PROBLEM

The planning and management of ICT projects has had a poor track record, both in developed and developing countries, with the latter performing very poorly (Galliers et al., 1998; Qureshi, 1998; Heeks, 2002; Mgaya, 1999). The causes of failure may be attributed in part to the lack of representation of the target audience; paying little attention to infrastructure, training and technical requirements; deploying complex technologies; inadequate financial resources; and a failure to contextualize ICT to meet specific needs, such as employment. The early application of information technology focused more on tools, techniques and processes rather than on end users. Furthermore, as pointed out by Songan, Ab Habib, Yeo, Gnaniah and Zen (2004), dysfunctional patterns of technology diffusion served to prevent the poor, mostly the rural majority of developing countries, from benefitting from ICTs to the same extent as their educated urbanized compatriots. Through development informatics, it is now possible to integrate contemporary ICT into rural and poor urban communities' economic lives, thereby raising income levels and improving the overall quality of life.

Andrew and Petkov (2003:76) criticise ICT planning that places too much emphasis on "the end result" and the "hard engineering aspects". This is exacerbated by the tendency of ICT implementers to "standardize on technology" (Andrew and Petkov, 2003:80) using "off-the-shelf technologies that may not be well-known or tested for a problem at hand". Andrew and Petkov (2003:86) attribute this error to "the common reductionist tendency" of regarding "the technological subsystem as the whole". Heeks (2002:103), using the contingency theory, explains that factors influencing the success of a technology project lean toward a "situation-specific" approach. Consequently, whenever a new technology is introduced, there is the danger of a poor fit between the "tool" and the "task", resulting in what he calls the "design-actuality gap" (Heeks, 2002:103-104). Using this theory, Heeks (2002:102) reports a failure rate of 20 – 25 % among ICT installation attempts in developing countries.

Determinants that enhance the chances of successful ICT project implementation are multivariate. Green (2000), citing data from the *Education Week's* 2000 Teacher Survey, observed that when teachers were asked why they did not use software or the Internet for instruction, they gave some reasons that had nothing to do with access, instead citing lack of software training; the considerable amount of time needed to use technology; the school's computers being less powerful; the technologies not being aligned with the schools' curricula; and the difficulty of finding software that meets or addresses students' needs. Crump and Mclroy (2003), discussing a community-based project in Wellington, New Zealand, wondered why when computing was available in a socially situated, convenient environment, at no cost, some people still chose not to compute. Lenhart et al. (2003), in a research project also based in Wellington, New Zealand, on economic and social inclusion, also noted that not all "have nots" necessarily

want to be "haves", and not everybody views their engagement with ICTs as a positive force that would improve the quality of their lives. In Northern Ireland (UK), the free provision of computers, fast Internet access and a website to residents/ businesses of Ennis in 1997 to enhance ICT uptake and modernize the region was met with limited success because technology had been thrust onto people without their participation and with little preparation. Training programs had taken place, but they were not sufficiently accompanied by programs that demonstrated why people should use the new technology in the first place.

In some villages in India (new India), the so called knowledge centres situated deep in rural areas meant well in principle to bridge the urban-rural divide. However, it emerged that some of the residents living next to these centres did not even know that they existed and/or what they were all about (The Economist Newspaper and The Economist Group, 2005). This finding is in contrast to the optimism of the 1990s that rural ICTs would leapfrog development, information societies, and a host of other electronic age applications for previously excluded communities. Woherem (1993) noted that software applications that are used in Africa are based on western models and do not take into account local cultural sensitivities. In addition, much of the technology is transplanted without any re-engineering to suit local conditions. Cloate (2007), discussing e-government in Africa, observed that projects have tended to fail because of centralizing the use of technologies by national governments without extending the benefits to intermediary institutions such as local government, parliament, civil society, etc.; in other words not linking good governance to the broader and more inclusive democracy.

ICT PROJECTS, FAILURES & THE DIGITAL DIVIDE

The United Nations (2005) reported that the spread of information technologies to a select group of people in the world was worsening the disparities between the ‘e-haves’ and the ‘e-have-nots’, thus fuelling the danger that the unequal diffusion of technology, far from fomenting cohesion by providing opportunity, was reinforcing the traditional patterns of economic and social inequalities which could lead to the weakening of social bonds and cultural organisation. During the 2003 World Summit on Information Society (WSIS), Kofi Annan lamented that for too many people, the gains of ICTs remained out of reach. This assertion was corroborated by the International Telecommunication Union (ITU) when it published the ICT Opportunity Index (IOI) in time for the second World Summi of Information Society (SIS) in Tunis in 2005, which generally showed that digital opportunities were unequally distributed between developed and developing countries. Consequently, the gap between the ICT-poorest countries and most others was actually growing. They concluded that the ‘have’ and ‘have-not’ countries were worlds apart (International Telecommunication Union, 2005).

Governments the world over are increasingly promulgating universal access and service policies as key strategies to bridging the digital divide (Mutula, 2008). However, the cases of ICT project failures seem to suggest that focusing on providing access is necessary but not sufficient in bridging the digital divide. Warschauer (2002) made the observation that bridging the digital divide is much more than providing Internet and

computer connections, because access to ICT is embedded in a complex array of factors encompassing physical, digital, human and social relationships. Norris (2001) concurs in describing the digital divide as a multidimensional phenomenon encompassing global, social and democratic dimensions. Warschauer (2002) concludes that a social inclusion framework is needed to redirect the focus from providing access to technology, to the effective integration of ICT into communities and institutions for social development. Development informatics is aimed at applying technology for the benefit of all in society. Pitkin (2001) notes that it is important for technology to be designed with the needs of the community that will use it in mind if it is to be useable and accepted. Woherem (1993) points out that unless ICTs are integrated into the cultural milieu of African communities, the people would stand few chances of benefiting and therefore accepting such technologies. The European Commission (2005) likewise observes that the effective use of government services online must start with the involvement of people in the design of e-government applications.

The importance of integrating ICT into the cultural milieu of the people should be considered as a top priority in enhancing development at grassroots level. For example, Masizana-Katongo & Morakanyane (n.d.) point out that rural populations in Botswana were afflicted more with HIV/AIDS because they were victims of the digital divide and therefore lagged behind when it came to information accessibility. Whitacre (2008) describes how several studies have expressed concern that households without ICTs will be at a disadvantage in terms of not only economic development opportunities, but also prospects for communication and social interaction.

This paper therefore addresses two objectives:

1. To demonstrate the inextricable link between ICT and development
2. To propose a 'Development Informatics Participatory Model ' for bridging the digital divide

The first objective has already been addressed in the preceding sections. The next section focuses on the second objective.

DEVELOPMENT INFORMATICS MODEL FOR BRIDGING THE DIGITAL DIVIDE

In literature, customer behavior has been studied mainly from the perspective of technology diffusion, adoption or domestication using diffusion theories to explain different types of users in the context of 'early adopters', 'early majority', 'laggards' and 'non-adopters' (Rogers, 1995). Others have relied on the Technology Acceptance model to explain the adoption decisions of consumers (Davis, Bagozzi, & Warshaw, 1989). Emerging technologies that pervade most parts of developing countries, such as mobile phones, now call for a different model to explain diffusion and the adoption dynamics of

people, since factors such as culture, values, local norms and customs have been found to have a significant impact on the adoption of mobile services in society (Rafiq & Gao, 2009). A model is a human construct intended to help in the understanding of real world systems as it simplifies assumptions and helps in understanding an abstract phenomena. There are many types of models, but for the purposes of this paper, a conceptual model is seen to demonstrate how people receive information, process it and respond accordingly (MacKay, 2010). Conceptual models are appropriate and desirable to use when introducing a topic as they help learners or interested parties get interactively involved with the creation, evaluation, and refinement of such conceptual models.

The model proposed in this paper (see Table 1) is premised on six pillars, i.e. development, information, technology, community informatics, e-government, and 'Batho Pele'. Each pillar has several dimensions that indicate the key elements that deserve to be taken into account in the planning and design of ICT projects to ensure the participation of end users. The participation pillar is the foundation of this proposed model and focuses on how to integrate participatory processes with information and communication technologies. The model incorporates the participatory design of information technology resources and popular education by which people are empowered to teach themselves rather than be told by outsiders what they should learn and how they should learn it. Through popular education, people have the power to study their own community and begin to identify local community development issues. They would also identify a set of information issues or the information needed to support specific community development projects.

The Millennium Development Goals (MDGs) are the source of the development pillar. The United Nations Millennium Declaration of 2000 identified eight MDGs for improving the human society. These goals include the eradication of extreme poverty and hunger; the achievement of universal primary education; the promotion of gender equality, empowerment of women; the reduction of child mortality; the improvement of maternal health; combating HIV/AIDs, malaria and other diseases; ensuring environmental sustainability; and developing global partnerships for the attainment of a more peaceful, just and prosperous world (United Nations, 2000). According to Zaidi (2005), economic development is "growth in GDP accompanied by relevant social and institutional changes by which that growth can be sustained". These changes include reducing absolute poverty, a better quality of life, high literacy levels, improved labour productivity, sophisticated techniques of production, development of physical and commercial infrastructure, higher savings, increase in employment opportunities, a positive attitude towards life and work, and a stable political system.

The information pillar in the proposed model borrows from the Consumer Information Processing model and WSIS manifesto. The Consumer Information Processing model posits that individuals have limitations in the amount of information they can acquire, use and remember. Therefore when imparting information, it is prudent to choose the most important and useful points to communicate, whether orally or in print. Processing, acquiring and evaluating information accordingly is affected by

motivation, attention and perception. People should be provided with information that does not require them to expend a lot of energy to obtain, but instead draws their attention and is clear. Furthermore, the amount, location, format, readability and processability of relevant information are important factors in designing information systems tailored to fit the audience (The Communication Initiative Network, 2003). Stoeker (2004) notes that information for development should focus on what kinds of information the community wants in order to implement a particular development, organizing, service, and/or advocacy project.

The final *communiqué* of the World Summit on Information Society held in Geneva in 2003 made a declaration of the common desire and commitment of the world to build a people-centred, inclusive and development-oriented information society, where everyone could create, access, utilize and share information and knowledge, enabling individuals, communities and peoples to achieve their full potential in promoting their sustainable development and improving their quality of life (WSIS, 2003). The declaration of principles also envisaged spreading the benefits of technology to all in society by connecting villages through ICTs and establishing community access points; connecting universities, colleges, secondary schools and primary schools through ICTs; connecting scientific and research centres through ICTs; connecting public libraries, cultural centres, museums, post offices and archives through ICTs; connecting health centres and hospitals through ICTs; connecting all local and central government departments and establishing websites and email addresses; and adapting all primary and secondary school curricula to meet the challenges of the information society. Furthermore, it is necessary to ensure that all of the world's peoples have access to television and radio services, as this would mean that more than half of the world's inhabitants would have access to ICTs within their reach (WSIS, 2006).

The ICT pillar is derived from the Sein-Harindranath model. This explains the inextricable relationship between ICT and socio-economic development. ICT provides the pipes through which information can be transferred to the community. Furthermore, ICTs provide the means by which information can be gathered and reformulated in tailor-made forms to meet the different needs of individual community members. When properly used, ICT has the potential to empower people to overcome development obstacles, address social problems, and strengthen democratic institutions. The importance of ICT in the implementation of development programmes cannot be overemphasised. Out of the 48 indicators used to benchmark progress towards the MDGs, the last three read thus: 1) To increase the percentage of the population with access to telephone lines and cellular subscribers; 2) To increase the number of personal computers; and 3) To increase the number of Internet users (ITU, 2005).

The community informatics (CI) pillar is borrowed from CI as an emerging discipline that focuses on applying ICTs to enable community processes and the

achievement of community objectives. Among the areas of most immediate concern and for which CI is an appropriate response, is overcoming "digital divides" (Gurstein, 1999). The CI pillar facilitates the understanding of development informatics because outside organizational contexts, it focuses on communities, and by and large such communities are believed to mirror the level of development in any given jurisdiction in as far as access to vital resources such as education, health, sanitation facilities, water, infrastructure, and participation in governance is concerned. Through CI, rural communities gain access to local or regional market information for small traders; access information about social and health services; access information that enhances customerto- customer or community-to-customer (C2C) transactions (e.g. tourism); access information to improve spatio-temporal relations for NGO work; access information on employment in the ICT-sector or jobs requiring ICT skills for family members; access information about legal or policy information; access information to facilitate business to business (B2B) transactions; and access services provided by international NGOs, among others.

The e-government pillar in the model is founded on the notion of a transformative modern government concerned with applying ICTs within public administration to optimise its internal and external functions, [thereby providing] the government, citizen and business with a set of tools that can potentially transform the way in which interactions take place, services are delivered, knowledge is utilised, policies are developed or implemented, and the way citizens participate in public administration reforms (United Nations, 2008). E-government is perceived to be a panacea to the deficiencies of traditional forms of government where citizens physically go to government offices to apply for passports, birth certificates or death certificates, or file tax returns, with the attendant delays that arise out of long queues, lost files or the absence of relevant officials (United Nations Department of Economic Affairs, 2006).

The 'Batho Pele' pillar is derived from the South African e-government's brand name which translates in English to mean 'people first'. Batho Pele consists of a number of principles which are considered to be a good policy and legislative framework for service delivery in the public sector in South Africa. These principles include (Department of Public Service and Administration, 1996) consultation (engaging with customers in terms of what they want); service standards (continually improving services); access (enabling disadvantaged persons to access services, speaking in understandable languages, etc.); courtesy (being polite, courteous and friendly to customers); information (reaching all customers to make sure they are well informed about the services government departments provide); openness and transparency (being open and honest about every aspect of work by publishing annual reports to tell citizens how resources were used, how much everything costs, including costs for staff, equipment delivery, services, etc.); redress or dealing with complaints (providing a mechanism for customers to record when they are unhappy with a service, etc.); and best value (giving customers the best service using all the available resources; eliminating waste, fraud and corruption; and finding new ways to improve services at little or no cost).

The proposed Development Informatics model is summarized in Table 1 below:

Table 1: Pillars & Dimensions of Proposed Development Informatics Model

No Pillar name Dimensions Source

No	Pillar name	Dimensions	Source
1	*Development*	Eradicating poverty; gender equality, empowering women; improving people's health; combating diseases; environmental sustainability; better quality of life; high literacy levels; good physical and commercial infrastructure,; a democratic political system	MDGs, WSIS,
2	*Information*	Useable information, effective communication channels, information accessibility, information integrity, information currency, appropriate format, relevant information, readability, custom-made information systems, development-oriented information, local content, linguistic diversity, multiculturalism	WSIS, Information Processing Model,
3	*Technology*	e-inclusion, information reformating digital literacy, digital divide, digital dividends, universal access, universal service, appropriate technologies, mobile phone penetration	WSIS, ITU, Sein-Harindranath
4	*Community informatics*	Community processes; community objectives; access to health, sanitation facilities, water, infrastructure; participation in governance; access to information on SMEs; information on employment, legal or policy information; NGOs services	Community Informatics
5	*E-government*	Government-citizen engagement, improved service delivery, e-democracy, e-services, e-business, e-commerce	E-government
6	*Batho Pele*	Consultation, service standards, access, courtesy, availing information to all, openness and	South African e-government Batho
		transparency, system of redress, best service value, reducing fraud and corruption, new ways to improve services, affordable service costs	Pele principles

Development informatics in bridging the digital divide

Development informatics draws its relevance from how it is applicable to all levels of society and enhancing digital inclusion. The EU for example, conceived the idea of e-inclusion to refer to employing modern ICT technologies to address issues of the access divide and promote opportunities for the economic and social empowerment of all global citizens (United Nations, 2005). E-inclusion envisages a future in which all people have access to social and economic opportunities and can use technology. In this context, the WSIS (2003) noted that the digital revolution, spurred on by the engines of ICTs, had fundamentally brought about new ways of, among other things, conducting economic and business practices, running government, engaging politically, providing the speedy delivery of humanitarian aid and healthcare, and improving the living standards of

millions of people around the world. In an article entitled "Mobiles narrow digital divisions", BBC News (2008) noted that mobile phone and net access were helping narrow the gulf between rich and poor nations. The efficiencies these technologies brought had boosted development in poorer countries. In Africa, where the increase in terms of the number of mobile phone subscribers and penetration has been greatest, the economic life of most people has improved. For example access to mobile phones by rural communities in Uganda and the small vendors in South Africa, Senegal and Kenya has helped traders get better prices, ensured that less went to waste, and improved the speed of transactions.

In India, an ICT health pilot application in Rajasthan successfully empowered village healthcare workers, burdened by demanding data-collection and paperwork responsibilities, to provide timely healthcare information. This problem was addressed by substituting manual registers with client data stored on handheld computers which can be accessed through a variety of icons. Another project in agriculture used ITbased machines at milk collection centres to measure the butter/fat content of milk, test the quality of the milk, and make prompt payments to farmers. This significantly reduced incentives to cut the milk by adding water and reduced the time for payments from 10 days to less than five minutes, thus instilling confidence in farmers in the cooperative set up (Subash Bhatnagar and Robert Schware, 2000). Also in India and with respect to good governance, the Computer-aided Administration of Registration Department (CARD) was implemented by the Government of Andhra Pradesh (AP) to improve the efficiency of its administrative offices and to become more responsive to its citizenry. Other success projects include the Honey-Bee Knowledge Network, which was implemented to augment grassroots inventors and overcome language, literacy, and localism barriers; the Warana Wired Village Project, designed to provide agricultural, medical and educational information to villagers through networked booths in the villages; and adapting and using ICT to enhance functional capacity and improve the employment potential of disabled people by using speech synthesisers and 'talking computers' (Subash Bhatnagar and Robert Schware, 2000). Similarly in Indonesia, mobile networks have helped connect a population dispersed over 17,000 islands, while in Pakistan, mobile technologies have been used to benefit low-income communities by offering them a chance to connect to the wider world, as some of them experienced during the earthquake in October 2010 (Gao & Rafiq, 2009).

Heeks & Kanashiro (2009) found in Peru that people living in mountain regions who suffered social, political and economic exclusion used ICTs to enable new and positive resource flows to teenage students and young farmers. The ICT that was deployed is presently used to maintain social networks and support information searches that have improved agricultural practice. Through ICTs, remittance payments are facilitated, health and online information is made available, tourism is enhanced, and there are improved sales of agricultural produce to external markets (Lightfoot, Gillman, Schueurmeier, & Nyimbo, 2008).

The South African Vodacom cellular phone service provider deployed more than 90 000 community service telephones to under serviced areas where they have become invaluable sources of entrepreneurial activity for hundreds of community phone-shop operators. Since its launch in 1994, the Community Phone Shop concept has expanded into that of communication centres, allowing entrepreneurs, job seekers and schoolchildren access to essential business communication services such as faxes, e-mail and the Internet daily (Department of Communications, 2008:116). Such multipurpose community centres are enabling people to gather information and create, learn, and communicate with others while developing essential skills (Benjamin, 2000). South Africa has about 355 multipurpose community centres (including cyber labs in schools with ICT equipment to enable Internet access and provide multimedia services) that provide ICT services, particularly to rural areas (Farelo and Morris, 2002).

The Independent Electoral Commission (IEC) of South Africa has on three occasions since its first multiparty election in 1994, leveraged ICT to promote free and fair elections. In 2004, for example, IEC, in partnership with cell phone service providers, enabled voters to Short Message Service (SMS) their identity number, and in return receive a message back indicating their eligibility to vote and the voting station's details. Moreover, a satellite-enabled network made it possible for the commission to register voters; relay, collect and verify ballots; and relay results across the country. The tabulation database system was also linked via a wide area network (WAN) to all district collation centres (Coleman, n.d.). Custom-designed handheld scanners captured information from bar-coded ID books and greatly streamlined the process of voter registration. A more recent e-government project is the South African
Revenue Services' (SARS) e-filing system, which provides a way to conduct transactions related to tax returns on the Internet between government and business (G2B).

The South African government also successfully deployed the National Traffic Information System (eNaTIS), which is used for applications for driving licenses and the registration and licensing of motor vehicles; notification of change of ownership or sale of motor vehicles; and applications for learner's licenses. The transactions and services can be provided by most transport offices across the nine provinces in the country (National Traffic Information System, 2008). During the first six months of 2008, more than 75 million transactions were performed on eNaTIS. With the exception of routine maintenance outside of business hours, downtime was virtually non-existent in the first half of the year, and phenomenal system processing time was experienced. The eNaTIS processed 96 % of all transactions in less than two seconds, 99.8 % in less than 10 seconds, and 99.95 % in less than 60 seconds. Before e-NATIS was launched on 12 April 2007, its predecessor (Natis) managed an average of 300 000 transactions a day. Now, the average rate of daily transactions is 600 000 (Segar, 2008).

In Botswana, the government has extended telecommunications services to most villages in rural districts covering the Central, North West, Chobe, Ghanzi, and Kgalagadi Districts of the country (Botswana Guardian, 2009) The project, known as Nteletsa II, is part of the government's telecommunications development programme which seeks to extend telecommunications services to all rural areas of the country. Nteletsa is a Setswana word which means 'call me'. The government, through the local telecom operator, launched Nteletsa II to provide mobile services capable of delivering the Internet, voice and data. One of the key objectives of the project was to provide a shared telecentre in each village with telephone lines and Internet access operated by the national telecom operator in partnership with local communities as a means of empowerment. The telecentres provide other basic services such as charging mobile phones, desktop services, photocopying, scanning and printing. The government also introduced the bolus system (a chip is inserted into an animal and monitored through a centralised computer system) as a compliance measure to European Union regulations for accepting Botswana beef exports to its member countries. This followed several incidences of foot and mouth disease in Botswana. The bolus system tracks cattle from the farm to the slaughterhouse. The purpose of the bolus system is to improve the identification of respective animals, thereby reducing illegal trade and livestock theft (Kalusopa, 2009).

Nelson (2009), in the context of the Philippines, says teachers use mobile phones to receive videos delivered over school-based televisions via satellite. An anti-corruption website with an online portal also helps in reporting cases (of corruption). Cases are investigated and thereafter names of all public officials who have been convicted of corruption are published to shame them. The website also focuses on a network of community-owned rural Internet kiosks through which government records can be accessed. The website includes recognition of community involvement in both maintaining the sustainability of Internet access and in advising on content available in e-governance solutions. With respect to health, mobile phones and ICT are applied to improve health outcomes by monitoring various websites that ask for feedback via text messaging and through the generation of reports.

In the context of e-government, some countries have made good progress in implementing e-governance systems that are tailor-made to suit various citizen needs. For example, the Singaporean government portal provides information services on culture, recreation, sports, defence and security, education, employment, family, community development, health and the environment. The portal also includes usercentric hot links such as "give us your feedback on national issues and policies" (Government of Singapore, 2004). The Canadian e-government portal, on the other hand, enables public participation that allows individuals to share their opinions on specified subjects, or to participate in various activities (Government of Canada, 2006).

CONCLUSION

This paper has demonstrated the inextricable link between ICTs and development; provided examples of the practical application of development informatics; and proposed

a Development Informatics Participatory model for bridging the digital divide. The author has adduced that current approaches to bridging the digital divide have not led to desired outcomes because technology is not integrated in the social and economic milieu of the targeted communities. The author has argued that a model based on development informatics would provide a solid framework through which technology is designed and implemented to support people and their activities, thus enhancing e-inclusion. The author acknowledges that development informatics alone will not be enough to address the intricacies of bridging the digital divide in developing countries without addressing the conventional challenges that already afflict developing countries, such as poor ICT infrastructure, poverty, limited ICT skills, inadequate resources, etc.

The prospect of using the Development Informatics model proposed in this paper in attempting to bridge the digital divide, especially in developing countries, will not be without challenges. Development informatics is an emerging field; certain challenges need to be anticipated so that appropriate interventions can be designed. Matavire (2010) observes that development informatics is a dynamic, complex, morally challenging and altruistic area. Among the greatest threats of new technologies, is that they have the potential to perpetuate and expand existing power relations and inequalities. From the perspective of e-commerce, growth in this area remains slow as citizens have yet to trust the electronic environment because issues of transactional security, privacy and data integrity are yet to be addressed. The challenge related to limited awareness and ICT skills affects the realization of the benefits of development informatics. Without an educated, ICT-aware populace, no community can fully participate in the networked world. The serious shortage of ICT skills in developing countries must also be addressed in deploying technologies so that adequate capacity is developed to manage, integrate and sustain them. To empower communities to respond to and avoid these threats, development informatics must enable and function in a fully democratic process.

Finally, development informatics as an emerging discourse needs to be continuously researched to make it more effective as an alternative in addressing the perennial challenges of bridging the digital divide in developing countries. The 4th International Development Informatics Association Conference identified ICT failures and successes (Matavire, 2010) as a topic of interest. Research should also extend to cover non-discriminatory systems for creating, disseminating, using and re-using information, and managing information for the common good. The use of mobile technology in the delivery and management of healthcare services for the poor in society needs greater attention, especially in line with the MDGs. As most countries increasingly implement and disperse ICT to their citizenry, the uptake and use of such technology needs to be assessed to determine the impact it has brought with respect to socio-economic development. Indicators for measuring the uptake of technology need to be researched further, especially in the context of developing countries where there is a paucity of local content and limited broadband access.

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Patron 2.0: Characterization of The Dotcom Library User

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ABSTRACT

Library users have changed with the information environment. As a matter of fact, many library user studies indicate that the pace of this change is faster now than ever before. Consequently, a new breed of library users, known as Patron 2.0, has emerged. This study, conducted through documentary analysis, unveils the core characteristics of these users and how librarians can support them to maximize the benefits of their library usage.

Keywords: Library 2.0, Patron 2.0, Web 2.0, information seeking behaviour

INTRODUCTION

Many studies have demonstrated that the environment in which library services are offered has changed drastically. In fact, some scholars have described the situation as 'the climate of ceaseless change' (Giesecke, 1994; Haricombe and Lusher, 1998). For instance, Rainie (2009) notes how the volume of information has grown drastically; the variety of information, its sources and format of presentation have increased; the speed of information flow has increased; times and places to experience communication media have expanded; the number of information perspectives and points of view has exploded; and people's interest in and alertness for information has grown. One other element of this change is the emergence of a new information-seeking behaviour that involves a kind of skimming activity, where patrons peruse just one or two pages from an online resource or site and then 'bounce' out, perhaps never to return. With this new information-seeking behaviour has also emerged a new brand of library user, described as Patron 2.0, who generally finds it easier to "Google" than drive to a library. With some studies also indicating that many such users are reducing their level of use of traditional library services, it is important that librarians continue to understand the key elements of the information-seeking behaviour of their patrons, including those designated Patron 2.0. Such an understanding will enable librarians to satisfy the information needs of these patrons, keep them as users, and encourage a stronger recognition of the added-value to be gained from using a library. Through documentary analysis, the authors highlight the characteristics of these emerging users and relate them to the Web 2.0/Library 2.0 debate.

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MANY USER STUDIES SHOW THAT LIBRARY USERS' NEEDS ARE CHANGING FASTER THAN EVER BEFORE

Salwasser and Murray-Rust (2002) conducted a needs assessment of the users of the Oregon State University libraries and found that the users wanted to find, retrieve, integrate and synthesize well organized information, quickly. The study also found that although many scholars of librarianship and practitioners recommend the involvement of the relevant stakeholders early and, indeed, at all stages of new library developments, the common approach still seems to be to ignore the users (Salwasser and Murray-Rust, 2002). Salwasser and Murray-Rust (2002) also cite a study conducted in 1998 at the Archaeology Data Service at the University of York in the United Kingdom which found that archaeologists want large quantities of varied kinds of information. The same study also revealed that the archaeologists wanted free access to such content and services (Condron, Richards et al., 1999). Farkas (2008) also explains that the user studies which she has conducted recently reveal that users wanted to have more full-text articles available online so that they didn't have to use interlibrary loans, a notion she calls self-sufficiency.

OCLC's (2005) report and other statistics (Aiken, 2006) also indicate that libraries are rapidly relinquishing their place as the top sources of inquiry (Chad and Miller, 2005). Indeed, a sizable number of current library users indicate that they will reduce their library use in due course (OCLC, 2005). This change can be attributed to the constantly shifting expectations of users, especially revolving around the time and convenience of use of library services and collections (Ramos, 2007; Farkas, 2008). Fundamentally, modern library users simply expect to be able to access any information they want any time, anywhere (Yu, 2007; Pauli, 2008). They want the library service to fit their lifestyle and not vice versa (OCLC, 2005).

The OCLC (2005) research highlights very unflattering perceptions of the modern library user about the library and its resources in the light of the digital revolution: 1) A large number of users begin their information searches with search engines, not librarians or catalogues; 2) People who have used both search engines and librarians for information searches admit that both approaches yield results of more or less similar quality; 3) Libraries are about the provision of outdated, dirty, bulky and often unavailable books, not information; 4) The library is not the first or only stop for many information seekers, and although this is not an entirely new finding, the situation is worse now because more alternatives to the library exist; and 5) Information seekers are not satisfied with the library experience and desire that it should stretch beyond books, crowded noisy reading areas, limited parking, bureaucratic limitations on the use of resources, need to travel, as well as unfriendly, unavailable and inadequate library staff.

Mostert (2009) also explains that library users tend to measure the quality of services and products based on the library's level of investment in Information and Communication Technologies (ICTs). She also adds that users perceive the library's relevance to emerging needs based on the currency of the information tools available for the users in the facility. Webster (2002) supports the view that library users are beginning to evaluate the usefulness of libraries in terms of the availability of ICT tools and how accessible they are to the patrons.

But there are scholars who caution that the library's central core identity and role have and will remain the same. They argue that although methodology changes with technology, meeting user needs has and remains the crucial role of libraries even when looking into the future. Although they admit that technology makes it possible for almost any place to become a library, they assert that physical libraries will continue to serve as destinations for people who wish to engage with other people and artefacts in the pursuit of understanding. They suggest that library buildings should continue to include traditional reading rooms which are cherished by all ages of readers and are likely to remain over time. Nonetheless, they propose that these reading spaces should be adjusted to accommodate new trends and technology in information seeking and use. For instance, provision of less formal rooms with soft chairs that provide group study spaces enabling users to work together as teams have been recommended. It is also being suggested that fewer books be housed in the immediate proximity to readers, but that more space be created for refreshments and users' personal gadgets, such as iPods or laptops (Blyberg, 2006; Pauli, 2008; Eager, 2009). Some users also demand more ICT tools such as Digital Video Disc (DVD) burners, unrestricted Universal Serial Bus (USB) access on Personal Computers (PCs), little or no restrictions on Internet access, the ability to install their own software, unrestricted quotas on network facilities, and MPEG-1 Audio Layer-3 (MP3) file sharing terminals (Webster, 2002; Stephens, 2007).

Isaacson (2006), on the other hand, argues that libraries should only seek to meet the needs of users, not their wants. There is contention, however, on who and how to determine library users' needs and wants. Isaacson (2006) justifies his view by explaining that a library should not try to compete with Barnes & Noble, which is interested in direct profits. He concludes that libraries should not experiment with populist ideologies but should be brave to tell the users that some questions need to be sifted, refined, checked in multiple sources, and perhaps even reframed before they can be answered adequately. He admits that there are occasions when the librarians may be wrong, but he also emphasizes that the users cannot also always be right. He cautions that there is no need for "Wal-Mart greeters" in libraries.

Other scholars also point out that some librarians are importing terminology used in the private commercial world into librarianship without adequate consideration of the implications. For instance, they argue that the concept of customer care as used in the commercial spheres where products are sold to clients cannot be applied to library users casually. They describe this as a rhetoric dissonance which is oblivious of the fact that libraries do not serve the same need as retail outlets. They do, however, clarify that there

are many techniques that librarians can learn from the commercial world. Nonetheless, they point out that such adoptions should not only be appropriate, but also proper (Hoadley, 1999; Hernon and Nitecki, 2001; Budd, 2005).

Significantly, many librarianship scholars agree that there is a new emerging breed of library users which some authors have described as very different from past users in various perspectives. These differences are manifested through their expectations about access to, availability and findability of information; time use; personal efficacy and effort to enhance their library usage; as well as the rewards and challenges of networking for social, economic, political and other purposes (LaGuardia, 1996; Zimmerman and Tu, 2003; Rainie, 2009).

KEY CHARACTERISTICS OF PATRON 2.0

The concerns of the new breed of library users are immediacy, intricacy and interaction. Indeed, a study conducted by CIBER (2008) found that the new breed of library users exhibit a unique information seeking behaviour which is perceived as being horizontal, "promiscuous", diverse and volatile. The findings of the study further suggest that the new breed of users: 1) Is generally more competent with technology, pick up these skills on the move through trial and error and expect a lot from ICTs; 2) Prefer interactive systems and are turning away from being passive consumers of information; 3) Have drastically shifted to digital forms of communication such as texting rather than talking; 4) Multitask in most, if not all, areas of their lives; 5) Prefer info-tainment approaches to traditional information provision; 6) Have limited tolerance of delay in the provision of services; 7) Find their peers more credible as sources of information than authority figures and structures; 8) Feel the need to remain constantly connected; 9) Believe everything is on the Web; and 10) Is format agnostic. Evidently, Patron 2.0 is comfortable with and enthusiastic about technology; expects instant gratification; prefers downloading or getting information digitally; has no time; prioritizes convenience; desires easy access; and prefers discovery (Ramos, 2007; Ayre, 2008; CIBER, 2008; Kiran and Singh, 2008; Rainie, 2009).

Clearly, Patrons 2.0 are not just content consuming library users. They are content creators, creating their own content and augmenting existing material through annotations (adding tags or comments) or cross-referencing (adding links) within a dynamic and collaborative information space (Pienaar and Smith, 2007; Dussin and Ferro, 2009). Searchable tags supplied by users, and in their own language, could be more useful than those developed through conventional means. Some scholars have also argued that to this breed of users, conversations, research and learning never end (Primus, 2009). The users interact and create resources with each other and with the librarians and thus blur the lines between the user and librarian, creator and consumer, as well as authority and novice (Maness, 2006). Consequently, they appreciate efforts to empower them to create or manage content (Casey and Savastinuk, 2007). Furthermore, these users are creative.

In fact, many of them create as much as they consume and want to share and collaborate. They want library systems to be easy, quick, recognizable and flexible (Pauli, 2008). Patrons 2.0 view the library as a platform where user-contributed content is being used to add value, is fun to work in and has something for everyone (Ayre, 2008). Though most of the information searching and delivery tools embraced by Patrons 2.0 are free, studies indicate that these users are also ready to pay for any information, product or service they consider valuable.

Patrons 2.0 prefer to be given appropriate options for information format, method of delivery, and fulfilment type, including loan, copy, digital copy, and purchase (Ayre, 2008). These users also would like to be able to personalize their spaces (whether digitally or physically), for instance choosing the background colours of the website, font sizes and faces, or greetings. Even though boundaries are inevitable, Patrons 2.0 prefer experimenting with the widest range of options. Being given options gives these users the feeling that they are in charge of their usage. Patrons 2.0 relish being in control (Ramos, 2007). It is also a perspective of self-service where the patrons conceptualize, actualize and review their own usage. Basically, Patrons 2.0 are also described as visual learners; have a low threshold for boredom and memorization; need customizable learning experiences; enjoy active or hands-on learning; and are hyper-text, not linear thinkers (Wheeler and Harris, 2006).

The emerging breed of patrons perceives library use as part and parcel of their lives and applies a multiplicity of approaches and technologies to seek and use information. To them, boundaries between social and work information seeking activities are blurred and they apply several different methods of communication to satisfy their information needs. This explains why they are more comfortable with infotainment than conventional communication. They play video games, listen to music and use library information all at the same time. They are adventurous and live on the edge of emerging technologies. Thus, to them, email is dated; Instant Messenger, Twitter, Facebook, and MySpace are the tools to use to seek, use and share information. They also exhibit an expectation/desire to use their own equipment such as phones, laptops, or applications. So, they expect the library to have facilities which will enable them to plug in and use their own appliances easily (Primus, 2009; Saecker, 2010). Libraries which provide more social information resources such as video games have registered an increment in usage, especially among the younger people. But again, the same libraries have experienced reduced usage from older patrons (Kirriemuir, 2007).

Patrons 2.0 appreciate an information experience that is responsive and fuelled by questions; provokes conversation; is built on identity; measures with currency; demands personal investment; and is guided by safely-made mistakes (Warlick, 2010). Significantly, they prefer to remain in constant touch with their colleagues and librarians through myriad communication tools and techniques. They value feedback mechanisms enabling them to provide suggestions and comments about the services and products of the library. So, whether it is rating or reviewing information resources through tagging or responding to user surveys, the emerging breed of library users would like open and

seamless communication systems between them (library users), the library and beyond, encompassing alerts, updates, feeds and social networks (Rainie, 2009). Critically, they also want their suggestions or comments acted on and when the suggestions are not implemented, they would like dialogue on the decision (Casey and Savastinuk, 2007). Effective feedback mechanisms build relationships with the users and enhance their ability to contribute to and benefit from the library services. When users understand the library's plans and activities, they fit better with the library's mission and do their part in facilitating its fulfilment (Metz, 2002; Singer and Griffith, 2010).

The new breed of users does not see the library as the centre of their information environment. These users rely more on networked information systems such as the Internet and the World Wide Web. This partly explains why most of the library users now turn to the Internet instead of travelling to the library. However, some library scholars are quick to point out that this apparent overreliance on the Internet as the trusted source of ready information may be misguided. For instance, Zimmerman and Tu (2003:120) explain that the new breed of library users often uses inadequate search engines and obviously get "a morass of disorganized, incomplete and sometimes inaccurate information". Sadly, they explain, the users seem to be "perfectly happy with the results". A better approach, however, should balance the usage of the different forms of information sources. The librarians should educate the users on how to identify and use credible Internet information sources. Although the new breed of users may exhibit a know-it-all-attitude, the librarians should impress upon them the fact that not all the ready pieces of information accessible via the World Wide Web and other sources are authoritative, especially on sensitive subjects.

The new breed of patrons is accustomed to the notion that books and coffee go together just like movies and popcorn. They view the library space as useful for collaboration, entertainment and refreshment. They want information about their friends and submit personal updates to their friends, share events that they could go to, and wish to know what their friends are reading, who their friends know, and what movies their friends are watching. Libraries should therefore create spaces with a warm and welcoming ambiance and decor where users love to linger longer. The effective use of such spaces also requires effective programming to schedule activities such as book talks, software demonstrations, discussion groups and performances (stand-up comics or yoga) which create a platform to engage the users (Dilevko and Gottlieb, 2004; Isaacson, 2006). The greatest challenge in creating these socializing areas is space constraints in most libraries. Some libraries, especially in the West, have already begun modifying their structures to accommodate this emerging need (Dilevko and Gottlieb, 2004). But as the libraries take on these new roles, they are apparently admitting that they can no longer attract users with their collections alone. Similarly, debate is still ongoing as to whether attracting more people through social programming would translate to improved use of the library collections and services. Some scholars have also pointed out that though

coffee and books may go together, they cannot mix together on tables - coffee damages books (Marshall, 1998). Nonetheless, the important issue here is the emerging opinion that library services will soon be established together with other services. Thus, the library will no longer be a stand-alone institution, but a conglomeration of several entities providing integrated services.

Most Patrons 2.0 have embraced what some scholars have described as "mobility", drawing them deeper into the digital world to the extent that they feel a sense of obligation to stay connected and cannot afford to be off the grid (Ramos, 2007; Rainie, 2009). They are nomadic and expect services where they are when they need them. They own mobile devices which have converged technologies such as video, audio, Geographical Positioning Systems (GPS) and/or wireless Internet connectivity, enabling them to remain connected anytime anywhere. In essence, the library is where the mobile device is. Whether on the train or in the grocery shop or restaurant, this breed of users can seek and use information from a wide array of mobile computing devices (Morgan, 2009; Tarulli, 2010). It is therefore incumbent on the library to deploy services, such as text message (SMS) referencing or mobile search applications, and content which are downloadable on mobile devices such as iPhones, iPads or Blackberries. Specifically, the library services should take into account the applications, interfaces and connectivity options most of their patrons use. With the soaring uptake of mobile telephony services, libraries can no longer ignore these devices. The potential of mobile devices to extend the reach of the library and enrich its feedback mechanisms cannot be overemphasized. Already, several libraries worldwide are delivering various library services on mobile devices. Even in sub-Saharan Africa, some academic and research libraries such as the University Pretoria in South Africa and International Livestock Research Institute (ILRI) in Kenya and Ethiopia are using social networking applications to deliver references, provide access to downloadable research publications, and disseminate library notifications, among other services on mobile devices.

From the foregoing, it is evident that the library users have and will continue to change. Currently, the library institution is faced by a new breed of users that exhibits unique information seeking behaviour which is inconsistent with the conventional library tools and systems; is generally ICT-savvy; seeks instant gratification and is intolerant to any forms of delay; wants the library services at the point of presence; wants to be in charge of information seeking and use; relies heavily on and collaborates with peers; multi-tasks; loves adventure and discovery; and enjoys infotainment. Table 1 below summarizes these attributes.

Table 1: Key attributes of Patrons 2.0

Attribute	Patrons 2.0
Age	Generally young or middle-aged.
Tolerance	They exhibit a know-it-all-attitude and low tolerance for delays in getting the services or products they require.
ICTs	They glorify ICTs, have much trust in ICT tools, generally more knowledgeable in ICTs, and feel the obligation to remain connected constantly.
Information seeking	Skimming in nature - they cherish instant gratification, are easily bored. They often multitask and can easily move on to the next activities if the current one is not fully engaging.
Relationships	Constant links with peers in whom they trust; little relationship with librarians; value feedback.
Library space	Rarely come to the physical library because they are nomadic. However, they are attracted to physical libraries with comfortable seats, space for collaboration, socializing and programming.
Socialization	They frequent libraries that they find fun to use; they are not generally drawn to the library by its collection per se.
Control	They want to be in charge of their usage; appreciate personalization and prefer using their own equipment.
Creativity	They are highly creative and prefer to contribute as much content as they consume.
Mentality	Their thought process is in “hypertext”, not linear.

CONCLUSION

Whilst scholars agree that the fundamentals of librarianship (collecting, preserving, organizing, providing access to information) have not changed, Allen (2008) suggests that they (scholars) admit that everything else has. Thus, responding to changing user needs may require some adjustments in existing library services, job descriptions and organizational structures (Haricombe and Lusher, 1998), requiring new skill-sets and attitudes. Indeed, some librarians are already urging their colleagues to embrace an attitude of openness, flexibility and willingness to learn and grow in tandem with the changing times while still remaining committed to the timeless tenets of librarianship by facilitating free and open access to information regardless of format, location or method of access (Allen, 2008). Librarians are being called upon to focus more on breaking down barriers to resources, involving single sign on, unifying workflows and liberating metadata for re-use (Pauli, 2008).

It is also being suggested that in the emerging circumstances, librarians should be more inspiring and engaging. This is in recognition of the fact that libraries bring people together to dialogue and learn from each other. Librarians should actively facilitate this engagement (Eager, 2009). Consequently, some scholars have proposed changes to the librarianship training curricula to build new skills in areas such as marketing, public relations, ICTs and training to help librarians engage more with users (Mckay, 2001; Gupta, 2006; Musoke, 2007; Musoke, 2008; Mostert, 2009). These suggestions are based on the understanding that libraries should not just be mere reservoirs of information resources. Conversely, they should get embedded in the day-to-day lifestyles and aspirations of the users as much as possible to remain relevant (Durrani, 2008; Morgan, 2009).

Library scholars have also conducted studies which have confirmed that many new breeds of library users conduct bad information searches using inadequate tools in a disorganized way, but are perfectly happy with the results. The expectations and habits of the users are constantly changing in tandem with the ways they interact with content and services, creating new and original ways of exploiting them (Dussin and Ferro, 2009). Librarians need to help these self-sufficient users by playing the role of educator, mediator, human face and guide to the right information. The librarians must prepare the users adequately to face the wide variety of information resources available to them, especially through the Internet and related technologies (Zimmerman and Tu, 2003). Evidently, library users now need more assistance from librarians than ever before. For instance, they need help to move quickly between electronic and traditional resources and knowledge and to fully utilize machine interfaces and search protocols to navigate the ever expanding body of knowledge, evaluate information quality, and develop research strategies (Giesecke, 1994).

It is also noteworthy that libraries will continue to serve the older breed of users, a proportion of which is actually increasing in some countries. In recognition of the fact that some older people may not be comfortable with some of the emerging trends and preferences of library use, librarians need to be more cautious in implementing changes which may be disruptive to this category of users.

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How Efficient and Effective is the Records Management System used by the Government of Swaziland?

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ABSTRACT

An effective records management system allows tracking of the life- cycle of records in an organization and enables the organization to know when a record is created, its functions, duration of its usefulness by the agency that created it, the parameters and duration for maintaining it and the legal authority that enables it to be destroyed. The management and preservation of records in an organization help in achieving greater efficiency, effectiveness and economy.

Records management in the government ministries in Swaziland is undertaken within the framework of Swaziland National Archives Act no.5 in 1971. Its mission is to empower Swazi citizens to fully participate in their country's social, political and economic life through the equitable development, preservation and protection of the Swazi cultural heritage. Without proper records management systems, governments cannot be made to account of its decisions.

The aim of this paper was to investigate records management practices in government Ministries in the Kingdom of Swaziland. The study in particular sought to determine how records generated, used and disposed of in Swaziland government; the types of records that are generated within Swaziland Government; how the records are organized and retrieved; the training needs of Swaziland government registry staff?; the attitude of staff towards records management practices; the level of staff awareness about sound records management practices; the suitability of records storage facilities and the challenges of e-records management in the government of Swaziland.

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Mixed method research paradigms were used to carry out the study. The target population consisted of action officers; and records officers (registry staff) in government ministries in Swaziland. Ninety two action officers and 29 registry staff were involved in the study. From the action officers' stratum, 31 staff were from top management, 31 from middle management, and 30 from lower level management.

The results revealed that government ministries in Swaziland do not practice sound Records management in line with the Swaziland National Archives Act (No. 5 of 1971). Besides, there is no uniformity in government with regard to filing methods and the manner in which records are destroyed or deleted. There are no control measures for ensuring care and safe custody of records. Electronic records management policy, filing procedure manual and disaster recovery plan do not exist. There is no policy or guidelines to ensure proper management of records. The lack of records management practices indirectly affects the information flow within the ministries. It is expected that the outcome of this study would inform policy on records management in government of Swaziland; facilitate effective records management in government; create awareness about sound records management; help inform records management training plan and help establish integrity and transparency in the functioning of government.

Keywords: Records management, Swaziland

INTRODUCTION

An effective records management program is a system that tracks the life cycle of each and every record. This means knowing when a record was created, what function it serves, how long it is considered useful by the agency that created it, what the parameters are for maintaining it and for how long, and what legal authority enables it eventually to be destroyed and when, if at all (R.M Manual,2003). The managing and preservation of records help in achieving greater efficiency, effectiveness and economy.

In government institutions all over the world, preservation of records is regarded as an activity that is the exclusive responsibility of the conservational unit of an archival institution. The challenge remains ensuring continued access to such records over a long period of time. Cameron (2001) argues that the most cost – effective and efficient way of securing records for future (archives) is to ensure that they are captured on as durable materials as possible.

Eden and Feather (as cited in Akussah, 2002) concluded after a survey of preservation policies and strategies in British Archives and Record offices that preservation is a cord that runs through all the activities of an archive or record office. The perception held commonly that preservation belongs to the domain of the conservator in the archival institutions and not for the records manager in the registry, or records centre. In this regard, Lusenet and Drench (2002), argued that such a perception does not give the records of today the chance to graduate into the archives and for that matter heritage of tomorrow. The purpose of records management system is to ensure that records are created, used, maintained, and disposed of in an orderly and controlled

manner. According to Sebina (2001), without proper records management, organizations in general are likely to face problems of paper proliferation in their offices and experience retrieval difficulties. Chirwa (1993) explained that records held by various

government departments are created in the course of various official functions allocated to various government departments. However, without a proper records management policy to streamline the creation of such records, it is not easy to understand the procedures followed in their creation, utilization and maintenance of the records. Government ministries create records to fulfil their operational needs and attain the desired goals, but they do not seem to plan what quantity and quality of records they would like to see created.

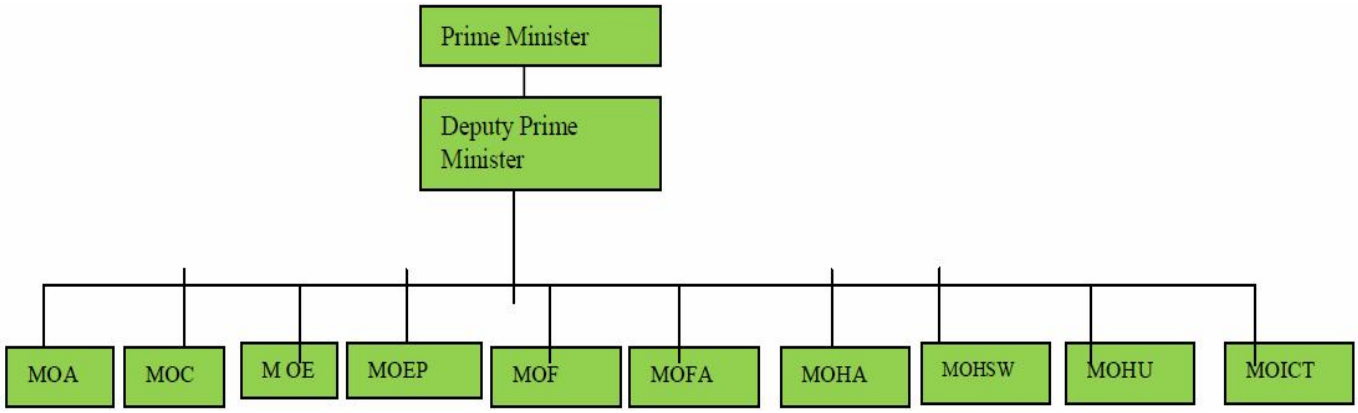
The Structure of Government of Swaziland

In Swaziland, there are 17 government ministries that include among others:

- Ministry of Justice
- Ministry of Labour and Social Welfare
- Ministry of Public Service & Information
- Ministry of Tourism
- Ministry of Works & Transport
- Ministry of Sports & Culture
- Ministry Natural Resources.

Some of the Ministries have decentralized their activities by establishing regional branches while others are yet to do so. Each ministry has several departments and registries which are managed by personnel some of whom are not trained in records management (Lukhele, 2008).

Figure 1 presents selected the government ministries in Swaziland.



How efficient and effective is the records management system used by the government of Swaziland?

Legend:
MOA= Ministry of Agriculture MOF= Ministry of Finance
MOHSW= Ministry of Health &Social Welfare
MOC= Ministry of Commerce MOFA= Ministry of Foreign Affairs
MOHU= Ministry of Housing & Urban Development
MOE= Ministry of Education MOHA=Ministry of Home Affairs MOICT= Ministry of Information Comm. Technology
MOEP= Ministry of Economic Planning

Figure 1: Illustration of Swaziland's government's organizational structure

Records management infrastructure in government ministries in Swaziland

Records management in the government ministries in Swaziland is undertaken within the framework of the Swaziland National Archives Act. Swaziland National Archives was established by Archives Act no.5 in 1971. Its mission is to enable Swazi citizens to fully participate in their country's social, political and economic life through the equitable development, preservation and protection of Swazi cultural heritage.

Besides, the Swaziland National Archives has a mandate for records management in government and public sector organizations. This mandate includes:
- Managing public records and ensuring their preservation as historical records.
- Advising public offices on proper records management practices.

Government ministries in Swaziland receive advisory services on the storage and preservation of their archival materials from Swaziland National Archives as stipulated by the Act. The Act empowers the director of Swaziland National Archives to examine and advice on the care, preservation, custody and control of any public records. The Act further empowers the director at his or her discretion, to approve any institution, whether private or otherwise, as a place wherein may be deposited, housed or preserved, either permanently or temporarily, any public archives or records that have been declared public records.

STATEMENT OF THE PROBLEM

There has been many an instance when a person (government employee, researcher, journalist, student, etc.) in search of a particular document known or perceived to be in the custody of one of the government's agencies found that document impossible to find (Times of Swaziland, 2003). According to Dlamini (2008), "Information that is known to exist becomes hard to retrieve." Often this translates to time wasting on the part of the document seeker and a general low regard for registry personnel in terms of their custodial qualifications.

Without proper records management systems, governments cannot be held accountable for their decisions. Corruption cannot be easily detected or questioned and service delivery is hampered. Sound records management systems enhance transparency,

accountability and integrity in government. Without such a system in place, it is difficult if not impossible to hold a government accountable. Public records are key to accountability and good governance because they reflect the government's functions, activities and procedures and the administrative processes that generate them, as well as the facts, acts, and transactions affiliated to them. Records can effectively play the above role if they are appropriately managed and made accessible when required (Ngulube, 2003). According to Wamukoya and Mutula (2005), poor records management is bound to result in information gaps that, lead to incomplete public records and the loss of documentary heritage.

AIM AND OBJECTIVES OF THE STUDY

The main objective of this study was to investigate records management practices in government ministries in the Kingdom of Swaziland in order to come with a framework that enhances their effective and efficient management. The specific objectives of the study were to:

(a) Determine how records are generated, used and disposed of
(b) Assess the types of records generated within government ministries in Swaziland
(c) Find out how records are organized and retrieved
(d) Examine the training needs of the government's records management staff
(e) Establish the level of awareness of sound records management practices.
(f) Assess the suitability of the records storage facilities used
(g) Explain the challenges of records management within government in Swaziland

METHODOLOGY

A survey of the of 15 government ministries was carried out. A questionnaire and follow up observation was designed for the purpose of collecting relevant data from ministries. The government ministries were selected purposively based on their economic impact to the nation, size of the ministry and amount records generated and managed. Ministries that had many departments and staff and were also generating and managing large amounts of records were selected for study. The ministries that were selected for study are reflected in Table 1.

POPULATION OF STUDY

The target population consisted of action and records officers in government ministries in Swaziland.

SAMPLING PROCEDURE

The study adopted the Israel Model to determine the sample size (Israel, 1992). Using the formula presented by this model the following sample sizes were calculated:

$$n = \frac{N}{1+N(e)^2}$$

Where n= desired sample size
N = Population size
E = Margin of error
e =±10%
90% Confidence Level

a) Sampling of government ministries

$$n = \frac{N}{1+N(e)^2}$$

$$n = \frac{17}{1+17(0.10)^2}$$

=14.5 Ministries
= 15 government ministries

b) Sampling of registry staff

$$n = \frac{N}{1+N(e)^2}$$

$$n = \frac{40}{1+40(0.10)^2}$$

= 29 registry staff

c) Sampling of action officers

$$n = \frac{N}{1+N(e)^2}$$

$$n = \frac{1185}{1+1185(0.10)^2}$$

= 92 action officers

The action officers and registry staff were randomly selected based on their operational level positions in the ministries' organizational structures; 92 action officers and 29 registry staff represented the target population. The distribution of the action officers was as follows: 31 staff were drawn from top management, 31 from middle management, and 30 from lower level management. Besides 29 staff members were drawn from the registries as already depicted above. This distribution ensured that the sample covered all the management levels at ministries.

DATA COLLECTION PROCEDURE

Two set of questionnaires were used to collect data complemented by observation. The first questionnaire was distributed to the action officers. This questionnaire was intended to enable the researcher to understand the functions of the various departments of the government ministries; the nature of the records each department creates, receives and uses; the frequency use of the records; the type of information that is shared across the department; and lastly, users' perception of the services rendered by the registries and secretaries.

The second questionnaire was distributed to the registry staff. The researcher intended to understand the types of records kept; procedures for opening and closing files; file titling; storage, retrieval and disposition procedures and other matters affecting the operations of the registries. The administration of the questionnaires was followed by physical observation of records units and registries in the ministries.

VALIDITY & RELIABILITY OF INSTRUMENTS

To ensure validity and reliability of instruments, questions were piloted to a small group of consultants at the Institute of Development Management (n=5) before being administered to the main sample. This was to provide the opportunity to check out whether any of the questions were ambiguous and interpreted differently by different respondents.

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DATA ANALYSIS

After the collection of the data, the researcher developed a coding sheet for representing variables with figures, for example officers, **registry** =1 and **action**=2. Responses to the open-ended questions were scanned to determine the words and phrases used by the respondents. The Statistical Package for Social Sciences (SPSS) version 12.0 for Windows was used to present and analyze the data. Tables, pie charts, percentages and graphs were used to present the responses of the respondents. Significance within the variables was noted and then evaluated via cross tabulation in order to assess any correlation between the variables.

Table 1: Government ministries and staff included in the study

Ministry	Records Staff	Action officers
1. Commerce & Trade	2	6
2. Education & Training	2	6
3. Foreign Affairs	2	6
4. Health & Social Welfare	2	7
5. Housing and Urban Development	2	6
6. Labour & Social Security	2	6
7. Public Service & Information	2	6
8. Sports, Culture and Youth Affairs	2	6
9. Agriculture	2	7
10. Economic Planning	2	6
11. Justice & Constitutional Affairs	2	6
12. Natural Resource & Energy	2	6

13. Information & Communication	2	6
14. Finance	2	6
15. Public Service	1	6
	(N=29)	**(N=92)**

FINDINGS

The responses obtained from questionnaires and information recorded through observation were analyzed and presented under the following broad subheadings:

Types of records created by the ministries

The survey sought to reveal the types of records created by the action officers and registry staff in the process of carrying out their functions. Both action officers and registry staff were asked this question in order to identify the nature of the records created. Most of the respondents 93 (78%) focus was on policies, manual and personnel records, although 30 (25%) work with financial records. The creation of records in the ministries didn't appear to follow any conventions, such as standardized formats and referencing. An organization with a proper records management programme would implement, as part of program correspondence management, forms management, report management, directive management and copies management in order to ensure standardized formats in the creation of records. Some of the records created by the action officers did not have reference numbers. Some of the files did not even have file titles. Those that had file titles had broad ones that led to all related issues being filed in them. It should be noted that files are not documented.

Places of storage of records

Action officers were asked where they kept the records that were created. The results show that 73 (81.1 %) were keeping records in their offices, 47 (52.2 %) were keeping records in registries, and 22 (24.4 %) were keeping records in the storeroom.

The findings also revealed that most of the action officers preferred to keep their records in their office cabinets. Perhaps this is because they found it much easier and faster to get access to them in their offices. The action officers frequently transferred records to the registries when they no longer used them, effectively using the registry as a storeroom when in fact a registry is "the place where files and other records are processed, kept and retrieved. It is the control centre of all information coming into and

leaving the organization. It provides information when it is needed, where it is needed, at the time it is needed and to people who need it'' (Registry Handbook, 1993).

The responses also revealed that there is a lot of duplication of records in these offices. The appraisal of records was found to be a particularly problematic area. No procedures were in place to assist in the appraisal of records. Officers removed records from their offices when there was no space available to store them. The storerooms are more of a dumping ground for records. No procedures were followed when records were deposited into the storerooms. It was observed that in the storerooms, records were competing for space with other materials such as old computers, chairs, vacuum cleaning machines, fan and heaters. Files in these storerooms were neither well arranged nor documented, which a problem is when action officers want to retrieve records. Most of the time records in the storerooms were forgotten and remembered only when there was a need to extract information from them.

The research also sought to check whether action officers were using the registries to keep their records. The findings showed that about 82 (69 %) of the action officers were not using the registries for keeping records. The reasons given by the registry staff was that most of the action officers kept their current records in their offices and only transferred records which they were not using to the registries. The action officers noted that they were not using the registries because files got lost in the registries; consequently, it was safer to keep current records in offices and take those that they did not need to the registries.

Information sharing challenges within ministries

The survey sought to find out if there were some challenges in sharing information within the Ministries. The results of the study revealed that 75(63.3%) were having problems in sharing information within the Ministries because not all of them were using the same classification system in classifying their records and others were not using the classification scheme at all. As a result documents could not be retrieved easily. Besides, there was a lot of duplication of records in different offices.

Upon observation, it would seem that though central registries existed in these ministries, they were not used properly by action officers. Sharing information was a problem because there was no proper documentation of the files in the offices in addition 11(9%) of respondents revealed that sometimes decisions could not be taken because of missing files.

Classification scheme

Respondents were asked if their records were arranged according to a classification scheme. The survey revealed that only 56(47%) were using their ministries classification scheme. Furthermore, those who were not using the classification scheme kept their records in their offices, where they claimed to remember each and every file, but they did not know how to use the classification scheme. These created problems of accessing information contained in records especially, when action officers were away

and had to deal with records upon their return. The records were transferred to the registries when they were not frequently used leaving the registry staff to classify those documents. Action officers mentioned that they were never trained on how to use the classification scheme, and those who were using it, were not using it properly.

Lack of knowledge of the existing classification scheme and the in ability to use it also resulted in the improper referencing of mail. The survey's findings showed that only 48(40%) of action officers referenced their correspondence. Procedures that act as a benchmark for the maintenance and use of files were non-existent. Incoming mail that was processed and ready for action was attached to the respective files prior to submission to the action officers. Replies to these in many instances never found their way into files, meaning that files had an incomplete account of what transpired.
Information that was known to exist was not easily retrievable.

Electronic records

The officers were asked whether they generate electronic records in the process of carrying out their functions. It was revealed that 76 (84.4%) action officers generated records in an electronic format. They were then questioned about the existence of a policy governing storage and retention of e-mails. Most of the respondents indicated that a policy governing e-mail storage and retention did not exist (45%) or they were not aware whether it existed 36(40%). Only 14 (15 %) of the respondents were aware of the existence of an email policy. Therefore only 15 % of the respondents possibly managed their e-mails according to the ministries' policies. The Ministry of Education is the only ministry with a database to maintain its records. Most of the respondents 39(43.3 %) maintained their electronic records on a memory stick, 7(7.8 %) on a hard drive, and 14(15.6 %) said that they did not create electronic records.

Semi- current records

The survey also sought to elicit how closed files were handled in the registries prior to their transfer to the archives. 18 (62%) of the registry staff stored their closed files on the floor and in the cupboard, while 11(38%) stored their closed files in store-rooms. The findings also revealed a shortage of registry space to keep non-current records and cupboards prior to archiving. Appraisal of records was a problem as no procedures were followed to assist. The researcher also checked the condition of the records in the registries and found that most damage to the records was caused by mishandling and the intensive use of documents. Other factors that caused damage in these registry documents were insects and bad paper. This explained the deterioration of documents that ended up in Swaziland National Archives.

Disposal procedure

The respondents were asked what legal requirements governed when records should be destroyed, and what records should be permanently preserved. It was found

that although there was a legal basis for records' destruction, most of the registry staff were not aware of them 20(70 %). Such legal requirements include the stipulation in Act no. 5 and the retention schedule. Yet even those who were aware of this legal requirement did not apply it.

The researcher observed that registries stored closed files on top of the cabinets, and these were to be destroyed or sent to archives. Most of these records needed to be audited An example was the Ministry of Education's scholarship records regarding students who had finished school ten years prior and financial statements that needed to be audited. The study also investigated how often records were transferred to the archives. 8(28%) respondents transferred records after 3 years and 21(72%) transferred records after 5 years.

Further follow up through observations revealed that records that took long a time to be transferred to archives were records like financial statements, payment vouchers and scholarships records. With respect to the frequency of transfer of records to National Archives, 8(28%) of the respondents said records were transferred after 3 years while another 21(72%) said records were transferred after every 5 years.

Trainisng

Records management is a specialized field that can only be handled by experienced professionals. The respondents appointed to the position of records management officers were not fully trained records managers. They were therefore not prepared to professionally handle the records management dilemma faced by the ministries. Most of the registry officers had an O'level certificate, but none had formal training or even diploma level in records management.

CONCLUSION AND RECOMMENDATIONS

It is evident that an effective records management program should guide the management of records throughout their lifecycle. This means knowing when a record is created, what function it serves, how long it is considered useful by the ministries that created it, what the parameters are for maintaining it and for how long, and what legal authority monitors its lifecycle (R.M. Manual, 2003). The ministries' strategies are not following the lifecycle approach, causing havoc in the management of records.

The following recommendations were proffered to help mitigate the problems identified:

The Swaziland National Archives should consider developing and implementing good records management policies and set up standards and guidelines to be adhered to by government Ministries. The Swaziland National Archives should strive to ensure compliance with the relevant provision of the Act as well as the ISO standards on records management. Records management is a specialized field which can only be handled by experienced professionals. Therefore it is recommended that ministries should train the records management officers at least to a diploma level or recruit well trained records

personnel into public institutions, as they will have a better appreciation of preservation issues.

Further research should be extended to parastatal organizations in Swaziland to ensure that management of records, both in government and the cognate public sector, is harmonized to enhance service delivery, accountability and transparency in the management of the country's public affairs.

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The diffusion and Impact of Mobile Phones on the Informal Sector in Kenya

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ABSTRACT
Mobile phones have been quickly and widely adopted over the last decade by populations in both developed and developing countries. This paper examines the rapid diffusion of mobile phones in Kenya and how this is being used to improve business in the informal sector. It is based on an on-going research study on "The diffusion of ICTs in informal sector enterprises in Kenya".

Keywords: ICTs, diffusion, informal sector enterprises, Kenya, mobile telephones

INTRODUCTION

Mobile phones have been quickly and widely adopted over the last decade by populations in both developed and developing countries. As rightly captured by Kalba (2008:632), "Mobile phones are spreading ubiquitously across the planet and are the latest phase of globalization, … mobile phones have out-diffused virtually every prior technology, whether TV sets, radios, wrist watches, fixed phones, computers, Internet, etc.'' This observation is backed by recent statistics from the Communication Commission of Kenya (CCK) [as of March 2010], which shows that the four mobile phone operators in Kenya, namely Safaricom, Zain, Orange and Yu, have a combined subscriber base of close to 20 million. The rapid spread of mobile phone technology has also had a major impact at local level, unlike other types of technology such as the computer, the Internet and the fixed line telephone. The local penetration rate of 49.7 for mobile phones compares favourably to the world rate of 49.8 per 100 inhabitants (ITU World Development Index, 2009), but compares poorly to the low diffusion of other ICTs, most notably the computer and the Internet.

The rapid diffusion of the mobile phone can be explained by, among other things, the drop in the price of mobile handsets to within reach of those with low incomes and the drop in mobile tariffs as a result of stiff competition between the four mobile phone operators, as well as the low cost of prepaid calling cards (CCK, 2010). Mobile phones also require only basic literacy to use and this makes them accessible to a larger proportion of the population, particularly low-income, small business traders. They are easy to use and adaptable - for those without electricity, phone–charging kiosks have quickly come up in small towns and shopping centers while solar-powered phones have also been introduced onto the market.

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The relatively high user-friendliness and affordability of mobile phones have made it possible for low income micro and small enterprise (MSE) traders, who are also referred to as the informal or 'Jua Kali' sector in Kenya, to adopt and use them widely. As in most other developing countries, MSEs make up the primary source of income and are the main forms of employment/livelihood for the majority of Kenyans. The rapid adoption of mobile phones in the country has had positive effects on the running of MSEs by saving time and money because they replace travel with telephone calls and facilitate instant feedback, thus speeding up the exchange of information and decision making. They can also be used to reach more customers for the selling of goods and services and for obtaining raw materials. Many MSE traders, such as taxi drivers, mechanics, carpenters, curio sellers, retail traders and other trades people, now rely on the mobile phone to run their businesses.

Mobile phones have also been used to speed up the financial transactions of Kenyans from all walks of life through the highly successful 'M-pesa' financial transaction medium, a mobile banking service which was introduced in Kenya by the mobile phone operator Safaricom in 2007, and which signed up over six million users in its first two years of operation (Mas and Morawczynski, 2009). The main competitor Zain followed suit with 'Zap' in mobile banking and 'Yu Cash' for the YU mobile phone operator. The objective of mobile banking is to improve the efficiency of microfinance by using mobile technology to make transactions faster, cheaper and more secure (Geach, 2007:4).

The 1999's National Micro and Small Enterprise (MSE) Survey in Kenya (1999:18) revealed that almost two thirds of Kenya's MSEs are situated in urban areas. These enterprises are mainly grouped together in highly concentrated clusters, but there are also many isolated ventures scattered widely across urban areas as well as in the market centers in rural areas. The most visible are retail shops in clothing and footwear in the main streets of Nairobi and other urban centers, curio traders, electronic and mobile shops, grocery stores, auto-spare shops, horticultural exporters, carpenters, vehicle repairs, and metal fabricators, to name a few.

Informal sector enterprises in this study were taken to be those with between one to nine employees. This definition was also used by 1999's baseline survey, one of two national baseline surveys carried out on informal sector enterprises (the one before was carried out in 1995), whose findings were that 70 % of MSEs in Kenya are one-person units, while 97 % are in the range of 1-5 employees.

The purpose of the study is establish the status of ICT penetration (or lack thereof) in the MSE sector in Kenya, and also the rate and level of ICT diffusion through mobile phones in Kenya in the face of the rapidly changing global information environment. We have attempted to answer the following research questions: What is the status of ICT penetration-access, use and impact- (or lack thereof) in the MSE sector in Kenya?, What is the rate and level of ICT diffusion in the informal sector?, What is the types of ICTs being used by the people working in the informal sector and the impact if any they have on the businesses?, What are the challenges that hinder awareness and use of ICTs in the informal sector?, What is the government involvement if any in putting the required infrastructure for use of ICTs in the informal sector Kenya.

METHODOLOGY

A total of 450 MSEs were selected from two provinces using a combination of multistage sampling technique consisting of purposive, cluster and random sampling. The first province was purposively selected based on our observation that Nairobi Province, which is also the main urban center in Kenya, has a very large concentration of MSEs. MSEs can also be found in rural areas where they are less concentrated, mainly in market centers. Central Province was selected as representative of rural provinces. Due to lack of existing sampling frames in the areas of study, MSEs in the selected areas were counted so as to provide the sampling frames from which units of study were randomly selected**.**

Three main streets, namely Tom Mboya Street, River Road and Kirinyaga Road in the central business district (CBD) of the city of Nairobi, and three markets on the outskirts of the city, namely Village Market, Gikomba and Kenyatta Markets, were purposively selected because of their concentration and the variety of MSEs. MSEs on these streets and markets were counted and used as the sampling frame; a total of 290 MSEs in Nairobi Province were selected using random sampling. For the Central Province sample, one urban center and one rural center - Thika and Kiambu respectively - and two market centers, Kabati and Makutano, were selected. MSEs in the two towns and market centers were counted when formulating the sampling frame; a total of 160 MSEs were randomly sampled.

Data was collected from a total of 450 MSEs using questionnaires. The MSEs consisted of retail shops (mainly dealing with clothing and footwear), phone shops, auto-spare shops, furniture and hardware shops, and curio and horticultural traders. The clothing and footwear retail shops, phone shops and electronic shops were more concentrated in the CBD of the city, while hardware, furniture, hair salons and construction material shops were found in the two markets, i.e. Gikomba and Kenyatta Markets. Curio traders were found in the up-market Village Market which is mainly frequented by foreigners, while horticultural traders were based at the Jomo Kenyatta International Airport. The two urban and market centers in Central Province had a combination of all the MSEs.

Data was collected using structured and non-structured questionnaires. Due to the informal nature of the business environment in the MSE sector, administered questionnaires were found to be appropriate because it was not easy to follow up on questionnaires when they were left with the traders to fill in on their own. This is because their working spaces are more often than not squeezed and/or shared, and questionnaires tended to go missing or were difficult to trace when left behind. The traders were also not situated in the same place all the time as some operated more than one business and therefore kept moving. Some of the traders were, however, fairly stable, with some having operated from the same location for many years. The level of education of some of the MSE traders also necessitated the translation, interpretation, and explanation of some questions.

RESULTS

The results are reflected in sections 1 to 5

1. Gender composition and educational level of respondents

The sampled MSE traders had a gender balance of almost fifty/fifty. The educational level of the traders varied from primary to degree level, with 27% (116) of the respondents having gone up to degree/diploma level and 40% (207) up to secondary school level.

Seventeen per cent (75) had undergone various types of post secondary training, while 8%(34) were primary school leavers.

Table 1: Educational level of respondents

education level

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	primary level	34	7.8	7.9	7.9
	secondary level	207	47.3	47.9	55.8
	post secondary level	75	17.1	17.4	73.1
	diploma/degree/masters	116	26.5	26.9	100.0
	Total	432	98.6	100.0	
Missing	System	6	1.4		
Total		438	100.0		

2. Types of MSEs in the study

The results show that the MSEs can be divided into three categories based on the premises from which they operate. The first group operates from permanent buildings and enjoys infrastructural facilities such as water, electricity, fixed-line telephones, and/or computers with Internet connectivity. These categories of MSEs pays relatively higher rents, are registered, and punctually pay their licenses. They also enjoy relative permanency and their capital outlay seems to be relatively high. Examples of these are horticultural exporters and electronic and auto-spare shops. Most MSEs in this category use ICTs such as the Internet and email for their businesses, and the owners and some of their employees possess ICT computer skills. This category of MSE traders are, however, few in number when compared to the many MSE traders who operate with minimum resources.

The second category operates from temporary sheds or stalls or in the open (this is the origin of the term “Jua Kali’’, Kiswahili for ‘’under or in the hot sun’’ used generally to refer to informal sector enterprises in Kenya). The players here are characterized by low levels of education, and their premises generally lack infrastructural facilities such as tap water and electricity. They also hardly use or own ICTs such as computers and rarely have anything to do with the Internet or email connectivity for use in their businesses; they do not have computer skills and lack awareness of ICT developments. Examples of these are curio traders, grocery stores, food kiosk operators (who also mainly operate from open and temporary sheds) and repair shops. This needs to be viewed against a backdrop of three recently arrived fiber optic cables that promise to bring cheaper Internet connectivity to Kenyans, but which do not seem to play any significant role in the lives of most MSE traders. Their main concern tends to be getting permanent physical premises where they can sell their goods and services without being harassed by the authorities or moved from place to place so that they can build a good base for their customers and businesses.

The third category of traders does not operate under the hot sun, rather they run and operate micro-sized businesses. Despite being housed in permanent premises and therefore sheltered from the natural elements and not having to pack and carry their wares at the close

of business (as is done by the second category), and the fact that most have access to infrastructural facilities such as electricity and water, their businesses and operations are very small, and one cannot help wondering if they actually make any economic sense. These are the micro retail stalls that are very common and highly visible along the main streets of Nairobi on Moi Avenue, Tom Mboya Street, Taveta Road, River Road, Luthuli Avenue, etc. They occupy premises that formerly used to be Asian-run shops but which have now been subdivided into micro units, selling everything from clothing to footwear, traveling bags, boxes, watches, mobile phones and accessories, and electronics. They also offer repair services, and some even share their micro shops. Seventy per cent (307) of the MSEs studied had between one and five employees, while thirty five percent (153) consisted of only one employee.

The former Asian-run shops continue to be sub-divided into micro stalls that operate independently but collectively pay rent to a main tenant. Their clientele are mainly the local people and apart from mobile phones, they do not use any other form of ICTs - they might not have space for a computer even if they could afford it. They also seem to be too many to make much business, and one gets the impression that anybody without a job simply flocks there without realizing that the environment is already oversaturated. These micro operations seem to provide a source of livelihood, however small, to a significant percentage of the population to whom the ownership and use of ICTs is a far-removed idea.

3. Diffusion and use of ICTs among the MSEs

With the exception of mobile phones, which seem to have taken the MSE sector by storm, most traders in Kenya do not seem in the least inclined to use ICTs such as computers and the Internet. The majority carry on as if such technological developments have nothing to do with their lives and/or their businesses, and questions about the ownership and use of these types of ICTs seemed irrelevant and out of place.

Twenty seven (119) of the respondents owned and used a computer for Internet and email communication, while 90%(394) owned mobile phones. Only 13%(58) owned or used fixed line phones while 23%(112) used the Internet/email for their businesses, 8%(36) owned a printer, 6% (27) owned a scanner, and another 6% (25) a fax machine. Only 10%(42) of the respondents thought ICTs could bring about more business opportunities, and an equal number thought they simplified work in the business. Only 3 per cent (17) thought ICTs were good for business records. Surprisingly, there was a relatively large number of respondents with computer skills; forty four percent (192) had computer skills but were not using them because (according to them) the work they were doing did not need a computer, and in any case most of the respondents in the study thought computers were beyond reach because they could not afford them.

4. Diffusion and use of mobile phones

Most of the respondents did not think that the mobile phone was an ICT development such as computers and the Internet. This meant interpreting the questions or asking separate questions about mobile phones so as to get clearer answers. The mobile phone is one ICT that seems to be quite popular among the MSE traders, with over 90 % of the respondents reporting that they not only owned a mobile phone, but also used them to conduct their businesses. Majority (80%; 349) also reported that they were registered M-Pesa users.

Most of the respondents (87 %; 380) reported never having ever owned a land line and the mobile phone was their first 'close' contact with a phone. Given that even the relatively reduced prices of handsets and cost of airtime is a big proportion of their earnings, they gave the impression that they would rather forgo other things to make sure they acquired and maintained the use of the mobile phone.

Mobile phones are also seen as a status symbol in addition to being useful and functional gadgets. They are used for social communication to contact friends and relatives - some of the respondents said they could not imagine life without the mobile phone despite the fact that they have only been around (in mass consumption terms) for the last ten years. Fifty two per cent (227) reported having owned their mobile phones for between five and ten years, while 34% (147) had used them for a period of one to five years.

5. Impact of mobile phones on MSEs in Kenya

Fifty two percent (226) of the respondents reported that they used the mobile phone for their businesses while 62% (278) reported that they used them to order goods. Sixty nine percent (302) of the respondents said they used them to contact customers, and 44% (192) said they used them to improve their businesses. Sixty two percent (273) said they used the mobile phone for social communication, e.g. contacting friends and relatives.

In response to what difference the mobile phone had made in their lives and their businesses, 44% (194) of the respondents said the use of mobile phones made it easier and faster to communicate and carry out business transactions at any time as well as with people in far off places. Fifteen percent (57) said the mobile phone helped them to get goods/stock delivered more easily. Twenty seven percent (116) said the use of mobile phones made it easier to contact and bring more customers, which meant more revenue.

Only a small percentage (2 %; 6) of the respondents said that they were what they were because of the use of mobile phones, i.e. they had been able to start a business and maintain it due to the availability and use of the mobile phone. They explained that by using the mobile phone, they were able to know which market to go to in the morning after comparing prices in different markets, as well as where to go and sell the goods before they left home by calling to enquire about the going rate. They were also able to make decisions and to change strategies if the information received on the prices of a particular commodity would not cover their costs or make profits.

Notably, those who reported using the mobile phone to make such business decisions were few; most respondents reported doing the businesses they had already been doing more easily and conveniently with the use of the mobile phone, while 16%(62) of the respondents were still excited by the genuineness, speed, convenience and reliability that has been brought about with the mobile phone, 4%(16) of the respondents said they could not do without it as it had ''become everything in business today'', which is to say that most of the activities in their businesses were easier to do because of the mobile phone.

Some respondents said they could go and comfortably buy goods or raw materials like

wood and not feel bothered about transport until they were ready to move - they could make a call to the transporter when they were ready rather than having them hanging around waiting and increasing the cost of doing business. Some traders reported that it was easy to track down their employees when they were sent to buy or collect goods, therefore making it possible to advise the customer to hold on or to come back later. It was also much easier to call for the delivery of stock to the business premises whenever it was required.

The mobile phone was reportedly used to tell time by 73% (276) of the respondents, thus effectively replacing the wrist watch. Forty seven per cent (178) also reported using it as a camera, 46% (173) used it for the Internet, 49% (185) reported using it as a radio, while ninety two per cent (345) used it for money transactions and transfer services, mainly through M-Pesa (a service introduced by the Safaricom mobile phone provider in 2007 which became an instant success). M-Pesa and the other money transfer services, Zap from Zain phone provider and YU cash from YU, were reported to be heavily used by the MSE traders because of their convenience, easy access and availability as well as their informality, unlike other money transfer and banking services. They are also easier to identify with because they are operated at the MSE level of business.

Twenty nine percent (108) reported that they used M-Pesa daily, and another 29 %(111) said they used it once or twice a week; 21 % (90) said they used it whenever the need arose. Sixty three percent (237) said they used it to send and receive money from relatives and 79 % (296) reported using it for business transactions. Due to the newly found convenience of the money transfer and banking services, respondents reported that business had become much easier and faster to run, and was more profitable. Thirty five per cent (131) of the respondents said mobile phone-based money transfer services simplified business and social financial transactions by saving time and money, mainly by cutting costs of traveling and increasing the efficiency of the business.

Two per cent (6) of the respondents said the money transfer services were handy when a customer did not have money and could be trusted to send it later. This low figure is significant in showing that MSE traders are still stuck in doing face-to-face transactions rather than encouraging credit services. A small percentage (4 %; 14), said that M-Pesa is good for security because one can carry the phone around instead of cash and that even if the phone is stolen the money remains safe. Three per cent (10) said it comes in handy in emergencies, such as medical emergencies where money can easily be sent to the person in need. Nineteen per cent (72) of the respondents reported that the money transfer services are available for more hours unlike banks, and that it is also easier to save small amounts at any time because of instant access without having to queue at a bank.

When asked if they had any problems using the mobile phone, 37 % (140) said they had problems buying credit for their phones but nonetheless indicated that it was a necessary cost for doing business. Quite a large number(55 %; 207) complained about network congestion, a common problem with the main mobile service provider, Safaricom, which has the lion’s share of subscribers. This problem was also reportedly common when using the M-Pesa money transfer service which can be quite inconvenient when one wants to send money and the network says it is experiencing problems while a supplier or a relative might be waiting.

Forty six per cent (175) of the respondents also said that the mobile phone has been an easy target for thieves and pickpockets and is the first to go when one is unfortunate enough

to go through such an experience. A very small percentage (0.5 %; 2) reported having problems with charging their phones, which is quite significant given the fact that there are many people in Kenya without access to electricity in their homes, but who still manage to get their phones charged. As to whether they received more business or social calls, 65 % (245) of the respondents said they received more business calls. When they were followed up and asked how many of the calls they had made in the last week were work-related and how many were social calls, 15 % (64) reported using the phone for business and social calls equally. The responses from the other respondents are as shown in the table below.

Table 2: Frequency of calls

how many of the calls have you made for the last one week are (1)work related(2)for social communication

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	50%-50%	64	14.6	16.8	16.8
	20%-80%	10	2.3	2.6	19.5
	80%-20%	19	4.3	5.0	24.5
	30%-70%	16	3.7	4.2	28.7
	40%-60%	59	13.5	15.5	44.2
	70%-30%	30	6.8	7.9	52.1
	60%-40%	37	8.4	9.7	61.8
	no answer	60	13.7	15.8	77.6
	100% business calls	38	8.7	10.0	87.6
	100% social calls	47	10.7	12.4	100.0
	Total	380	86.8	100.0	
Missing	System	58	13.2		
Total		438	100.0		

DISCUSSION

This study has found that first, gender composition of MSE traders in Kenya is the same for men and women, secondly, that the size of MSEs are getting smaller as shown by the continued mushrooming of the micro retail businesses that continue to come up in the main streets of Nairobi where formerly premises used by the Asian traders to run bigger businesses. The later have given way to the micro businesses which now carry out smaller retail businesses as a result of import and liberalization. With the exception of few MSEs the majority of the micro outfits continue to be survival outfits which are started with minimal capital and preparations. This shows that operations of MSEs have not changed since the original ILO research was carried out in 1972 (ILO 1972). There are, however, few exceptions as the study found which exhibited considerable growth. Examples of these are garment traders who were reported in the study as having grown from micro businesses into considerable sizes i.e. from having only two employees to more than ten as well becoming importers/suppliers of new dressing and suiting materials to other traders. One horticultural trader also grew from a small MSE of less than five employees to more than thirty five

currently. The majority, however, remain small with new entrants coming in all the time thus making an already-saturated situation worse.

Thirdly the lack of growth among most MSEs has not endeared them to the use of the more expensive types of ICTs like the computer and related internet. Fourthly, the study found out that the small size MSEs have greatly adopted the affordable mobile ICT. Fifthly, the mobile technology has easily been adopted to the local economic environment i.e. adopting very fast to the mobile telephone-based money transfer/transaction services which has also been extended to banking by those who had hitherto had little or nothing to do with the formal banking services because they considered their savings too small to be taken to the bank or as they put it to ‘’waste time queuing in the bank’’. MSE traders have also come to appreciate and easily adapt to the extended hours of the mobile phone-based money transfer services to the hitherto unavailable credit services to the MSEs.

CONCLUSION AND RECOMMENDATIONS

The results of the study show that available and affordable technology can be adapted towards local needs, as in the case of the mobile phone technology which has been widely adopted to simplify communication and make work more efficient, less costly and more profitable in the MSE sector in Kenya. Mobile phone technology has also been innovatively used to offer financial transfer services whose fast adoption and success is proof that it is very handy for those relatively smaller transactions which the existing banking services have not been able to reach. The mobile phone-based money transfer and transaction service has also supplemented and given competition to the formal banking services due to their convenience, availability and informality that is not offered by existing banking system. These savings can be incrementally built up to make the MSEs grow steadily to Small and Medium Enterprises (SMEs). The latest move of connecting the money transfer and transaction services to the customers' bank accounts, the M-Kesho by M-Pesa and the Equity bank can also be used to further and extend banking and credit services to the hitherto unreached MSE businesses.

The fast adoption of the mobile phone technology and the accompanying money transfer/transaction services innovativeness which continues to grow by the day may curve a progressive path for the growth of MSEs by improving the banking and money saving opportunities as well as credit services which are necessary for their growth. These savings can e incrementally built up to make the MSEs grow steadily to Small and Medium Enterprises (SMEs). The latest move of connecting the money transfer and transaction services to the customers, bank accounts, The M-Kesho by M-Pesa and the Equity bank can also be used to further and extend banking and credit

The study recommends that even as attempts to adopt the other ICTs are made like trying to connect as many people to the internet as possible through the optical under-sea cable, efforts should also be made to evaluate what brings more returns to the majority of the population especially the MSE participants who manage to get their living from informal trading activities. In other words the type of technology that is easily being easily appreciated by the majority however simple it is should be identified and encouraged because that is where a path to bring out a broad based and relevant development may be carved with faster ICT adoption.

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