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THE STATE OF

IN **ICT**

HIGHER
EDUCATION
LESOTHO





L E S O T H O
C O M M U N I C A T I O N S
A U T H O R I T Y

REPORT

THE STATE OF ICT IN HIGHER EDUCATION LESOTHO

First Edition – November 2016

A brief reference guide to the
State of ICT in Higher Education in Lesotho

THE STATE OF ICT IN HIGHER EDUCATION IN LESOTHO

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Although great care has been taken to ensure that this publication is as accurate and complete as possible, Lesotho Communications Authority cannot accept any legal responsibility for the information given and opinions expressed in it.

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Acronyms and Abbreviations

AUP	Acceptable Use Policy
BMP	Bandwidth Management Policy
CD	Compact Disc
CHE	Council on Higher Education
CPE	Customer Premises Equipment
DVD	Digital Versatile Disc
GoL	Government of Lesotho
HEI	Higher Education Institution
ICT	Information and Communications Technology
IMS	Information Management System
IT	Information Technology
Kenet	Kenya Education Network
LAN	Local Area Network
LCA	Lesotho Communications Authority
LEC	Lesotho Electricity Company
ODeL	Open, Distance and e-Learning
OPAC	Online Public Access Catalogue
OSP	Open Source Policy
SARUA	Southern African Regional Universities Association
TVET	Technical and Vocational Education and Training
UPS	Uninterruptible Power Supply
Wi-Fi	Wireless Fidelity

Acknowledgements

On behalf of the Lesotho Communications Authority, I am pleased to present the first edition of the state of ICTs in higher education institutions. The publication makes a significant contribution to the knowledge base of ICT adoption by higher education institutions. The report was prepared by M. Mochebelele, D. Maqutu and M. Phakisa in the Economics, Research and Market Development division. We would also take this opportunity to thank the staff of the Authority for the different roles they played in support of this project.

The report is based on a survey that required detailed and proprietary data from each of the institutions and it could not have been completed without the support of heads of institutions, academic registrars, directors of ICT and development planning. The Authority thanks them sincerely for their cooperation. The Authority is also grateful to the Council on Higher Education (CHE) for the information that assisted the Authority, particularly with identification of some of the higher education institutions.

T. 'Mokela

Chief Executive Officer

1. Introduction

1.1. Background

With the world moving rapidly into the digital era, the role of information and communication technology (ICT) in education has become critical. The use of ICTs in higher education institutions has the potential to enhance the quality of teaching and learning, increase research productivity and improve administrative efficiency. In addition, usage of ICTs by students in higher education institutions develops the future workforce that will occupy leadership positions and therefore, play a critical role in the transformation of a country to an information society (Kenet, 2009).

The application of ICTs for teaching and learning is useful in a variety of ways that include developing course material and delivery of lectures and presentations. ICTs can also successfully support and extend reach of open and distance learning/education and aid higher education research function. For instance, the increases in computing power have made it possible for researchers to analyse huge amounts of data and perform complex computations in a manner that is fast, accurate and reliable. Another dimension of ICTs in research is the use of online text databases and online research libraries/virtual libraries that provide academics with online access to the content of a number of books, research reports and peer reviewed articles in electronic journals.

ICTs enhance day-to-day management of institutions in various functional areas that include students, staff and general administration. The student administration functions that include student applications, admissions and registration, timetabling, examination results and transcripts have benefitted

from the use of ICTs. Application of ICTs for staff administration involves, among others, usage of computers for recruitment and work allotment of staff and automation of staff leave management. With regard to the general administration of institutions, ICTs can be used for efficient management of finances, procurement and store management, data distribution and management, among others.

The potential for ICTs to transform teaching, learning, research and management in higher education is no exception in Lesotho. To this end, the 2013 Lesotho higher education policy underscores the need for higher education institutions to take advantage of the new ICTs, as well as adopting more flexible approaches to programme delivery such as open, distance and e-learning (ODeL) method. One of the broad policy goals is to harness new ICTs in higher education, which will be achieved by, among others, creating enabling environment for the institutions to upgrade their ICT facilities in order to enhance and support teaching and learning, research and innovation as well as other functions.

It has been shown that higher education institutions in developing economies are at different stages of adoption of ICTs for education and management (Kashorda and Waema, 2011). Similarly, in Lesotho, the higher education institutions are at different stages of ICT adoption but the extent of ICT penetration in these institutions is not documented. That is, there is limited statistics on ICT indicators related to higher education institutions in Lesotho. The study, therefore, seeks to review the state of ICTs in higher education institutions throughout Lesotho with the aim of assessing the extent to which ICTs are integrated into the operations, including teaching and research functions of the institutions.

1.2. The scope of the study

Higher education in Lesotho is defined as a tertiary level of education that includes all post high school education with a minimum continuous duration of at least two academic years (Council on Higher Education, 2010). The formal education system includes seven years of primary schooling, three years of secondary and a further two years of high school. Ordinarily, learners progress through these stages of schooling and qualify for entry into higher education, which includes the stream of those that qualify for technical and vocational education and training (TVET).

The survey covered all higher education institutions in Lesotho including the institutions that offered vocational education and training with programmes that have a minimum continuous duration of two years and an entry requirement of a high school leaving certificate. For institutions that had two campuses, each campus was treated as an independent institution because the study sought to unmask the confounding variables in the measurement of ICT indicators within individual campuses. The study covered 19 institutions, three of which had two campuses that were treated as independent institutions (survey units). These then brought the total number of surveyed institutions to 22 and they are presented in Table 1.1.

Table 1.1 Higher education institutions covered in the survey

No.	Institution
1.	National University of Lesotho (Main campus)
2.	National University of Lesotho (Institute of Extra Mural Studies)
3.	Limkonkwing University of Creative Technology
4.	Centre for Accounting Studies
5.	Lerotholi Polytechnic
6.	Lesotho Agricultural College (Main campus)*
7.	Lesotho Agricultural College (Leribe)*
8.	Lesotho College of Education (Main campus)
9.	Lesotho College of Education (Thaba-Tseka)
10.	National Health Training College*
11.	Institute of Development Management
12.	Lesotho Institute for Public Administration and Management*
13.	Lesotho Boston Health Alliance*
14.	Roma College of Nursing*
15.	Paray School of Nursing*
16.	Scott College of Nursing*
17.	Maluti Adventist College*
18.	Thaba-Tseka Technical Institute*
19.	Leloaleng Technical Institute*
20.	Catholic Comprehensive Community College
21.	Bethel Business Community Development
22.	St. Elizabeth Training Institute*
*Denotes specialised institutions	

1.3. Data collection and analyses

Data were collected using a structured questionnaire, which was given to institutions to complete. In most institutions, the head of IT/ICT unit and/or the head of development planning in consultation with other department heads (faculty deans, directors, librarians etc.) completed the questionnaire. On average, institutions took about three months to complete the

questionnaires. The delay by institutions in responding was mainly caused by lack of data in a single database. Several return visits and telephonic follow-ups were made due to incomplete questionnaires received as well as nonresponse by some institutions. Moreover, most institutions did not produce annual reports that captured all the demographic data for both staff and students and expenditures on ICT. All the institutions were requested to submit the 2014/2015 data.

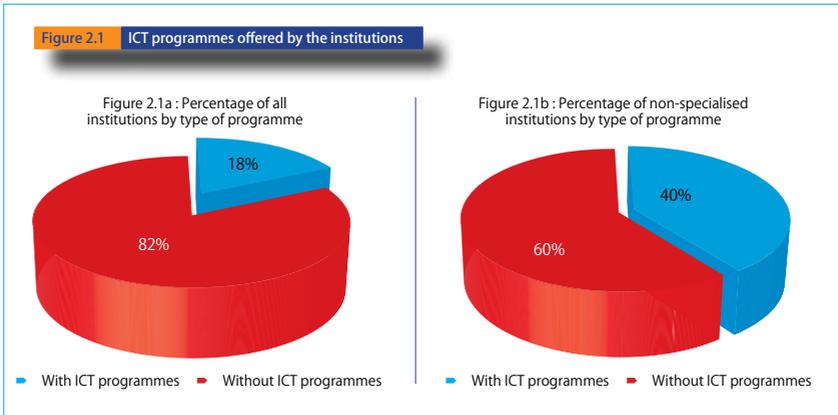
With regard to the analyses of ICT related study programmes, the institutions were classified into two groups, namely, specialised and non-specialised institutions. Specialised institutions consisted of those that offered only specialised programmes such as health training colleges, agricultural colleges etc. As a result, specialised institutions would not offer majors that include ICT related areas but could offer ICT related courses. The non-specialised institutions consisted of all other institutions, which did not offer specialised training in the context explained here. Instead, they have a broad range of programmes that cut across a number of disciplines ▣

2. Profile of the institutions

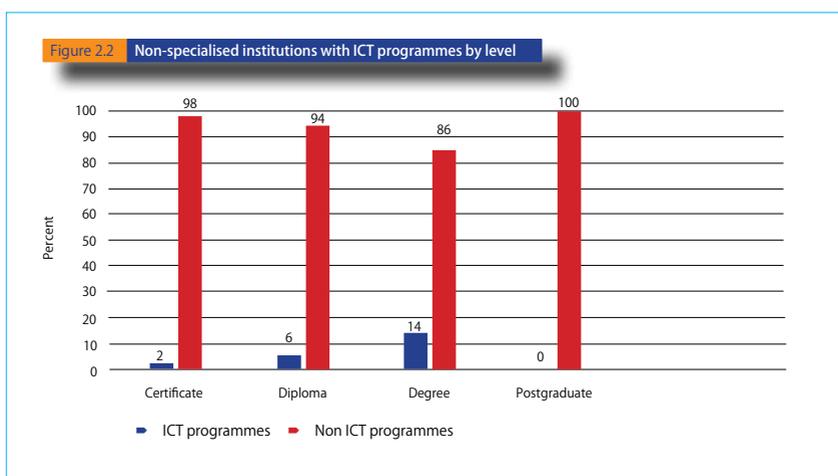
2.1. The ICT programmes

Majority of institutions (81%) offered diploma amongst some of their programmes while 59 percent of them offered certificate as one of their programmes. First degree programmes were offered by 23 percent of the institutions whereas 14 percent offered post-graduate programmes as well.

Of all the institutions in the study, 18 percent offered ICT related programmes (Figure 2.1(a)). However, when the non-specialised institutions were considered in isolation, 40 percent of them offered ICT related programmes (Figure 2.1 (b)).



Of all programmes offered by non-specialised institutions, the ICT related programmes constituted nine percent. A further disaggregation of the programmes offered by non-specialised institutions in terms of level of qualification showed that 14 percent offered ICT related majors at the first degree level while less than 10 percent (6%) offered such majors at the diploma level. Only two percent of these institutions had ICT related majors at the certificate level and none of them had ICT related majors at the postgraduate level (Figure 2.2).



2.2. Staff

The overall number of employees in the higher education institutions was 1, 859 and the institution with the smallest number had 10 employees whereas one with the largest staff compliment had 616 employees. The staff with ICT related qualifications accounted for nine percent (Figure 2.3). A breakdown of staff by job category (teaching, administrative and support and library staff) showed that 23 percent of library staff had ICT related qualification, teachers and administrative staff (including support staff) constituted 11 percent and four percent respectively (Figure 2.4).

Figure 2.3 Staff by type of qualification all institutions

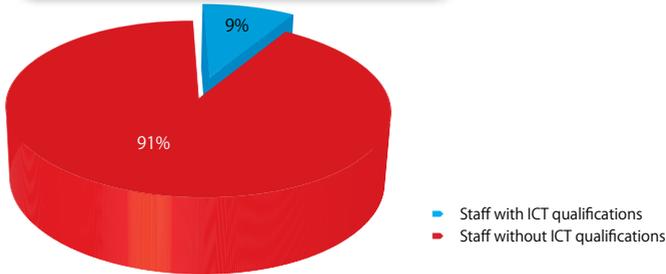
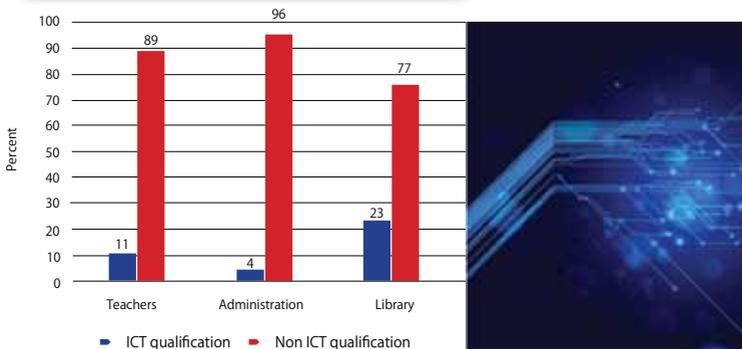


Figure 2.4 Staff with ICT related qualification by job category



With regard to non-specialised institutions, the proportion of staff with ICT qualification was 11 percent (Figure 2.5). When disaggregated by job category, 29 percent and 14 percent of the library staff and teaching staff had an ICT related qualification respectively (Figure 2.6). Administrative and support staff with the ICT related majors constituted six percent.

Figure 2.5 Staff by type of qualification in non-specialised institutions

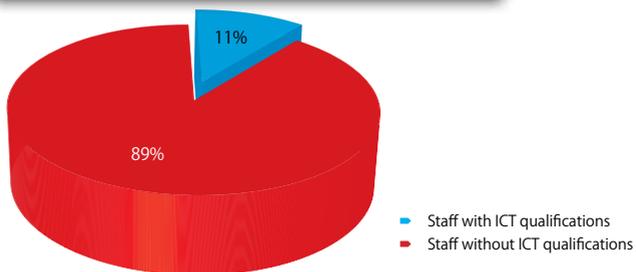
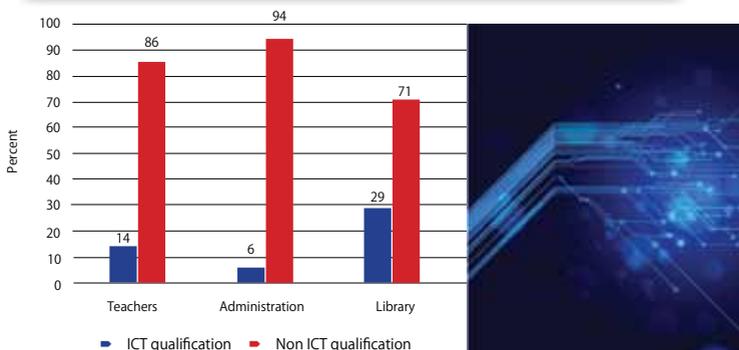
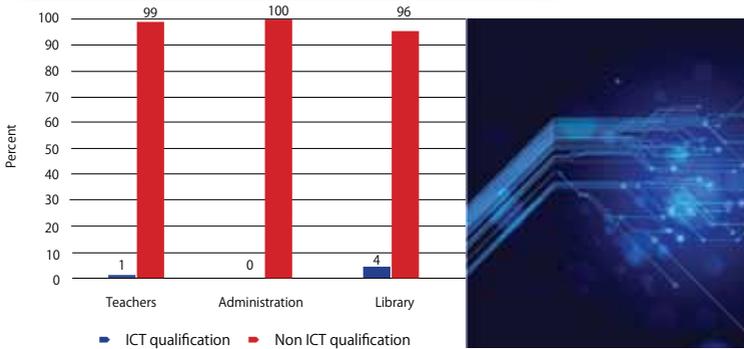


Figure 2.6 Staff with ICT related qualification by job category in the non-specialised institutions



Considering the specialised institutions, on the overall, less than one percent (0.8%) of staff had an ICT related qualification. With the ICT related qualifications by job category, a pattern similar to that of non-specialised institutions was observed. That is, the proportion of the library staff with ICT related qualification (4%) was slightly higher than that of teaching staff (1%). None of the administrative and support staff had an ICT related major (Figure 2.7).

Figure 2.7 Staff with ICT related qualification in the specialised institutions

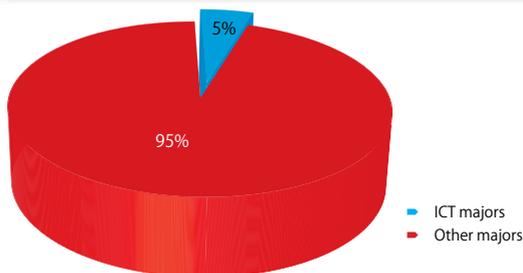


Overall, results suggest that non-specialized institutions are better served in that they have a relatively higher percentage of staff with ICT related qualifications.

2.3. Student enrolments

There were 24, 226 students enrolled in higher education institutions during the time of the study. The institution with the lowest enrolment had registered seven students and the one with the highest number had 9, 554 students. Since the specialised institutions did not have students taking programmes in ICT related fields, they were excluded for the computations regarding the proportion of students with ICT related programmes. Five percent of the students were taking ICT related programmes in the non-specialised institutions (Figure 2.8).

Figure 2.8 Students enrolled in ICT related programmes in non-specialised institutions



With regard to students' enrolment in the higher institutions by gender, it is shown in Figure 2.9 that there were more female students (60%) than their male counterparts (40%). However, the reverse was true in terms of proportion of students that took ICT related programmes by gender. That is, 79 percent of students majoring in ICT related fields were males whereas the remaining 21 percent were females (Figure 2.10).

Figure 2.9 Students enrolment in the higher education institutions by gender

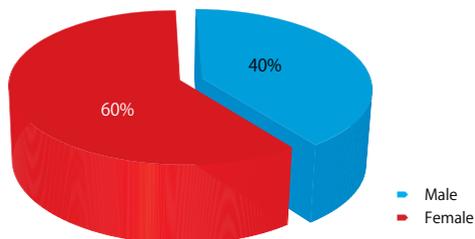
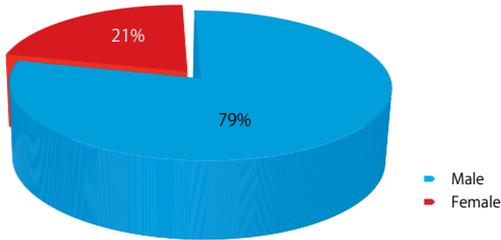
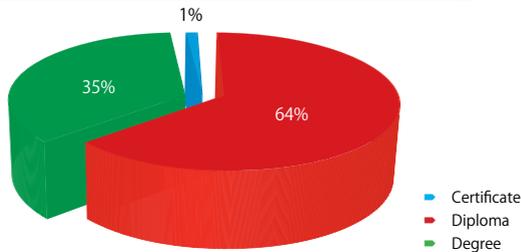


Figure 2.10 Students enrolled in ICT related programmes by gender



Amongst students majoring in ICT related programmes, majority were enrolled at the diploma level (64%) and 35 percent at the degree level while the remaining one percent were registered at the certificate level (Figure 2.11). None of the students who were taking ICT related programmes were enrolled at the postgraduate level.

Figure 2.11 Students enrolled in ICT related programmes by level

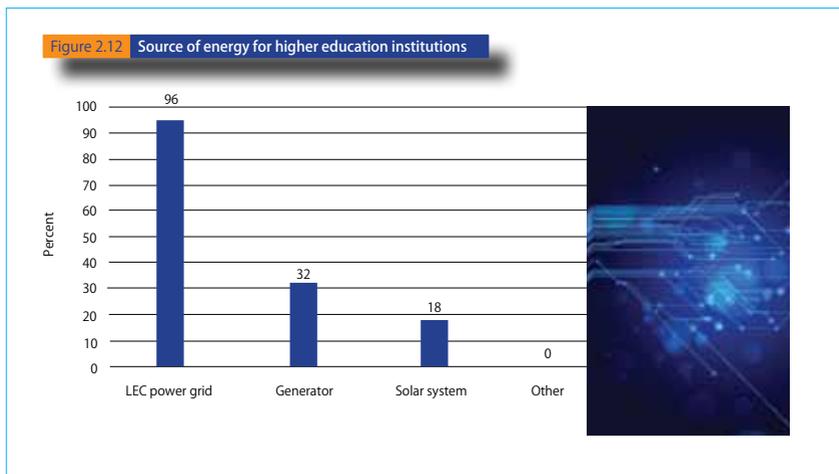


2.4. Disabilities

The institutions with staff or students that had at least one form of disability constituted 32 percent. Amongst those with disabilities, over half (57%) were paraplegic, 43 percent were blind and almost 30 percent were deaf/ mute. With regard to special ICT facilities for the disabled, 14 percent had special computers for staff while five percent had special computers for students.

2.5. Sources of energy

All higher education institutions were connected to LEC power grid except one institution, which is situated in the deep rural area where there was no power grid. Almost one third of the institutions used an electricity generator for back-up (Figure 2.12). Also, the solar power was used to back-up the LEC power grid except for one institution, which used solar as the main source of energy.



3. ICT infrastructure and connectivity

3.1. Presence of computers and servers

All the higher education institutions had computers regardless of whether they were for teaching or administrative purposes. The total number of computers in all institutions was 3, 464 and the institution with the smallest number of computers had five whereas the one with the highest number of computers had 1, 085. In addition, 93 percent of all the computers in the institutions were networked. The institutions that had tablets constituted 18 percent; with the highest having 12 tablets and one with the least had one tablet. More than half (56%) of the computers in the institutions were dedicated to students while the remaining 23 percent, 14 percent and seven percent were dedicated to teaching, administrative (including support) and library staff respectively. There was only one institution that had a computer scheme, which provided staff and students with personal laptops. The scheme worked in such a way that both staff and students would pay half of the laptop price and pay the remaining balance in instalments.

To assess access to computers in the institutions, the minimum, maximum and average user to computer ratios for students, teaching and administrative and support staff were computed and the results are presented in Table 3.1. There were on average 12 students to one computer, while there was one lecturer per computer and two non-teaching (administrative & support) staff members to one computer. The institution with the highest students-to-computer ratio had 20 students per computer, while the one with the highest teaching staff to computer ratio had 12 staff members to one computer. Also, the institution with the highest non-teaching staff to computer ratio had eight employees per computer.

Table 3.1 User to computer ratio for students, teaching staff and administrative and support staff

User-to-computer ratio	Average	Minimum	Maximum
Students-to-computer ratio	12:1	1:1	20:1
Teaching staff-to-computer ratio	1:1	1:1	12:1
Admin & support staff-to-computer ratio	2:1	1:1	8:1

One other form of access to computers in higher institutions of learning is through the use of computer laboratories (labs). The proportion of institutions with the general purpose labs was 91 percent, with the highest having nine while the one with the least number of labs had one. On the overall, there were 1,750 computers in the general purpose labs and the institution with the minimum number of computers in these labs had 9 while the institution with most computers had 455.

Information was also sought about specialised computer laboratories, which were meant for specialised programmes that require learning and or practicals using computers such as computer science, media production, and electronics majors. In this regard, the results showed that none of the specialised institutions had specialised computer labs but 30 percent of the non-specialised institutions had specialised computer laboratories and the one with the highest number had seven labs while one with the least number had one lab. Of those institutions with specialised labs, the total number of computers was 300, and the institution with the minimum number of computers had 80 and the one with the largest number had 110 computers.

The institutions were asked about the times when computer laboratories are opened for students to have access to computers. All of the institutions did give students access to computers from Monday to Friday between eight in the morning and five in the afternoon (Table 3.2). However, not all the institutions did allow students access to the labs during the week after working hours and weekends. That is, more than half (55%) of the

institutions availed students access to computers after working hours during the week while 50 percent of them also allowed students to have access to computers during weekends.

Times	Percentage of institutions
Monday to Friday 8am to 5pm	100
Monday to Friday even after working hours	55
Weekends	50
Always	18

With regard to the presence of servers, 64 percent of the institutions had them, with the highest having six while the institution with the least number of servers had one. Of the institutions with the servers, all of them had central servers (shared by the entire campus) while 36 percent of them had faculty/departmental servers (used only by a single faculty or department). In addition, all the institutions with servers had at least a server room. Seventy nine percent had server rooms with air-conditioning and the same proportion had server rooms with electrical back-up. All the institutions used the Uninterruptible Power Supply (UPS) for electrical back-up and a limited number (7%) had back-up generators as well.

3.2. Campus network

The campus network is one of the fundamental building blocks of an institution's infrastructure (SARUA, 2008). It usually provides a foundation for teaching, library access, research, administration and other countless university services. In this regard, 82 percent of the institutions in Lesotho had a campus backbone linking Local Area Networks (LANs) and of these, 61 percent deployed fibre-optic cables, 39 percent used wireless connectivity and a third (33%) utilised copper (Table 3.3). Forty four percent of the institutions had LANs in all offices and buildings used for teaching and research.

Table 3.3 Institutions with campus backbone and LANs by type of connectivity

	With fibre on campus	With copper on campus	With wireless network on campus	With LANs in all offices and buildings used for teaching and research
Percentage of institutions	61	33	39	44

3.3. Internet connectivity/access

The proportion of institutions with Internet connectivity constituted 82 percent and the total number of computers connected to Internet was 3, 064, accounting for 89 percent of the total number of computers in the institutions. The institution with the highest number of computers connected to the Internet had 1, 085 and the one with least number of computers had connected three.

Of the institutions with the computer laboratories, 70 percent of them had the computers in those laboratories connected to Internet for students to use. In addition, 56 percent of the institutions with Internet connectivity had Wi-Fi hotspots for students to access Internet.

With regard to the institutions that did not have Internet connectivity, the reasons mentioned included amongst others, lack of Internet coverage, insufficient funds, and lack of skilled staff to initiate the processes.

The institutions were asked whether there were Internet café in their locality. Seventy three percent of them had Internet cafés within a walking distance of ten minutes on average.

3.4. Web presence

A little more than half (55%) of the institutions had websites. Most of the campuses used their websites to amongst others, provide information on admission requirements, programmes offered, career prospects to prospective students, including downloading of the application forms. The websites were also used to provide information to current students on various issues related to them as well as making information available to the general public.

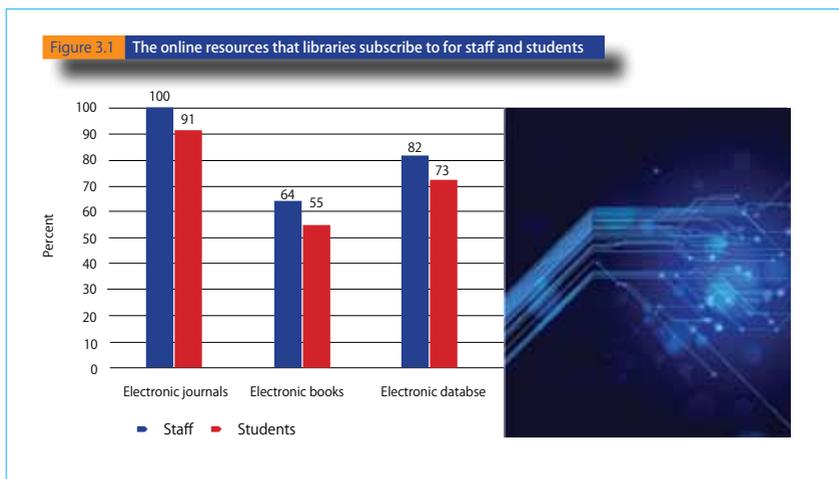
Of the institutions with Internet connectivity, less than two thirds (61%) provided staff with an institutional e-mail address. However, none of the institutions provided students with an institutional e-mail address.

3.5. ICTs in the libraries

Ninety one percent of the institutions had a library and of these, 20 percent had an archive section. With institutions that had a library, 40 percent had qualified personnel in charge of the library information systems. The qualifications included diplomas, first and second degrees in information sciences as well as first degrees of engineering in computer systems and networks. Of those institutions with a library, 45 percent regularly trained the library staff on IT/ICT systems.

The results showed that five of the 20 institutions with libraries were automated, but of these, none had automated all library operations. The function that was automated by all the five institutions was the cataloguing and classifying of books. There were four of the five libraries that had Online Public Access Catalogue (OPAC) and an automated issue desk. The book requisitions were automated by two of the five institutions. There was only one institution where OPAC was available off-campus for both staff and students.

More than half of the institutions (55%) had libraries that subscribed to online resources to support research. Libraries of all of these institutions subscribed for electronic journals for staff while 91 percent subscribed to such journals for students (Figure 3.1). Majority of the libraries subscribed for electronic database for both staff (82%) and students (73%). In addition, more than half of the libraries subscribed to electronic books for staff (64%) and students (55%).



Furthermore, half of the institutions had a multimedia centre for students to view or access multimedia resources such as CDs, DVDs and Internet databases. The number of networked computers used by students in the multimedia centres ranged from one to 65 across institutions.

Three quarters of the institutions allowed students, staff and other users of the library to bring their own devices to access library facilities on the library network (e.g. using wired or wireless connectivity).

With regard to support and training of users of the library, library staff offered library information literacy services and training to students and staff in 70 percent and 55 percent of the institutions respectively (Table 3.4). A

little over a third (35%) of institutions had their library sending out regular updates and information on library issues by email to staff. None of the institutions had their libraries sending updates by email to students.

Support by the library	Percentage of institutions	
	Staff	Students
E-mail updates and information to staff and students	35	0
Library, literacy, training to staff and students	55	70

3.6. On-site presence of communication facilities and CPEs

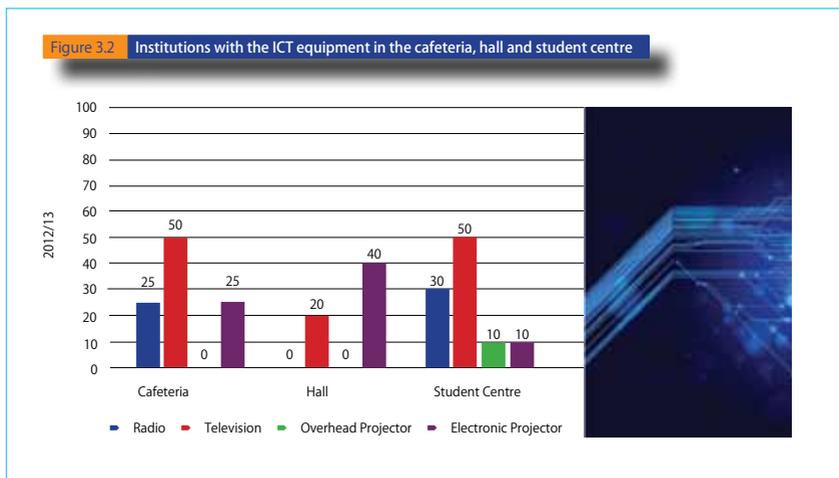
Majority of higher education institutions had fixed telephones (91%) and a little over two thirds had fax machines (68%). In more than half (59%) of the institutions, at least one senior administrative member of staff had a mobile phone supplied by the institution. Less than half (41%) of the institutions had cordless phones and none of the institutions had two-way radios.

Of those institutions with fixed telephone lines, 70 percent had more than one external telephone line and one with the highest number of lines had 10. Also, more than half (55%) of the institutions had access to public payphones located within an average walking distance of five minutes.

The total number of lecture rooms in the institutions was 227 and the institution with the least number of lecture rooms had one (this institution offered only one major) and the one with the highest number of lecture rooms had 30. With regard to the ICT equipment used in the lecture rooms, a few institutions (14%) had radios. Forty five percent of the institutions had at least one television in one of the classrooms and the maximum number of televisions in any one institution was two. Over half (59%) of the institutions had an overhead projector in the lecture rooms and the institution with

the maximum number of projectors had seven. The results also showed that institutions were moving towards the use of electronic projectors in the classrooms. Almost two out of three (64%) institutions had an electronic projector and the number varied between institutions with the maximum number of projectors being 12 in one of the institutions.

Figure 3.2 depicts the proportion of institutions with the ICT equipment in the dining halls (cafeteria), multi-purpose halls and student centres. Half (50%) of the institutions had televisions in the cafeteria as well as in the student centres. The electronic projector was mostly used in the multi-purpose hall (40%) compared to the cafeteria (25%) and the student centre (10%).



4. Organisation, leadership and management of ICTs

4.1. ICT units

Close to half of the institutions (46%) had a dedicated and centralised ICT unit with the head of the unit reporting to top management (Vice Chancellor, Principal, Deputy Rector, Registrar or Director Academic). One of the advantages of ICT heads reporting to the top management and leadership structures of the institutions include the fact that they are in a position to push for change and to mobilize for funding of ICT projects. There was only one institution with e-learning unit although it was still part of the IT unit.

4.2. Policies and plans

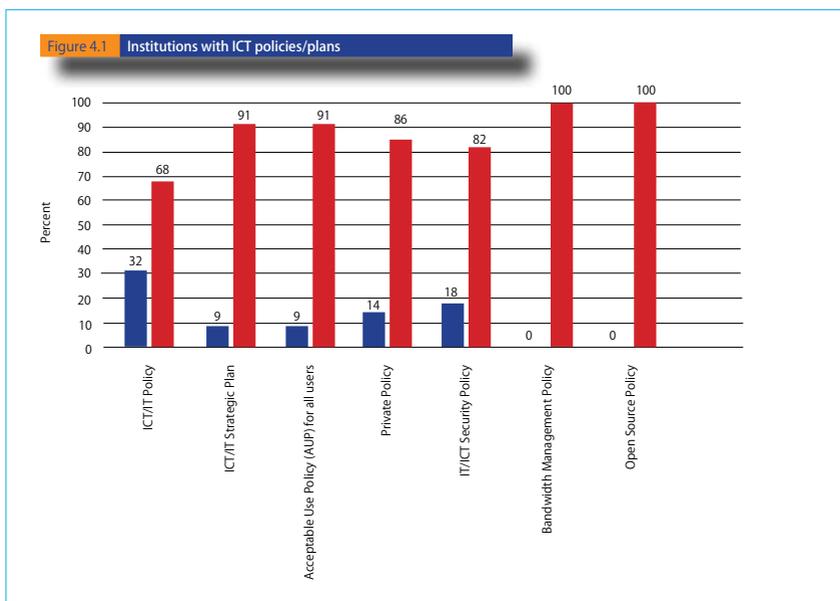
Information was sought from the institutions with regard to the ICT policies and plans in place in the institutions. There were six policies and one plan that institutions had to indicate whether or not they were in existence. These were as follows:

- ICT/IT Policy;
- ICT/IT Strategic Plan;
- Acceptable Use Policy (AUP) for all users;
- Privacy Policy;
- IT/ICT Security Policy;
- Bandwidth Management Policy; and
- Open Source Policy

More than half (59%) of the institutions had no ICT/IT policies or plans; 27 percent had between 1 to 2 policies or plans; and 14 percent had three to four policies or plans (Table 4.1). None of the institutions had all the seven documents of interest.

	No policy/plan	1 – 2 policies/plan	3 – 4 policies/plan	All policies/plan
Number of institutions	13	7	3	0
Percentage of institutions	59	27	14	0

The prevalence of ICT/IT related policies in the institutions was limited. Almost one third (32%) of the institutions had the ICT/IT policy, followed by the ICT/IT security policy (18%) and the privacy policy (14%). The institutions with ICT/IT strategic plan and AUP constituted nine percent each while none of the institutions had Bandwidth Management Policy and Open Source Policy (Figure 4.1).



4.3. Procurement of ICTs

In 41 percent of the institutions, procurement of all hardware and software was done by the ICT/IT unit or equivalent on behalf of other departments. That is, procurement of ICT/IT related equipment was centralised. Of all those institutions where procurement was not centralised, the IT/ICT unit was still consulted when other departments made hardware and software purchases.

4.4. Financial support for ICTs

Eighty two percent of the institutions indicated that the total ICT/IT capital budget came from their own internal resources (including Government subvention). The remaining 18 percent showed that in addition to internal resources, there was external donor support contributing between five to ten percent of the ICT/IT capital budget.

The institutions were also asked about their major source of funding for ICT recurrent expenditure. Ninety one percent of the funding for recurrent expenditure was from their internal resources. For the remaining institutions, the main sources of funding came from loans (4%) and external donor support (5%).

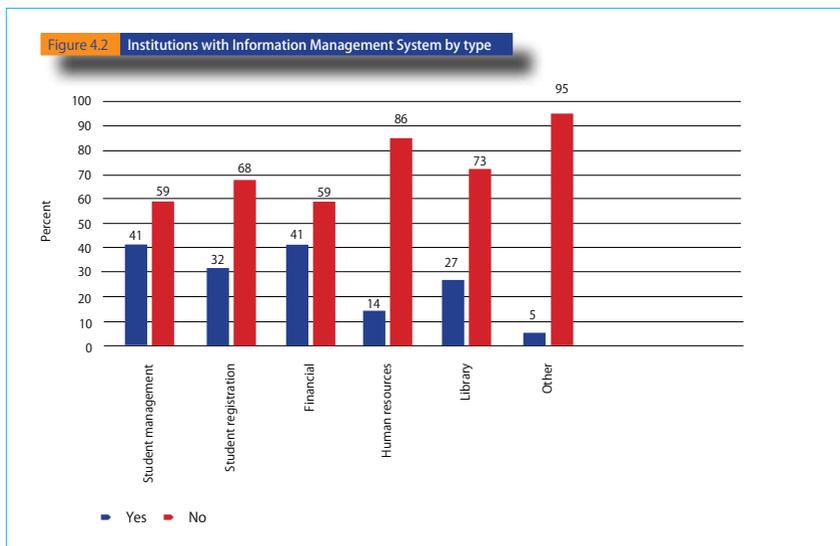
4.5. Information management system

With regard to the information management systems (IMS), half of the institutions (50%) had not installed any type of IMS while 14 percent had installed one to two types. The institutions with three to four types of IMS constituted 27 percent and nine percent had five to six types (Table 4.2).

Table 4.2 Existence of Information Management Systems (IMS)

Number of IMS systems	0	1 - 2	3 – 4	5 - 6
Number of institutions	11	3	6	2
Percentage of institutions	50	14	27	9

The most common information management systems were the student information management system and the financial information management system with 41 percent of the institutions having installed them. They were followed by the student registration information system and the library information management system with 32 percent and 27 percent of the institutions having them respectively. The human resources information management system was the least used system; 14 percent of the institutions used it (Figure 4.2). The other information management system not commonly used was the asset management system.



Of the institutions with IMS, a few of them used the systems that were developed in-house. For instance, 22 percent of those with student information management system developed the system in-house; the student registration information system and the financial information system were developed in-house by 14 percent and 11 percent of the institutions respectively. None of the institutions had developed the human resource information management system in-house.

4.6. Major ICT challenges

The institutions were asked to indicate the challenges they faced in trying to integrate ICTs in their operations. The issues and or challenges ordered by frequency of response starting with the highest were as follows:

- Lack of funding;
- Inadequacy of skilled ICT/IT staff;
- Delays in buying and or replacing ICT equipment;
- Low bandwidth;
- Lack of IT/ICT policies;
- Unreliable network;
- No Internet access in the area;
- Astronomical cost of high speed Internet connectivity and
- No LEC power grid in the area.

The most frequently cited challenge was lack of funding for ICT infrastructure and equipment, for instance, most institutions were not able to buy enough computers for students. Also the challenge of limited ICT/IT trained staff was mentioned by most institutions and in some cases; the departments of IT were highly under-staffed. With regard to Internet connectivity related issues, institutions mentioned the high cost of bandwidth which limits use of Internet to an extent that some still do not have Internet due to affordability. Unreliable network was also mentioned as one of the major setbacks when

trying to integrate ICTs in operations. There was also an institution that was not on the LEC power grid and relied on solar energy. As a result, it did not have adequate power to run all computers for students ☐

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