Information and Communication Technologies in Library and Information Science Education in South Africa

by

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Abstract

Information and Communication Technologies (ICTs) have become central in the education and training of Library and Information Science/Service (LIS) because of the great influence of these technologies on the profession. The purpose of this study was to determine the extent to which ICTs are applied in research, teaching, learning and academic administration and establish the levels of ICT support available in South African LIS schools in terms of policies, infrastructure, hardware and human resource. Descriptive survey method was applied. Questionnaires were electronically mailed to 15 LIS education departments, out of which 9 (60%) responded. The findings indicated that all LIS departments in South Africa had responded to ICT developments by offering a wide range of ICT modules and embracing the use of ICTs in teaching, research and academic administration. It was observed that changes or modifications in existing qualifications and programmes are ongoing activities in several institutions. The majority of LIS departments in South Africa have interactive WebPages within the respective university/technikon websites. However, for teaching and learning, only few LIS schools used ICTs in presentation of lectures, while for research, tele-conferencing and e-publishing are not yet extensively exploited. The study recommends that South African LIS schools should increase the use of ICTs in teaching and learning, as is the case in administration, to foster greater effectiveness. South African LIS schools should take advantage of experiences of online and distance education already well established among some universities in South Africa, in order to reach work-bound and other disadvantaged students due to distance from learning centres. The advantages of good Internet access should also be exploited and a mechanism for supporting accessibility be lobbied for students from the technologically disadvantaged areas.

1. Introduction and Context

It is generally believed that the new Information and Communication Technologies (ICTs) can extend knowledge and education to poor and marginalized people, and more so as the Internet increasingly gains prominence as a tool to deliver better education outcomes more efficiently (Selinger, 2000). However, African countries still face many challenges in trying to provide appropriate and sustainable solutions for improving education and skills that will support development in all communities. In so far as ICT is concerned, Adeya (2001) observes that there are constraints against the development of ICT in Africa such as inadequate computerisation, inadequate infrastructure and inadequate human capacity, most of which relate to the economic disadvantage of these countries. For instance, wider use of the Internet in Africa is impeded by the cost and telecommunication infrastructure (Jensen, 2002; Main, 2001). Selinger (2000) observes that in most sub-Saharan Africa countries, while much of the satellite technology can be used to access resources, there is no uplink. The digital divide problem is exacerbated by the fact that most software products are expensive, proprietary and continuously enhanced and/or developed. Software enhancements, apart from being a financial burden, have the added problem of rendering hardware obsolete. The purpose of this study was to map and audit the types, nature and diffusion of Information and Communication Technologies in LIS education and training programmes in South Africa. Of specific

focus to the study was the extent to which ICTs are taught and applied/used in teaching, learning, research, and academic administration in LIS departments.

Several African LIS educators and scholars have reiterated the need to produce, for efficiency and effectiveness, graduates equipped with competencies for working in the current information environment, which though still largely traditional, is increasingly becoming ICT-dependent (Adeya, 2001: Shiholo, 1997; Odini, 1999; Aina, 1993; Aina & Moahi, 1999; Thapisa, 1999a; Thapisa, 1999b; Kigongo-Bukenya, 2003; Minishi-Majanja, 2004; Ocholla, 1997, 1998, 2003). Ocholla (2003) observes that the LIS job market requires additional and new competencies such as computer literacy, word processing, spreadsheets, database construction and management, online searching and retrieval, CD-ROM services, electronic current awareness service, automatic indexing and abstracting, text digitisation, desktop publishing, electronic publishing, library automation systems, telecommunications, selection of software and hardware, home page design and administration, facsimile transmission, and archiving of audio visual and electronic documents. Kloppers (1996), in a study on Information Technology in LIS in South Africa, recommended that LIS curricula in South Africa should include courses in network technologies, communication technologies, and retrieval technologies. According to Kloppers (1996), Network technologies include telecommunications, Internet hardware and software, Internet facilities, Internet discovery tools, electronic publishing, LANs and intelligent gateways. Communication technologies include human computer interface, speech technologies, virtual reality, graphic user interfaces and natural language processing. Retrieval technologies include artificial intelligence, electronic current awareness systems, electronic document delivery, online database searching, automatic indexing, text digitisation and multimedia/hypermedia technologies (Kloppers, 1996). This list covers most of what Smith (2002) and Massis (2003) observe as the knowledge and skills for operating in a virtual library setup, that LIS staff currently need to be equipped with include competencies in:

- the latest search engines
- fluent Internet searching
- designing and maintaining websites
- electronic information sources/materials and their location
- ability and capacity, including patience, to work with patrons, some of who know "too much" and some "too little" of the electronic information world
- terminology, delivery modes and legalities of electronic information access.

Most of the ICT competencies require continuous updating because of the rapid rate of technological development. This makes it necessary for LIS schools to regularly review their curricula and up-date the content. While appreciating the challenges of curriculum review processes such as institutional bureaucracy, funding, time and lack of usable models, the need for dynamic and rapid transformation in LIS education in South Africa cannot be ignored and should involve continuous infusion of ICT content into the programmes as a means of transforming LIS education (Manmart, 2001; Ocholla, 2003) or else LIS education will be found wanting by both students and employers. Neither can these competencies be learned once only, i.e. in LIS School. Hence, LIS schools have the task of equipping LIS graduates, not only with current competencies, but also a firm but

flexible base for learning/acquiring newer competencies as the need arises in their working environments. Massis (2003:8) proposes that LIS schools can best do this by offering many management courses including courses that deal with current issues. These courses should be designed and taught in such a way that they prepare the graduate to readily respond, adapt to and/or adopt changes in the work place. In addition to ICT content, LIS instruction can also greatly benefit from diversified education delivery opportunities, mainly over the Internet (Manmart, 2001).

Most of the recent research on the use of information and communication technology in education is more or less explicitly examining technological possibilities in facilitating social interaction between teacher and students and amongst students. Selinger (2000) observes that all forms of learning are enhanced by ICT, especially problem solving situations, which readily lend themselves to ICT, and students can learn to develop skills such as being systematic, logical and deductive through engaging with carefully selected computer based tasks and scenarios. Lehtinen (2000) concurs that thousands of experimental studies on the educational impact of ICT have been carried out since the first attempts to assess the educational use of information technology in the early 1970's, and all together, the reviews and meta-analyses of the experiments show that ICT students have learned more and faster than students in control groups. It is therefore presumed that ICTs in general, and the WWW in particular, offer a platform for different methods of active learning styles such as simulation, role playing, practical performance, problem-solving and even listening to lectures. Thus, many distance education and continuing education programmes are exploiting this platform for both wider reach and effectiveness. Offering of web-based courses is also a way of enriching content through direct integration of the information resources into LIS programmes because information relevant to LIS education is increasingly available on the web (Smith 2002:219; Hooke, 1999:3). Additionally for LIS education, there is the extra bonus benefit of situated cognition, that is, learning content in the context in which it would be used (Minishi-Majanja, 2003).

LIS academic research process has also been enhanced by the ICT environment that enables researchers to co-ordinate research information and collaborate in research activities. The development of scientific research networks on a world-wide basis using the Internet, helps to empower research programmes even in developing countries, whereby 'virtual research groups - composed of interconnected specialists of different parts of the world - allow databases to be shared, conferences to be organised, papers to be circulated and discussed, and collaborative research and reporting to be undertaken' (Accenture, Markle & UNDP, 2001, section 2.2.2 para. 3).

Considering the above outlined potential benefits of ICTs, this study set out to investigate whether or not LIS education in South Africa is poised to take full advantage of the opportunities that ICTs offer. It was thus envisaged that, a general audit of the current ICT modules and resources would be one way of determining the extent to which LIS education in South Africa was on meeting the challenge.

2. Methodology

A survey questionnaire, with both structured and non-structured questions, was designed to obtain data from head/chair of Library and/or Information Science (L/IS) departments in South Africa. The framework of the questionnaire was based on two prototypes, namely the Association of African Universities (2000) and Kloppers (1996). The Association of African Universities (AAU) undertook a study of the use and application of information and communication technologies (ICTs) in higher education Institutions in Africa. Kloppers studied the extent to which Information Technology education was offered in LIS departments in South Africa in preparing graduates for working in electronic information services. The ethos of Kloppers study has been replicated in this study, but at the same time sharing similar goals and structure with the AAU study. Thus the questionnaire structure was replicated from the AAU's landmark study, which divided the questionnaire into 4 sections: SECTION 1: Facts about LIS schools, SECTION 2: The state, use and application of ICT in LIS education, SECTION 3: ICT needs in LIS schools, and SECTION 4: Additional relevant comments and information. Questionnaires were electronically mailed to 15 L/IS departments in South Africa, four of which were Technikons. Responses were received from 9 institutions comprising of eight universities and one technikon, thus there was a 60% overall response rate. The data was analysed using both the Statistical Package for Social Science (SPSS) software and Microsoft Excel.

3. Findings and Discussion

3.1 Background of LIS Education in South Africa

Formal Library and Information Science (LIS) education and training began in South Africa in 1939 at the University of Cape Town with the realization of the need to provide skilled paraprofessional labour for the library sector. Judging from the 9 LIS departments in this study, growth of departments has been steady with 11% of them being established in each the 1930s, 1940s, 1950s, 1970s and 1980s, and with a peak in the 1960s, which saw the establishment of 30% of the LIS departments. The last 20% were established in the 1990s. Thus development of new LIS departments levelled off in the 1990s and the 2000s are witnessing a decline as some departments close down, while others merge. Table 1 shows the number of programmes and population in these departments as at June 2004.

Table 1. Background data on L/IS Departments in South Africa

Name of Institution	Year estab-lished	No. of Programs Offered	No. of Under-graduate Students	No. of Post-graduate Students	No. of Academic Staff	No. of ICT Staff	No. of Admin Staff
1. University of Cape Town (UCT)	1939	5	(20)*	44	5	0	1
2. University of Kwa-Zulu-Natal (UKZN)	1973	7	(90)*	67(+10)*	7	0	1
3. University of Pretoria (UP)	1947	11{26}+3	300 (+1000)*	60	16 (+22)^¢	0	2

4. Rand Afrikaans University (RAU)	-	6	-	-	4	-	-
5. University of South Africa (UNISA) (*includes former TSA)*	1955*(1993)*	19	2941	267	12 (+8)^	1	4
6. University of Stellenbosch (SUN)	1999/2001	8	-	-	4 (+13)^	0	3
7. University of Western Cape (UWC)	1960	8	200 (+400)*	23	6	1	1
8. University of Zululand (UZ)	1970	7	-	-	5 (+2)^	0	0
9. Durban Institute of Technology (DIT)	1987	2	120	-	4	1	1
Total	-	[68] + 3¢	3561 (+1510)*	461(+10)*	63 (+45)^	3	13

* Figure in brackets represents non-LIS students
^ Figure in brackets represents part-time staff
¢ Collaborative programs
- Data not available
[ ] Duplication included
{} varieties of specialization
¢ Guest lecturers also used

In addition to Table 1, refer to Appendix I for a list of programmes offered and institutions where each programme is offered. It was found that the ratio of academic staff to students is about 1:65, which is far below that of the whole sub-Saharan Africa region, 1:38 (Minishi-Majanja, 2004), and even much lower than that of the ECS sub-region that averages 1:32 (Ocholla & Minishi-Majanja, 2004). It was noted that ICT and administrative staff in most institutions are pooled and shared.

Disciplinary and hence departmental nomenclature has been changing because of the emerging trends that have introduced a slant towards information science. The information market place, which is increasingly ICT-centred and ultimately facilitating direct linking of users to information e.g. through the Internet, seems to cast a shadow over the role of libraries and the place of library science. Although no consensus has been reached and hence it is not yet clear whether Information Science should be considered a parent discipline or alternative discipline to Library Science (Underwood, 2003), most LIS departments have incorporated the term “Information Science” in their name. From the 1990s, the trend was to relinquish term "library" from the nomenclature and prefer the term "Information Science” or “Information Studies” Likewise, some LIS schools in South Africa have eliminated “library” from their name. In most cases this change was said to be made in order to accommodate the wider scope of LIS activities that evolved ICT use, suggesting that the term Library Science is not sufficient to denote the current professional practice. Nevertheless, a four out of the nine (44%) LIS schools in this study still retain the term 'library' in their name. While the reasons for retaining the term "library" in the name could be a subject of discussion, it is believed that such departments wish to continue highlighting the importance and presence of libraries and library-based information work, as a major (if not central) component of their programmes. Hence, they emphasize the significance of library science concepts in the emerging and transforming discipline/profession. At the extreme end of the change spectrum, at least one department has so changed the focus of their training that they no longer offer

"Information Science" but instead offer "Knowledge Dynamics" All that is remaining is changing the name of the department.

3.2 ICT Infrastructure in LIS Schools

This study tried to establish the kind and level of ICT infrastructure and internet availability in South African LIS schools. According to Association of African Universities (AAU, 2000, section 2.6) a sufficient infrastructure should be based on a comprehensively clear policy and consist of equipment, carrier technology, functionality and accessibility. Each component should have the relevant variables as follows:

- equipment may include stand alone and/or networked computer hardware, modems, local area networks, intranets or campus wide backbone connecting LANs and multi-campus networks;
- carrier technology such as satellites e.g. VSATs, and wireless radio/television, fibre-optic technology, unshielded twisted pair, coaxial technology; sufficient bandwidth and routers availability that are important in ensuring that a wide variety of information products can be accessed efficiently;
- functionality such as email, Internet access, conferencing tools and multimedia tools; and operating systems that may be freeware or proprietary.
- Accessibility and actual use, which can be measured in terms of computer-student ratio, computer-staff ratio, organisation of access i.e. whether centralised or decentralised, free vs. fee-based access, and regulated vs. unregulated access (AAU, 2000, section 2.6). Actual use infrastructure issues also include the average time of ICT use by students and staff, and/or the number of accounts registered on the network (AAU, 2000, section 2.6).

Additional supporting environment for ICT infrastructure includes reliable electricity supply with a standby uninterrupted power supply (UPS) system, national ICT policy that liberally regulates telecommunication services, ISPs operations, cross-border exchange and other relevant developments (Accenture, Markle & UNDP, 2001).

It was notable that all (100%) parent institutions that host LIS departments in South Africa have already formulated ICT Policies and 6 (67%) of the policies explicitly include the ICT goals of the respective LIS department. However, only three (33%) of these have comprehensive policies while 6 (67%) have fragmented policies. While the above situation is not too bad, there is concern for the few institutions that do not have comprehensive policies. One of the implications can be the absence of proper financial, infrastructural and other support to the department, hence rendering the development of ICT incorporation into LIS programmes problematic. However, this aspect was not investigated by the study. Nonetheless seven (78%) LIS faculties/departments have departmental computer laboratories and 6 (66%) have departmental networks, even though 8 (89%) also operate on campus LANs that also provide shared/centralized computer laboratory facilities, and 6 of which are in a multi-campus environment. Additionally, each of the 9 LIS departments are linked to a campus intranet, most of which are accessible both on and off campus, the latter through the Internet websites. The intranet is a cheaper and easier way of sharing information at institutional level, without

which a lot of duplication in services may result. All nine institutions with intranet use it to share academic information, as well as services such as students' registration, financial administration, management decision-making and internal communication. Thus most of the LIS schools appear to have appropriate set-ups for most of the ICT concepts in information handling to be learned in a more or less the real world of online retrieval of information, which is so rich in information exchange scenarios. Hence, the flexibility and adaptability required of a LIS graduate should be nurtured at this early time by giving them hands-on experiences. However, it was found that students' physical access to computers in South Africa is not as high as would have been expected with only 44% of the students having access at the ratio of 1:>5 while11% sharing a computer among 6-20 students. 56% of the institutions could not provide this data. But access to computer facilities is better for staff, of whom 78% each have a computer, i.e. at the ratio of 1:1.

The Internet is currently an essential academic tool that should be accessible to the entire population of the LIS department, that is, staff and students. Responses showed that all the LIS schools in South Africa have access to the Internet and it was available for both staff and students. For most students, the cost is included in the fees as an extra charge. Eighty nine percent of institutions in South Africa use a dedicated line connectivity utilising Unshielded Twisted Pair (UTP) carrier (33%). Dial-up connection is used in 11% of the cases while satellite connection and radio connection were not cited by any of the institutions studied. Likewise the Very Small Aperture Terminal (VSAT) and Wireless carrier technologies were not cited, while fibre-optic and coaxial carriers were used by 44% and 11% respectively. Even though, according to Selinger (2000), wireless technology offers a cheaper solution, it was not clear why the use of electromagnetic waves, rather than some form of wire, to carry the signal over part or the entire communication path, is unused in South African LIS schools. The common Internet connection option is through the group domain name mode, which is used by 89% of the institutions as opposed to 11% who use the single name account mode. This is a wise decision because it is economical in terms of the cost of licences and administration. Internet downtime was reported to be once or twice a week, lasting between a few seconds up to one hour duration. The main causes for interruption included telecommunication link problems (i.e. technical faults), network configuration hitches, and system upgrading periods, all these clearly out of the control of the LIS department.

3.2 ICT Course Content in LIS Schools

The challenge of offering core competencies in LIS education is enormous because of the growing variety of these competencies and the transient nature of the ICT industry. One has to look at the variety of course titles that emerge in curricula to appreciate the difficulty of a LIS educator. New titles such as Design and Realisation of Internet Information, Production and Publishing of Information Media, Database Applications, Email Services, The Social Impact of the World Wide Web, etc. are a reflection of demand for such knowledge/competencies (Minishi-Majanja, 2004:200). This study identified 29 ICT courses/modules, in five categories i.e. (1) General ICT knowledge had nine modules, (2) Storage/Retrieval Technologies had eight modules, (3) Network Technologies had seven modules, (4) Communications had three modules, and (5) Library Automation had two modules *(see Tables 2a-2e*).

Table 2a. General ICT knowledge courses offered in South African LIS Schools

Course/Module	Core/ Required	Elective	Integrated in other course/module	Not Offered
.1 Computer architecture	4	1	1	3
.2 Hardware/software selection	4	2	2	1
.3 Programming	1	2	0	6
.4 Software engineering	0	2	0	7
.5 Operating systems	3	1	3	2
.6 General application programmes e.g. word processing	6	1	1	1
.7 Information systems design/analysis	5	1	2	1
.8 Distributed systems	2	0	1	6
.9 Broadcasting technologies	1	1	2	5

Table 2b. Storage/Retrieval Technologies Modules offered in South African LIS Schools

Course	Core/ Required	Elective	Integrated in other course/module	Not Offered
10. Online database searching	8	0	1	0
11. Automatic indexing/abstracting	4	1	2	2
12. Electronic current awareness systems	6	0	2	1
13. Electronic document delivery	6	0	1	2
14. Artificial Intelligence and expert systems	3	2	1	3
15. Text digitisation	5	0	1	3
16. Hypertext	7	0	1	1
17. Multimedia/hypermedia	7	0	1	1

Table 2c. Network Technologies Modules offered in South African LIS Schools

Course	Core/ Required	Elective	Integrated in other course/module	Not Offered
18. Internet hardware and software	3	1	3	2
19. Internet facilities e.g. telnet, ftp, etc	6	0	2	1

20. Internet tools e.g. Search engines	7	0	1	1
21. Intelligent gateways e.g. Easynet	6	0	1	2
22. Local Area Networks	6	0	2	1
23. Intranet	7	0	2	0
24. Electronic Publishing	7	1	0	1

Table 2d. Communications Modules offered in South African LIS Schools

Course	Core/ Required	Elective	Integrated in other course/module	Not Offered
25. Telecommunications	2	1	4	2
26. Data Communication	2	1	4	2
27. Human-computer interaction e.g. natural language processing, speech technology, GUI, virtual reality, etc.	3	0	3	3

Table 2e. Library Automation Modules offered in South African LIS Schools

Course	Core/ Required	Elective	Integrated in other course/module	Not Offered
28. Library automation software	6	0	1	2
29. Management of Library Automation	6	0	1	2

It was found that all the 29 ICT modules identified by the study are offered in South Africa. Even though only two modules, online database searching and Intranet competencies are offered in all LIS schools, the majority of the modules are offered in many of the LIS schools. Only 4 modules identified as not being widely available, i.e. Programming (available in 33% of the LIS schools), Software Engineering (22%), Distributed Systems (33%) and Broadcasting Technologies (44%). However, these four could be found in other departments within the same institutions, and hence we can only infer that these four are not considered to be core to LIS professions in South Africa. Regarding the 'core versus elective' question, the study found that when offered, most of the ICT courses are core/required either as independent modules or as relevant content integrated in other core modules. Core or required modules are those that must be studied by all students, thus reflecting the importance placed on these competencies in the LIS professions. In most cases, such courses contain the knowledge and skills that are essential for the profession. As such, very few ICT modules are offered as electives i.e. in no more than 22% of the LIS departments for any one given module.

On the question of 'theory versus practical' content and teaching, it was found that most (83%) ICT modules offered consisted of both theoretical and practical orientation. This was important because many LIS graduates find jobs in small organization and hence need the knowledge base and practical experience to be able to work independently. A balanced combination of both theory and practice is therefore essential in their training. Practical training, in particular, is very important for students who have no previous exposure to the technology. Without this component, a graduate will be unable to perform adequately in the work place. Only six modules registered less than 50% of the desirable balance. Broadcasting Technology as a module had the lowest practical component because 80% of the LIS schools that offered it, taught only the theory.

3.4 Application of ICTs in Teaching and Learning

ICTs offer unique and exciting opportunities for teaching and learning. Selinger (2000) observes that ICTs facilitate communication, increase access to information, provide greater access to learning (especially for students with special educational needs), model and simulate a range of scientific phenomena, generally motivate students, develop problem solving capabilities and aid deeper understanding. However for all this to happen, lecturers need to be aware of the potential of ICTs for learning and be experienced in the use of the technology for teaching. Table 3 shows that the majority of LIS departments use ICTs for imparting computer literacy skills and for access to remote academic resources. However, there is marginal to average use of ICTs in lecturing, curriculum development, electronic bulletin board and the development of local websites. Overall ICTs have become part and parcel of academic discourse and work in South African LIS departments.

Table 3. Use of ICTs in teaching & learning activities **Number = 9**

	Always		**Sometimes**		**Not at All**	
	No	**%**	**No.**	**%**	**No.**	**%**
1. To provide basic computer literacy skills	7	78	2	22	0	
2. To improve access to remote resources	7	78	2	22	0	
3. In the presentation of lectures	6	67	3	33	0	
4. To develop local websites	5	56	4	44	0	
5. To provide content (e.g. CD-ROM's, www)	5	56	4	44	0	
6. To improve course management	5	56	4	44	0	
7. To develop curriculum	5	56	3	33	1	11
8. For the Electronic Bulletin Board	5	56	2	22	2	22
9. For assignments/projects by e-mail	4	44	5	56	0	
10. To provide feedback to students	4	44	5	56	0	
11. To support teaching methodology (e.g. group work tools for group assignments/discussion on the Intranet)	2	22	7	78	0	
12. For distance learning	2	22	6	67	1	11
13. To collaborate in online teaching and e-learning with other faculty and students from around the world	2	22	5	56	2	22

3.5 Application of ICTs in Research

All LIS departments subscribe to online databases and have access to electronic document delivery, especially through the respective institutional library networks. This indicates that access to research information need not be a problem. Table 4 shows the level of ICT application in various research activities.

Table 4. Use of ICT in Research **Number = 9**

	Always	**Sometimes**	**Not at All**
1. To collect academic/research information	7	2	0
2. As a research tool e.g. statistical packages, simulation software	6	3	0
3. To disseminate academic/research information	6	3	0
4. In national collaboration e.g. to create networks	6	3	0
5. To 'advertise' research plans and/or find donors, etc. on the www	6	2	1
6. In International collaboration e.g. to create networks	5	4	0
7. For electronic publishing of the research outcomes, theses, etc. on Internet	3	5	1
8. For electronic publishing of the research outcomes, theses, etc. on Intranet	3	4	2
9. To provide conferencing/group work tools	2	6	1

It was found that most LIS researchers in South Africa use ICTs frequently in their research activities. But the areas of electronic publishing and tele-conferencing have the lowest use. This suggests that most research results are communicated via conventional conferences and journals.

3.6 Application of ICTs in Academic Administration

Computerisation has permeated into all aspects of educational administration. In South African LIS schools, computers are used 89% (of which 67% is online) in the decision-making process, 89% in financial administration (of which 67% is online), 78% in students' registration activities (of which 56% is online), 89% in academic records administration (of which 56% is online), 89% in the human resource management (of which 56% is online), 100% in internal communication (of which 78% is online), 89% in office automation (of which 56% is online), 89% in interacting with external constituents (of which 67% is online) and 89% in the administration of assets (of which 56% is online). It was also revealed that 89% of academic staff have network access both on and off campus, as compared to 67% of the students and 78% of administrative staff who have similar access.

3.7 ICT Needs and Constraints

Among the immediate needs raised by LIS schools, two stood out, i.e. the need to increase the use of courseware (67%) and the need for the development of more modules

with ICT content (44%). Morales and Roig (2002) observe that increased use of courseware is necessary to enable universities achieve their objectives. Courseware use enables academic staff to adjust their instructional methods and foster greater hands-on learning, richer simulations, provision of exploratory environments, flexi-time learning, in addition to automated pedagogy (Burbules, 2000). As a by-product, through increased use of ICTs as integrated instructional devices, be it in the virtual classrooms, supported self-learning models or collaborative learning models, lecturers could to learn to develop courseware for each course.

Students' incompetence in the use of ICTs was commonly cited by 67% of the respondents as a problem. Many LIS departments provide computer literacy skills during the first year of study for their students. Alternatively, some LIS departments, and in fact entire institutions, suggest the introduction of the International Computer Driving Licence (ICDL) for all their students. The ICDL is an internationally recognised certification of a user's ability to use standard applications on a PC. Originally developed in Europe, where it is called the European Computer Driving Licence, ICDL promotes computer literacy by taking a student through seven tests covering basic concepts of IT, using the computer and managing files, word processing, spreadsheets, database/filing systems, presentation and information & communication (ICDL Africa, 2004). In South Africa, ICDL is licensed to the Computer Society of South Africa, administered by the ICDL Foundation of South Africa and available at a number of institutions and organizations. However, there is an additional cost element for students. Other ICT related constraints to LIS departments included inadequate funding (67%), which is compounded by the high cost of software (56%), inadequate number of computers (67%), network connection charges (56%) and software currency/compatibility (56%). As can be deduced, these constraints surpass the jurisdiction of LIS departments, and would require higher level of management to adequately address them. The formulation of relevant ICT policies and structures that can address the issues therein are required.

4. Conclusion

The Higher Education landscape in South Africa is being transformed not only by political changes but also by ICT developments. Managers of Higher Education recognize that an ICT-driven learning environment is a core component of their infrastructure. This environment must be robust enough to support both staff and students and flexible enough to adapt to a wide variety of instructional requirements. What remains for LIS departments to do is to continually participate in decision-making processes, especially of ICT development within their institutions. These processes involve planning (vision and policies) for and implementation (selection of hardware and software, networking and training) ICT solutions in learning and administration. LIS departments should strive to maintain their visibility in institutional ICT and other policies. This will ensure that the needs of the department are built in the financing, administrative, licensing and other enabling structures for ICT exploitation.

In general, LIS education in South Africa has made commendable strides in incorporating ICTs in their training programmes, especially when compared to the rest of Africa.

Relevant and modern competencies have been infused in most curricula, and necessary restructuring is evident. However, there is still a lot of room for improvement. The ICT infrastructure is good, but not yet excellent, both at institutional and national levels. For instance, since one of the real difference that can be made is in the empowerment of students, it is then of crucial importance to improve students' physical and epistemological access to ICTs. Concerted efforts need to be made by every department to acquire adequate quantities of computers so that physical access by students is maximised. Collaborative research activities, tele-conferencing and electronic publishing of academic research results should be encouraged among LIS academics. On a broader and higher levels, the pricing of ICT products and services needs to be carefully examined, as should the opportunities of open source software, so as not to strangle individual institutions and organizations.

Finally, South African LIS departments should fulfil their position of technological leadership in Africa by exploiting the opportunities provided by ICTs and meeting the challenges posed by these technologies.

References

Accenture, Markle & UNDP. 2001. *Creating a development dynamic: final report of the digital opportunity initiative.* [Online]: http://www.markle.org/news/pages/es.html. Accessed 2 August 2002.

Adeya, C N. 2001. *Information and communication technologies in Africa: a selective review of studies and projects*. Oxford: INASP.

Aina, L O. 1993. Education and training for information technology in Africa. *Inspel* 27: 242-250.

Aina, L O & Moahi, K. 1999. Tracer study of the Botswana library school graduates. *Education for information* 17 (3): 215-245.

Association of African Universities. 2000. *Technical experts meeting on the use and application of information and communication technologies in higher education in Africa*: report; 17th-19th May 2000 at the University of Dar-es Salaam, Tanzania. [Online]: http://www.aau.org/english/documents/aau-ictreport-toc.html. Accessed 12 July 2002.

Hooke, J. 1999. Distance education: the perils of the virtual student in cyberspace. *Journal of Electronic Publishing*, 5(1). [Online]: http://www.press.umich.edu/jep/05-01/hooke.html. Accessed 12 July 2002.

International Computer Driving Licence (ICDL) - Africa Website. [Online]: http://www.icdl.org.za. Accessed 8 June 2004.

Jensen, M. 2002. The African Internet - a status report. [Online]: http://www3.sn.apc.org/africa/afstat.html. Accessed Retrieved 1 October, 2003.

Kigongo-Bukenya, I M N. 2003. Towards a viable curriculum: a comparative study of curricula at the East African School of Library and Information Science and the departments of Library and Information Studies of Universities of Wales, Botswana, and Cape Town. *Education for Information*, 21 (2/3):113-144.

Kloppers, M. 1996. *Education of the information professional for the electronic information service: the South African situation*. Rand Afrikaans University (unpublished thesis for the degree of Magister Informationis, 1996).

Lehtinen, E. 2000. *How to evaluate the impact of educational technology: theoretical promises and practical experiences*. [Online]: http://www.global-ed.com/aset2002/keynotes.html Accessed 16 May 2003.

Main, L. 1998. Web-based virtual classrooms: a model for LIS education. *Education for Information,* 16 (4):333-340.

Manmart, L. 2001. Impact of Internet on Schools of Library and Information Science in Thailand. *67th IFLA Council and General Conference*, August 16-25, 2001. [Online]: http://www.ifla.org. Accessed 5 August 2002.

Massis, B E. ed. 2003. *The Practical Library Manager*. New York, Howarth Information Press.

Minishi-Majanja, M K. 2003. Mapping and Audit of Information and Communication Technologies in LIS Education in Africa: a literature review. *Education for Information,* 21 (2-3): 159-179.

Minishi-Majanja, M K. 2004. *Mapping and Audit of Information and Communication Technologies in Library and Information Science Education in Sub-Saharan Africa*. PhD Dissertation, University of Zululand (unpublished).

Ocholla, D N. 1998. Human resource development and training: a social responsibility against information poverty. *IFLA Social Responsibilities Discussion Group*, Amsterdam, 16 August 1998. [Online]: http://www.ifla.org/VII/dg/srdg/srdg2.htm. Accessed 5 August 2003.

Ocholla, D N. 2003. An overview of information and communication technologies (ICT) in the LIS schools of Eastern and Southern Africa. *Education for Information* 21 (2-3): 181-194.

Ocholla, D N. 1997. The responsiveness of Library and Information Science Departments in developing competencies in application of new technologies for library and information services in southern and eastern Africa. *A paper presented at the IFLA Council and General conference, Copenhagen, Denmark August 1997. (code number of paper: 151-Africa-4-E*).

Ocholla, D N & Minishi-Majanja, M K. 2004. Overview of LIS Education and Training in the Eastern, Central and Southern Africa Region. Challenges and Opportunities. A paper presented at the *SCECSAL Pre-Conference Workshop to Establish the Library and Information Schools Network in Eastern, Central and Southern African Region (LISNET-ECS), 4th July 2004, Kampala, Uganda*.

Odini, C. 1999. Training and development of skills in a changing information environment. *Library Management,* 20 (2): 100-104.

Selinger, M. 2000. Information and Communication Technology in Schools. *KnowledgeBank Paper 4*. [Online]: http://imfundo.digitalbrain.com/imfundeo/web/learn/kb4/. Accessed 17 May 2003.

Shiholo, M B. 1997. *Competencies for the information professional in the coming decade: a Delphi study*. Moi University, Eldoret Kenya (unpublished MPhil Dissertation, 1997).

Smith, A G. 2002. Digital professional education for digital librarians. In Layzell-Ward, P. (ed.) *Continuing professional education for the information society: the fifth World Conference on the Continuing Professional Education for the Library and Information Science Professions*. IFLA Publications 100. Munchen: K. G. Saur, pp. 214-223.

Thapisa, A. 1999a. Developing lasting competencies for a twenty-first century information economy workforce in Africa. *Library Management*, 20 (2): 90-99.

Thapisa, T. 1999b. Training for the real working world in the information economy. *Library Management*, 20 (2): 84-89.

Appendix I: Programmes available in LIS Schools **N = 9**

PROGRAMMES OFFERED	**L/I S SCHOOLS**		
	***Abbreviation**	**No.**	**%**
A: Undergraduate - *Certificate Level*			
i. Certificate in Knowledge Management	UP	1	11%
ii. National Certificate - Archival Studies	UNISA	1	11%
iii. Certificate in Competitive Intelligence	UP	1	11%
iv. National Higher Certificate: Archival Studies	UNISA	1	11%
v. Advanced Certificate in Education – School Librarianship	UKZN	1	11%
vi. Post-diploma Certificate: Archival Studies	UNISA	1	11%
B: Undergraduate - *Diploma Level*			
i. National Diploma: Library and Information Studies	UNISA/UWC	2	22%
ii. National Diploma: Archival Studies	UNISA	1	11%
iii. National Diploma: Information Science	UNISA	1	11%
iv. Diploma in School Librarianship	UWC/UZ	2	22%
v. Diploma in Library/Information Science/Management	DIT	1	11%
vi. National Diploma: Youth and Children's Information Work	UNISA	1	11%
C: Undergraduate - *Bachelors Degree Level*			
i. Bachelor of Library and Information Science (BLIS/BBibl)	UWC/UZ	2	22%
ii. BA in Information Science	RAU/UNISA/UZ	3	33%
iii. BA in Archival Science	UNISA	1	11%
iv. BA in Arts & Culture - Societal Information	UNISA	1	11%
v. Bachelor of Information Science (B Inf./BIS)	UNISA/UP	2	22%
vi. B Tech: Library/Information Science	DIT/UNISA	2	22%
vii. B Tech: Archival Studies	UNISA	1	11%
viii. B Com: Information Science	RAU	1	11%
ix. BA Social Informatics	SUN	1	11%
x. BA Value and Policy studies	SUN	1	11%
xi. B Bibl Education	UWC	1	11%

D: Postgraduate - *Post-Graduate Diploma*			
i. Post-Graduate Diploma in Library and Information Science	UCT/UWC/UZ	3	33%
ii. Post-Graduate Diploma in Information Studies	UKZN	1	11%
iii. Post-Graduate Diploma: Information Management	RAU	1	11%
iv. Post-Graduate Diploma in Records and Archives Mgt.	UKZN	1	11%
v. Post-Graduate Diploma in School Library Services/Science	UZ	1	11%
vi. Post-Graduate Diploma in Museology	UKZN	1	11%
E: Postgraduate - *Honours Bachelor Degree*			
i. B Hons: Library and Information Science	UCT/UKZN/UP/UWC/UZ	5	56%
ii. B Hons: Information Science	UNISA/UP	2	22%
iii. BA Hons: Information Science	RAU/UNISA	2	22%
iv. BA Hons: Information Science for Development	UP	1	11%
v. BA Hons: Social Informatics	SUN	1	11%
F: Postgraduate - *Masters Degree*			
i. Master of Information Science (M Inf./ M IS)	UNISA/UP	2	22%
ii. MA/MSc. Information Science	RAU/UNISA	2	22%
iii. Master of Library and Information Science (MLIS/MBibl)	UCT/UKZN/UP/UWC/UZ	5	56%
iv. MPhil: Library and Information Science	UCT	1	11%
v. M Tech: Library and Information Science	UNISA	1	11%
vi. MA Social-Informatics	SUN	1	11%
vii. MPhil Decision-making, Knowledge Dynamics and Values	SUN	1	11%
viii. MPhil Information and Knowledge Management	SUN	1	11%
ix. MA Development Communication	UP	1	11%
G: Postgraduate - *Doctoral Degree*			
i. PhD – Library and Information Science	UCT/UKZN/UP/UWC	4	44%
ii. DPhil	RAU/UNISA/UP/UZ	4	44%
iii. DPhil Social-Informatics	SUN	1	11%
iv. DPhil Decision-making, Knowledge Dynamics and Values	SUN	1	11%

** Some of these abbreviations are created for this study.*

DIT Durban Institute of Technology, Department of Library and Information Studies
RAU Rand Afrikaans University, Department of Information Studies
SUN University of Stellenbosch, Department of Information Science
UCT University of Cape Town, Centre for Library and Information Studies
UZ University of Zululand, Department of Library and Information Science
UKZN University of KwaZulu-Natal, Department of Information Studies
UP University of Pretoria, Department of Information Science
UNISA University of South Africa, Department of Information Science
UWC University of Western Cape, Department of Library and Information Sci.