KENET

KENYA EDUCATION NETWORK

E-READINESS SURVEY OF HIGHER EDUCATION INSTITUTIONS IN KENYA (2006)

E-READINESS SURVEY OF HIGHER EDUCATION INSTITUTIONS IN KENYA

A STUDY FUNDED BY PARTNERSHIP FOR HIGHER EDUCATION IN AFRICA

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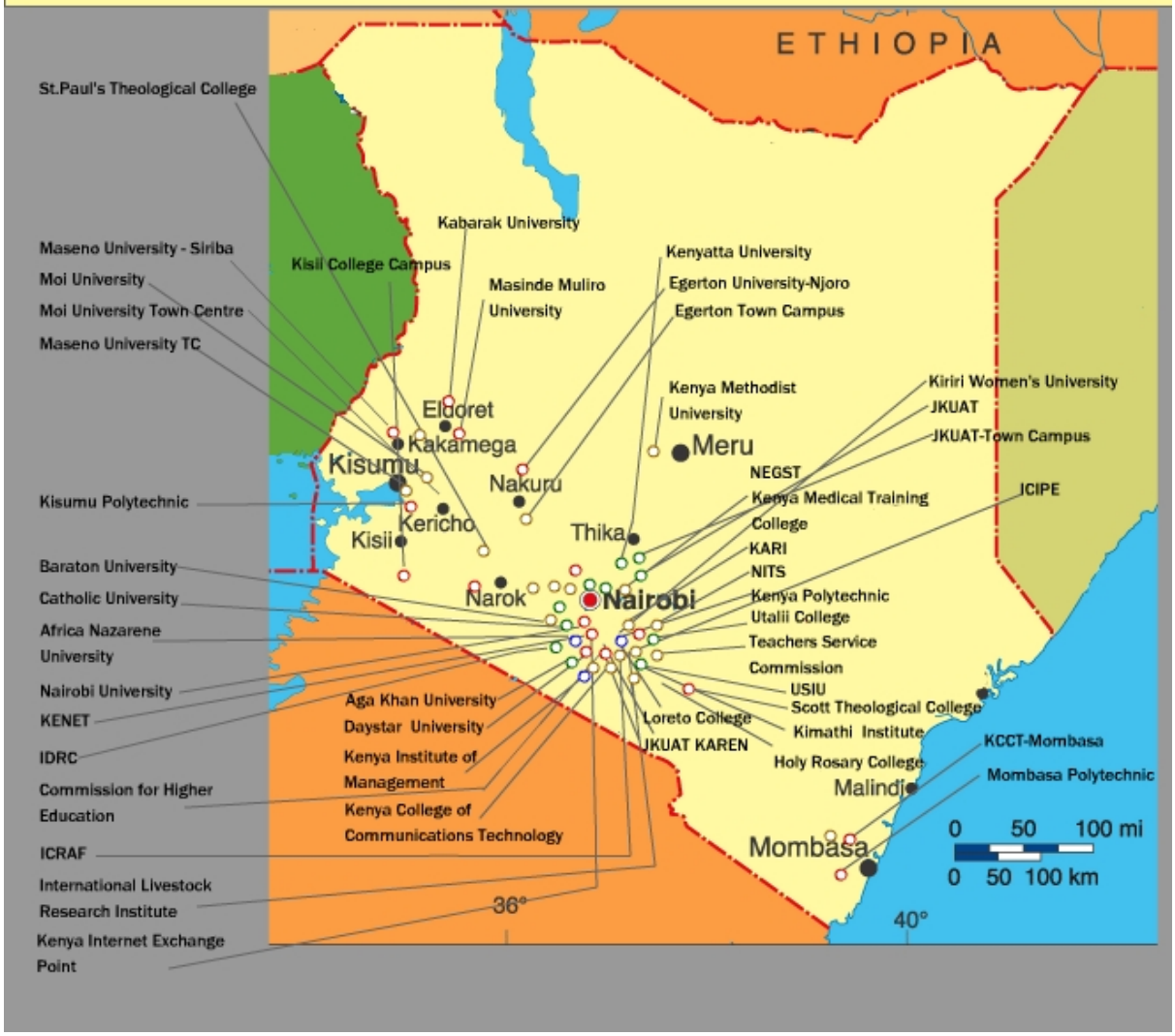
ACRONYMS AND ABBREVIATIONS

CCK	Communications Commission of Kenya
EDDI	Education for Development and Democracy Initiative
ERP	Enterprise Resource Planning
GSM	Global System for Mobile Communication
GII	Global Information Infrastructure
ICT	Information Communication Technology
IEEE	Institution of Electrical & Electronics Engineers
ISP	Internet Service Providers
IT	Information Technology
JKUAT	Jomo Kenyatta University of Agriculture & Technology
KENET	Kenya Education Network
KPTC	Kenya Posts and Telecommunications Company
KIM	Kenya Institute of Management
KMTC	Kenya Medical Training College
KSPS	Kenya School of Professional Studies
KU	Kenyatta University
LAN	Local Area Network
LI	Leland Initiative
MDGs	Millennium Development Goals
Mbps	Megabit per second
NRI	Networked readiness index
HE	Higher education
NREN	National Research and Education Network
NSF	National Science Foundation
OPAC	Online Public Access Catalog
PBX	Private Branch Exchange
PDA	Personal Digital Assistant
PC	Personal Computer
PCK	Postal Corporation of Kenya
SDNP	Sustainable Development Network Program
SP	Strategic Plan
SPSS	Statistical Package for Social Scientists
SWOT	Strengths, Weaknesses, Opportunities and Threats
TESPOK	Kenya Association of Internet Service Providers
TKL	Telkom Kenya Ltd.
UNDP	United Nations Development Program
UPS	Uninterrupted Power Supply
USAID	United States Agency for International Development
USD	US Dollars
USIU	United States International University
VSAT	Very Small Aperture Terminal
WAN	Wide Area Network

KENYA EDUCATION NETWORK INSTITUTIONAL COVERAGE MAP



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EXECUTIVE SUMMARY

Objectives and terms of reference

The main objective of this study was to assess the level of preparedness of Higher Education (HE) institutions in Kenya to use Information and Communication Technologies (ICT) in teaching, learning, research, and management. Indirectly, it also assessed the capacity or readiness of these institutions to use electronic learning (e-learning) to improve quality of education and ultimately increase access to higher education in the country. The effective use of ICT in higher education institutions would also ensure that the Kenyan tertiary level workforce effectively participates in the emerging global knowledge economy.

The following were the Terms of Reference (TOR) for the study:

1. Carry out a *diagnostic* assessment of the overall e-readiness of 17 universities, eight middle-level colleges (including polytechnics), and five research institutions that are members of Kenya Education Network (KENET) with a particular focus on the use of ICT in teaching, learning, and research.

2. Develop an e-readiness assessment framework and indicators appropriate for Kenyan Higher Education institutions. The framework would be based on the Center for International Development (CID) tool titled, "Networked readiness guide for developing countries."

3. Create a database of existing core institutional demographics and ICT infrastructure, including the information technology (IT) applications, in each member institution that could be updated on-line.

4. Identify the critical issues that confront member institutions and impede the adoption of ICT in teaching, learning, research, and management.

5. Organize at least two stakeholders' workshops for vice chancellors or heads of member institutions, at the start and end of the study, to discuss the findings of the diagnostic e-readiness assessment.

6. Present the findings of the e-readiness survey to a wider group of stakeholders including the leadership of KENET member institutions, faculty, students, senior government officials, private sector, and development partners at a mini-convention or conference.

7. Prepare a final e-readiness report for KENET to be distributed to all stakeholders.

This survey has achieved all of the above terms of reference.

The survey was conducted by the following team of researchers:

1. Professor Meoli Kashorda, Principal Investigator and research team leader (mkashorda@kenet.or.ke or mkashorda@strathmore.edu)

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3. Professor Mary Omosa, ICT and society researcher (momosa@uonbi.ac.ke)

4. Eng. Victor Kyalo, ICT infrastructure researcher (vkyalo@kenet.or.ke)

This survey was supported by research grants of $54,000 from the Rockefeller Foundation ($30,000) and Ford Foundation ($24,000). The grants were obtained through the Kenya Education Network (http://www.kenet.or.ke), a Trust created in 1999 by Kenyan universities to provide affordable Internet services to its member institutions. All the 25 higher education institutions surveyed are members of KENET.

Assessment framework and key results

The study used a modified diagnostic e-readiness assessment framework containing a set of 17 ICT indicators grouped under the following five categories:

(i) Network Access (four indicators – Information infrastructure, Internet availability, Internet affordability, Network speed and quality)

(ii) Networked Campus (two indicators – Network environment, E-campus)

(iii) Networked Learning (four indicators – Enhancing education with ICTs, Developing the ICT workforce, ICT Research and innovation, ICTs in libraries)

(iv) Networked Society (four indicators – People and organizations online, Locally relevant content, ICTs in everyday life, ICTs in the workplace)

(v) Institutional ICT Policy and Strategy (three indicators – ICT strategy, ICT financing, ICT human capacity)

The framework was derived from an e-readiness assessment tool originally developed by the Center for International Development at Harvard University (http://www.readinessguide.org). The new e-readiness framework contains two new categories of indicators (networked campus and institutional ICT policy and strategy); seven new indicators; and over 60 new sub-indicators specific to higher education institutions. However, the new framework is similar to the CID readiness assessment in that it is diagnostic and stages each of the indicators on a scale of 1 to 4, where 1 represents unprepared and 4 the highest degree of readiness.

Using a diagnostic e-readiness framework makes it easy for the results to be used in institutional ICT strategy development and to monitor progress of ICT strategy implementation. The survey therefore identified a set of 15 strategic ICT sub-indicators for higher education institutions that could be monitored by the institutions on an annual basis, and that are critical for determining the degree of readiness for ICT.

Data collection and analysis

Two sets of detailed questionnaires were used to collect data, namely:

a. A hard facts questionnaire that was completed by heads of ICT and other senior university administrators such as finance managers and academic registrars.
b. A perceptions questionnaire (field user survey) that was completed by students and staff in each of the 25 higher education institutions surveyed.

The questionnaires were administered to 25 KENET member institutions that included 17 universities and eight tertiary institutions. Sample sizes for the perceptions were determined to be statistically significant for each of the higher education institutions and also to capture the diversity of the students and staff (e.g., areas of study, year of study, gender, etc.). All data (hard facts and survey data) was entered into a Web-based database by students from the different universities (see: http://eready.kenet.or.ke) and is available to authorized users of the member institutions.

Completing the comprehensive hard facts questionnaires was very challenging because most of the higher education institutions do not have integrated information systems containing student, staff, programs, and financial data. The data was not available to the heads of ICTs and was collected from different managers of the institutions. The process of collecting and cleaning the hard facts data was started in August 2006 and completed in January 2007.

Data analysis used a comprehensive staging framework developed by the research team. The researchers staged each of the sub-indicators. The indicator stage was derived by a simple average of the associated sub-indicators.

Staging results and key findings

An interesting finding of the study was that the 25 higher education institutions surveyed had a total enrolment of 170,000 students. This was over 50% higher than the enrolment data in the Kenyan Economic Survey 2006. The 17 universities had a total enrolment of 130,000 students, 20,000 in private universities and 110,000 in seven public universities. This was markedly higher than the 89,000 students indicated in the Economic Survey 2006, which was used to calculate the initial sample sizes. The 130,000 students did not include the enrolment in the tertiary colleges that are offering degrees in partnership with the public universities (e.g., Kenya College of Accountancy, Augustana Academy, etc.).

Figure 5.1 summarizes the results of staging of the 17 indicators for all the 25 higher education institutions surveyed.

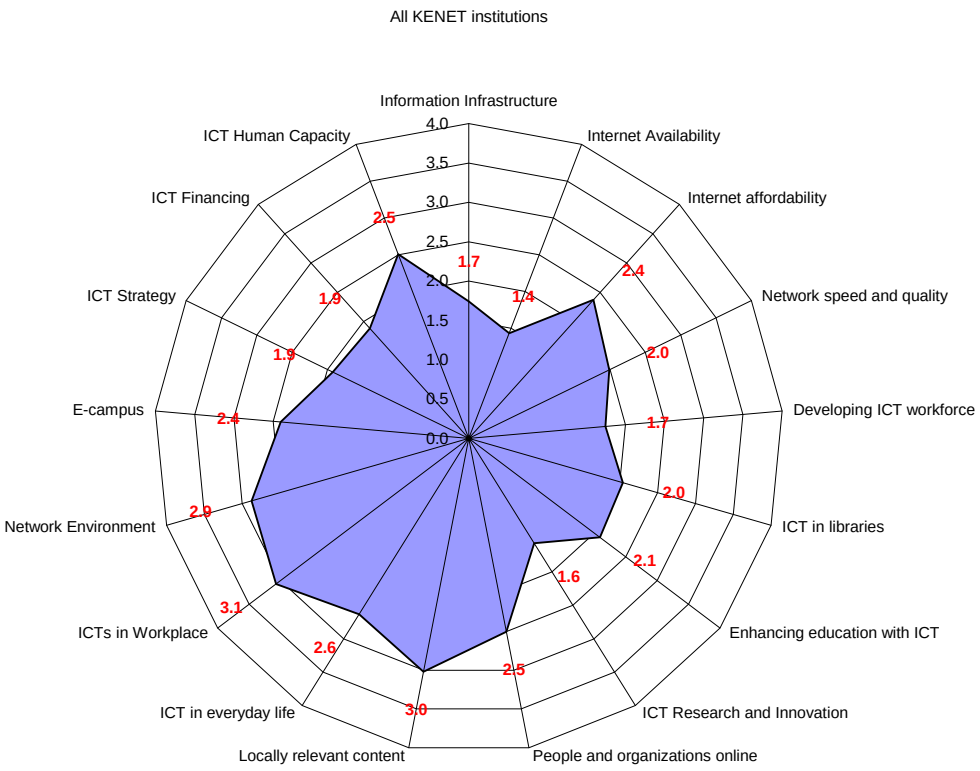


Figure 5.1: Average indicator stages for all institutions

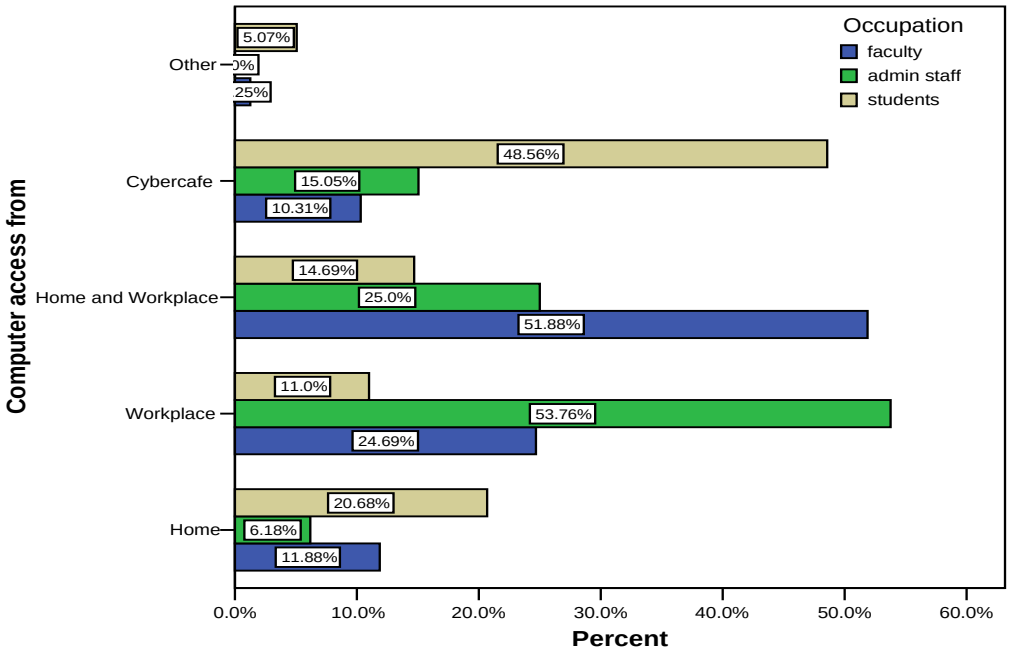
The results show that on average most institutions are in stage 2 and below in all the network access and networked campus categories of indicators. For example, Internet availability is only in stage 1.4 suggesting that overall the institutions are not ready to use ICT for e-learning. The score of 2.4 in Internet affordability means about 50% can afford to double their Internet bandwidth costs if only they considered Internet access a strategic priority.

The score of 2.0 and below in ICT strategy and ICT financing means that ICT is not yet a strategic priority for the higher education institutions. Consequently, the profile of heads of ICT is low and budget allocation for Internet bandwidth is less than 0.5% of the operational budgets.

Most of the institutions were not using ICT for learning (stage 2.1 in enhancing education with ICT and stage 2.0 for ICTs in libraries). This again is related to the ICT strategy that is often not aligned to the educational goals of the institutions. The institutions are below stage 2.0 in ICT research and innovations measured using quality of ICT-based projects and graduate studies in ICTs. For example, only University of Nairobi has an operational doctoral program in the non-engineering ICT degree programs (i.e. information systems and computer science).

The results also show that universities have not yet started integrating ICT into their curriculum. Students are also not required to use Internet resources for learning for the majority of university courses. A few institutions have installed course management software like Moodle, WeBCT or Blackboard and faculty are using them to supplement their classroom teaching but none of the institutions had data on the percentage of courses that are using the e-learning platform.

Overall, however, the higher education community exhibited a high readiness for using ICT as shown by the relatively higher stages in networked society category of indicators (see Figure 5.1). For example, institutions are in stage 3 in locally relevant content and in stage 2.6 in ICT in everyday life indicator. This is despite the fact that about 49% of students access computers and Internet from cyber cafés and only 11% access computers from their institutional campus networks (see Figure 4.2.). Moreover, about 95% prefer to use international Web-based e-mail (Yahoo, Gmail, and Hotmail) rather than the unreliable institutional e-mail.



source: KENET 2006

Figure 4.2: Location of primary access to computers by users in HE institutions

Networked society and gender

This study also conducted a gender analysis of some of the networked society sub-indicators that measure ICT usage and access. These sub-indicators include location of access to computers and Internet, the purpose of using computers, frequency of access to websites, and regular visit to local Web portals. The results show that there is no significant difference in ICT usage by male and female students, and faculty. In fact, a higher percentage of female users access computers, the Internet and ICT at cyber cafés (48%) compared to 42% male users. In terms of regular usage of Internet, male students are marginally more intense users of the Internet. For example, 30% of female respondents do not visit any local websites compared to 21% of male respondents who do not visit local websites. The results also show that 30% of the female student respondents reported that they use the Internet daily in contrast to 35% of the male students who reported to use the Internet daily. However, the percent of female and male students using the Internet, at least 3 days per week, is similar for male and female students.

The research results also show that students in the humanities and languages use the Internet more than students in engineering, biological and physical science, and medical sciences. Although the research study did not analyze the gender enrollment in different programs, generally there are fewer female students in engineering and science degree programs. This may explain why female students constitute 30 to 40% of the enrollment in public universities but

over 50% in private universities. In terms of ICTs in the workplace, the research did not find any difference in the usage and access levels of female and male faculty members and staff.

Internal vs. external factors of e-readiness of higher education institutions

In general, universities were at slightly higher stages in all of the 17 indicators when compared to the eight tertiary institutions surveyed as Figure 5.2 shows. This means that the institutional challenges of all the institutions are similar. We note that only a few of the 17 indicators are directly influenced by the external economic and ICT environmental factors. For example, Internet availability is partly due to the fact that Internet bandwidth costs are relatively high in Kenya at $2,330 per Mb/s per month. The network environment indicator measures the availability of ICT power supply backup, critical in Kenya where the commercial power supply is not reliable. Thus, only three of the 17 indicators depend directly on the external ICT environment (Internet availability, Internet affordability, network environment). The stages of the other 14 indicators depend on institutional ICT decisions and strategies rather than external factors.

As an example of the impact of institutional ICT strategy indicator on overall performance in other indicators, United States International University (USIU), Strathmore University and University of Nairobi were in stage 3 and above in at least 50% of the indicators. The only difference was that the institutional leadership, particularly vice chancellors, championed ICT within the institutions. This was a significant finding – the heads of institutions matter more than the few external factors affecting ICT diffusion in Kenya.

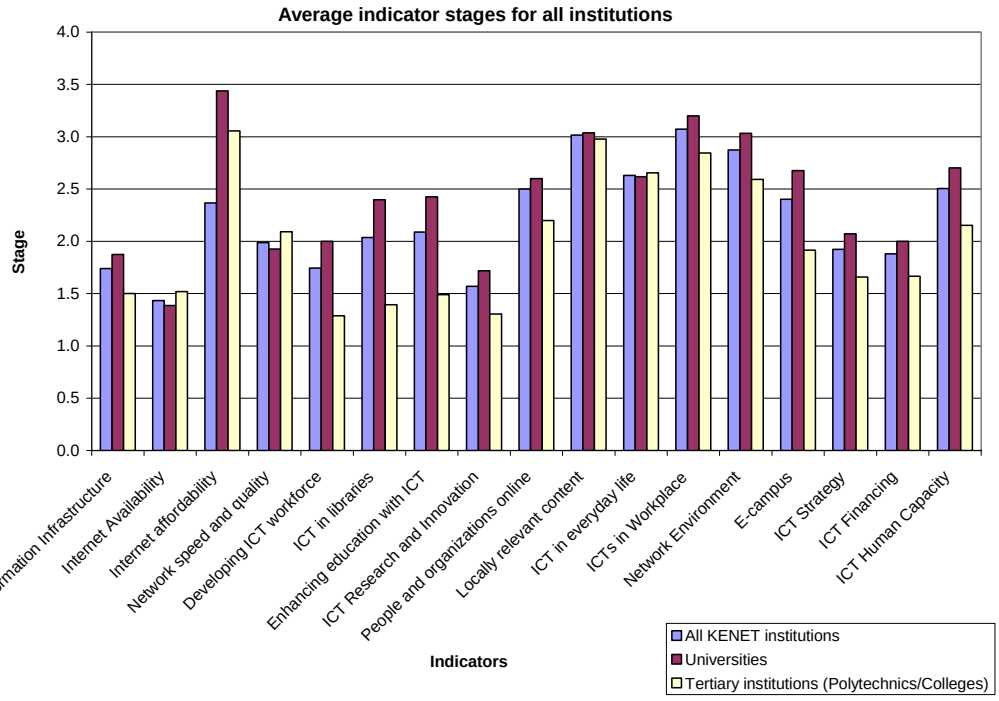


Figure 5.2: Comparison of stages for universities and tertiary institutions.

Strategic ICT sub-indicators

This study calculated the values of 60 sub-indicators (e.g. personal computers (PCs) per 100 students, Internet bandwidth per 1000 students). The values were then converted to stages using

the staging framework developed by the researchers. The survey selected a subset of only 15 sub-indicators that were considered strategic. These strategic sub-indicators could, for example, be incorporated in the performance targets of the institutions and therefore monitored on an annual basis. Figure 5.5 shows the overall performance in the 15 sub-indicators for the 25 institutions. It is clear that institutions are in stage 1 in Internet bandwidth per 1000 students. In real terms, this means that institutions are purchasing less than 512 kb/s per 1000 of downlink bandwidth and less than 128 kb/s per 1000 students of uplink bandwidth. This is unacceptably low and it is not surprising that students and faculty are dissatisfied with the speed. Similarly the institutions are in stage 1.8 (below 2.0) and therefore have fewer than 3 PCs per 100 students. In order to be ready to use ICT to enhance learning, it will be necessary for the institutions to move to at least stage 3 in all the strategic indicators.

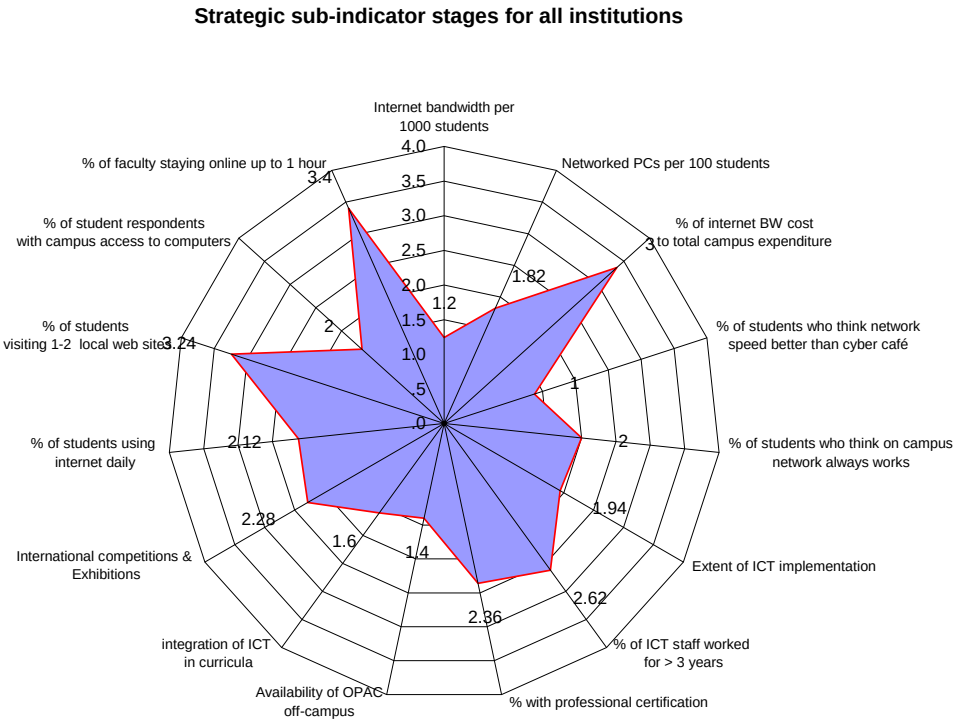


Figure 5.5: Average stages for 15 strategic indicators for all institutions

Summary conclusions, critical issues and recommendations

The main conclusion of this survey is that the higher education community, especially the university community in Kenya, is ready to use ICT for learning, teaching, research and management. However, the institutional leadership does not yet consider ICT a strategic priority for their institutions. Consequently, institutions are allocating low operational budgets to ICT, have not invested adequately in campus networks, and are not giving attention to the use of ICT to enhance education and research.

A stakeholders' meeting of the heads of institutions and ICT directors in March 2007 discussed the findings of the survey and concluded that each institution needed to understand the results in detail. They proposed that the research team should help the institutions incorporate strategic sub-indicators into their ICT and corporate strategies. That is, dissemination of results should happen at each individual institution. This was outside the scope of the current research project and additional funding will be required for dissemination. This report will also be converted into

a policy brief that will be launched at a stakeholders' meeting of donors, government officials, the private sector as well as university faculty and managers.

The survey has identified some critical issues that need to be addressed in order to enhance the e-readiness of the institutions. Table 1 below summarizes the critical factors and the associated recommendations.

Table 1: Critical issues and recommendations

Critical issues	**Recommendations**
1. Inadequate Internet bandwidth	Increase the total Internet bandwidth to at least 1 Mb/s per 1,000 students in the immediate to medium term and at least 4 Mb/s per 1,000 students in the long-term
2. Low access to networked PCs by staff and students	Increase the ratio of networked PCs to students to an average of 1:10 Implement adequate number network access points
3. Low quality of the campus network infrastructure and services (e-mail services, network, PCs, etc.)	Setup a reliable campus data center Hire and retain highly skilled technical staff
4. Lack of integrated management information systems	Acquire, implement and sustain integrated management information systems Hire and motivate qualified Information Systems professionals
5. Minimal integration of ICT in curriculum	Review curricula and integrate ICT with industry input Increase the percentage of on-line courses to 25% in the immediate to medium-term and over 50% in the long-term
6. Limited off-campus access to library resources	Enhance and accelerate library automation
7. Limited ICT research and innovations	Create ICT Masters and Ph.D programs and increase enrollment in these programs Improve quality of student ICT projects to international standards
8. Lack of operational course management system for e-learning	Set up a course management system Hire instructional designers and administrators
9. Lack of local research databases	Increase funding for development of research databases
10. Lack of interactive institutional websites	Setup interactive websites Hire and motivate qualified Information Systems professionals
11. Lack of customer survey data	Commission comprehensive surveys of the users annually and update indicators in this category Publish user satisfaction surveys
12. Reporting level of ICT head is low	Head of ICT to report to CEO and is a member of senior management
13. Average alignment of ICT strategy to corporate strategy	Adopt and make the strategic ICT indicators an integral component of the corporate strategic plan and monitor these together with the other corporate performance indicators
14. Infrequent ICT staff skills upgrade	Invest in frequent ICT professional training

Each of the recommendations in Table 1 has cost implications that depend on the stage of a particular institution. This highlights the need for institutional-specific dissemination of the findings of this research. One recommendation that appears to be a solution to more than one

critical issue is the need to hire, develop, and motivate the ICT professional and academic staff. The retention of ICT staff was reported to be poor and only the institutional leadership could address this problem.

This is the first detailed e-readiness survey of higher education institutions in Kenya and was limited to 25 KENET member institutions. Most of the institutions found it very difficult to complete the questionnaire partly because of lack of integrated information systems. A time-series of this data is essential in order to start ranking the institutions and we therefore recommend an annual e-readiness survey of higher education institutions. The survey should also be expanded to include similar institutions that are not members of KENET, particularly teacher training colleges.

We also recommend that other detailed academic area-specific e-readiness surveys be conducted. For example, the e-readiness survey of education departments or engineering departments. This is because of the apparent "digital-divides" of different academic departments in large institutions. All of these studies will require additional external funding.

1. INTRODUCTION

1.1. CONTEXT OF KENYAN HIGHER EDUCATION

The use of information and communication technologies (ICT) in higher education (HE) institutions has the potential to enhance the quality of teaching and learning, the research productivity of the faculty and students, and the management and effectiveness of institutions. In addition, the use ICT in higher education institutions develops the future workforce that can effectively participate in the increasingly networked world and the emerging knowledge economy (Soumitra Dutta, 2003, Anuja Utz, 2006). Graduates of these institutions will occupy leadership positions in government, business, and society in the future and therefore will play a critical role in the transformation of Kenya to an information society.

Kenya currently has a tertiary Gross Enrolment Ratio (GER) of about 3%, which is below the 5% average for sub-Sahara Africa (UNESCO, 2006). South Africa, for example, has a tertiary GER of 15%. Increasing the GER in Kenya might require the use of Open and Distance Learning (ODL). This also requires the use of ICT-based e-learning technologies. Thus, the capacity to use e-learning to increase enrolment has to be developed within the higher education community first by ensuring the e-readiness of existing and new higher education institutions.

Kenya has seven public universities and 17 private universities that have either a full charter or a letter of interim authority from the Kenya government through the Commission for Higher Education (http://www.che.ac.ke). This study surveyed a total 17 universities (seven public and 10 private universities) that have a total enrolment of over 130,198 students. The enrolment data in the technical public universities (e.g., JKUAT, Moi and University of Nairobi) shows that female students constitute about 30% of the student population. This is different from private universities where the female students on average constitute more than 50% of the student population. However, this study did not conduct a comprehensive analysis of the gender distribution of the different degree programs offered in Kenyan universities.

The demand for university education in Kenya remains very high and enrolment has grown dramatically in the past six years. However, the growth has mainly been in the privately sponsored full-fee paying students, either enrolled in the private universities or public universities. For example, the public universities have increased their enrolment by admitting evening and weekend degree seeking students in what is often referred to as Module II or parallel degree programs. Another method used by both private and public universities to increase enrolment is establishing satellite campuses in major cities and towns. For example, Egerton University in Njoro has a town campus in Nakuru. Similarly, Moi University whose main residential campus is 40 kilometers from Eldoret town, has established a town campus in Eldoret town. Consequently, about 50% of the students enrolled in public universities in Kenya are privately sponsored non-residential students. This group of students could benefit from e-learning technologies to supplement classroom instruction.

The University of Nairobi and Kenyatta University already have operational open and distance learning programs using a combination of learning centers, e-learning, and traditional correspondence-based distance education. Other public universities (e.g. Kenyatta University, Egerton University and Maseno University) have entered into collaboration with the African Virtual University (http://www.avu.org) to offer courses on behalf of foreign universities using ICT available at campus-based learning centers. There have also been discussions regarding

establishment of a national Open University that will use ICT and the Internet to deliver its programs.

Another method being used by public universities to increase enrolment and expand access to university education is to offer degrees in partnership with local middle-level colleges. This study did not include students enrolled in such middle-level colleges. It is therefore possible that the total university enrolment in Kenya is way above the 130,198 students.
ICT degree programs are very popular and all universities in Kenya offer at least one ICT degree program at the undergraduate level (e.g. computer science, information systems, electrical engineering, etc.). Apart from the degree programs, most of the universities also offer IT literacy and foundation courses. There is therefore increasing need to use ICT in higher education institutions.

However, a review of the strategic plans of all the universities shows that they have no explicit reference to developing the workforce for the emerging knowledge economy. This is despite the fact that the four main pillars of a knowledge economy are (Anuja Utz, 2006):

1. **Economic and institutional pillar**, which provides incentives for the efficient creation, dissemination and use of existing knowledge.
2. **Education pillar** that develops an educated workforce that can use knowledge effectively.
3. **Innovation pillar** that ensures that global knowledge diffuses into the nations and adapts it for local use and creates new local knowledge.
4. **Information and communication technology infrastructure** (ICT) pillar that facilitates the effective communication, dissemination and processing of information.

It is therefore necessary to align university strategies, particularly the ICT strategies with the demands of the knowledge economy. This study therefore recommends that the institutional ICT strategies recognize availability and access to ICT in higher education institutions as essential for developing the IT workforce and professionals for the knowledge economy. Although these institutions still continue to operate within constraints of the national information infrastructure (NII) as described in Section 1.2 below, this study found that it is possible to achieve international standards in use of ICT by focusing on the readiness of the campuses.

1.2. CONTEXT OF THE NATIONAL INFORMATION INFRASTRUCTURE

In the past six years, telecommunications and Internet services in Kenya have been partially liberalized. For example, mobile telephony is still a duopoly although the Kenya Communications Act 1998 requires full liberalization. International Internet bandwidth purchases and provision of leased lines required by higher education institutions was a monopoly service up to 2004. This means the prices of telecommunications services and Internet have remained high in the past six years. In particular Internet bandwidth costs have not been falling according to a recent Internet market analysis study partly due to the licensing regime (Waema, 2007). Additionally, all global Internet bandwidth is satellite-based because Kenya does not yet have an undersea optical fiber cable.

Although the mobile network now covers almost the entire country and a 20% mobile teledensity has been achieved, this has not yet had a significant effect on the geographical penetration, availability or affordability of Internet services. For example, some of the higher education institutions do not have access to reliable backbone or local access digital links. Kenya does not yet have legislation to promote and regulate the non-communications IT industry and

services (software, hardware and applications including e-commerce). The proposed Kenya Information and Communications Bill of 2006 (Government of Kenya, 2006), is expected to be passed into law in the year 2007. The e-government strategy 2004 implementation is also behind schedule and there are only a limited number of on-line e-government applications (Government of Kenya, 2004). In general, local content development is limited in Kenya and even the two major national newspapers host their content outside Kenya. In fact, our study observed that most students prefer Web-based e-mail addresses hosted outside the country (e.g., Yahoo mail, Google mail, Hotmail etc.).

Kenya continues to drop in rankings in international Networked Readiness Index (NRI). Table 1.1 shows the NRI for Kenya in the past three years in comparison to South Africa, Mauritius and the US (Dutta, 2004; Dutta, 2005; Dutta, 2006). The NRI measures not only the regulatory and national infrastructure but also most importantly, usage by government, businesses, and individuals as shown in Figure 1.1. A low ranking for Kenya suggests low level of readiness and usage by businesses, government and individuals.

Table 1.1: Networked readiness index

Period	USA	Kenya	South Africa	Mauritius
2004-05 (Rank out of 102 countries)	4	75	34	47
2005-06 (115 countries)	1	91	37	45
2006-07 (122 countries)	7	95	47	51

Source: World Economic Forum / INSEAD Global IT Reports 2004-2007

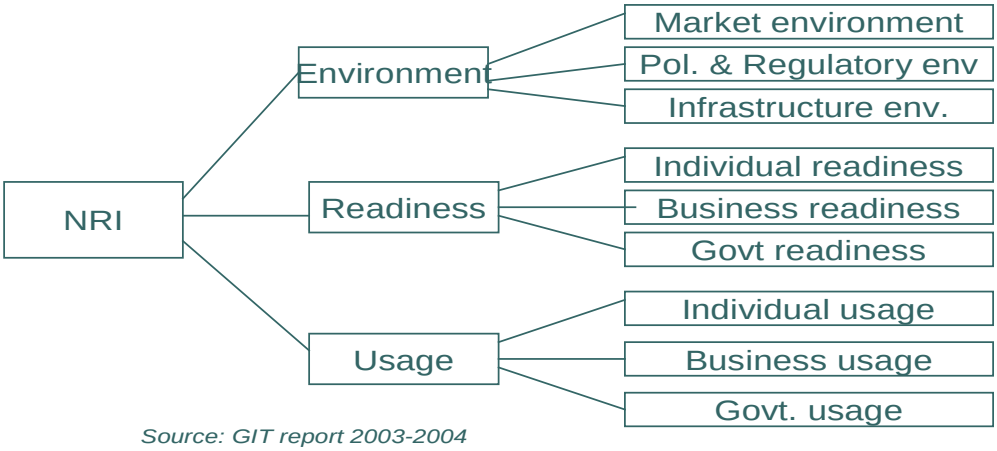


Figure 1.1: Networked readiness index sub-indexes

Another e-readiness index adopted by the International Telecommunications Union (ITU) is the ICT Opportunity Index (ICT-OI) (ITU, 2007). This index measures the uptake of ICT and is

predominantly based on hard facts data collected by ICT regulators. Table 1.2 shows that Kenya was ranked 145 out of the 183 countries that were ranked in year 2005 (ITU, 2007). Thus, whatever index is used to rank the countries, Kenya performs poorly by global standards and is typical of other lower income countries as classified by the World Bank. The challenge is therefore to ensure that the Kenyan higher education graduates achieve similar learning outcomes in terms of readiness to use ICT as those in countries with higher ICT index ranking.

Table 1.2: ICT Opportunity index scores and 2005 rank for comparator countries

Year	**USA**	**Kenya**	**South Africa**	**Mauritius**
2003 (score)	276.46	39.60	85.16	110.03
2004 (score)	305.67	41.18	88.26	118.88
2005 (score)	323.87	42.26	96.78	150.27
2005 (Rank out of 183 countries)	13	145	90	56

Source: ITU ICT Opportunity Index report 2007

This challenging national information infrastructure context affects Kenyan higher education institutions. The Kenya Education Network (http://www.kenet.or.ke) is a membership organization and Trust created in 1999 as one response to the challenges of national and institutional ICT infrastructures. It aims to deliver affordable Internet services to higher education institutions and to support their institutional ICT strategies. For example, KENET purchases Internet bandwidth from licensed providers at about 50% of the commercial prices. In 2005, KENET joined the Partnership for Higher Education in Africa bandwidth consortium that allows it to purchase international satellite bandwidth at a subsidized cost of US$ 2,330 per Mb/s from Intelsat. However, a recent Internet market study revealed that the average cost of satellite bandwidth is US$ 2,200 and one of the local operators actually purchases satellite bandwidth at a cost of $625 per Mb/s. The network is currently negotiating with Internet gateway operators to provide bulk international satellite Internet bandwidth at lower prices of about $1,500 per Mb/s per month.

Kenya is expected to be connected to at least one undersea optical fibre by 2008 and bandwidth tariffs are expected to fall to under 500 per Mb/s. This will allow universities to purchase bandwidth in adequate quantities to support their student populations. The Kenya government also plans to finance the construction of a national optical fiber cable backbone that is expected to be operational by 2008. An optical fiber backbone will make it possible to establish a national high-speed educational network at an affordable cost.

Thus, the national information infrastructure will dramatically improve in the next two years and that is expected to be a big boost to higher education institutions. The focus of this study was therefore to measure the institutional or campus e-readiness of universities and other tertiary institutions. The study found that higher education institutions are not yet ready to effectively use ICT, even if the national information infrastructure was extended to the institutions and the bandwidth prices reduced to $500 from the current price of over $2,330 per Mb/s per month. The study recommends strategies for increasing the internal e-readiness of campuses even as the national infrastructure continues to improve.

1.3 TERMS OF REFERENCE OF THE RESEARCH STUDY

It is against the context presented in Sections 1.1 and 1.2 that the terms of reference of this study were defined. The main objective was to assess the level of preparedness of the higher education institutions for using ICT in teaching, learning, research, and management. This was also indirectly an assessment of the institutions' readiness to use e-learning to enhance learning and ultimately, increase access to higher education in Kenya. That is, higher education institutions are expected to make effective use of ICT to achieve their institutional objectives and also to prepare the future Kenyan ICT workforce essential for competitiveness and growth of the economy. The following were the Terms of Reference (TOR) for the study:

1. Carry out a *diagnostic* assessment of the overall e-readiness of 17 universities, eight middle-level colleges (includes polytechnics), and five research institutions that are all members of KENET with a particular focus on the use of information and communication technology (ICT) for teaching, learning, and research.

2. Develop an e-readiness assessment framework and indicators appropriate for Kenyan Higher Education institutions. The framework would be based on the Center for International Development tool titled "Networked readiness guide for developing countries".

3. Create a database of existing core institutional demographics and ICT infrastructure, including the IT applications, in each member institution that could be updated on-line.

4. Identify the critical issues that confront each of the member institutions and impede the adoption of ICT in teaching, learning, research, and management.

5. Organize at least two stakeholders' workshops for vice chancellors or heads of member institutions at the start and the end of the study to discuss the findings of the diagnostic e-readiness assessment.

6. Present the e-readiness survey findings to a wider group of stakeholders including the leadership of KENET member institutions, faculty, students, senior government officials, private sector, and development partners at a mini-convention or conference.

7. Prepare a final e-readiness report for KENET to be distributed to all stakeholders.

8. Publish the results of the survey in International ICT conferences and/or a refereed international journal (e.g., Journal of Higher Education in Africa) by August 2007.

All of the above terms of reference have been achieved except for the mini-conference for stakeholders and publication of research findings in international ICT and educational journals. The research institutions were also excluded from the survey due to logistical reasons.

1.4 ASSESSMENT FRAMWORK AND KEY FINDINGS

The study developed a modified e-readiness framework and a set of 17 ICT indicators of e-readiness. As explained in Section 2, the new e-readiness framework is used to stage each of the 17 indicators on a scale of 1 to 4, where 1 represents unprepared and 4 the highest degree of readiness for that indicator. Apart from the new framework, the research team has also

developed a new set of ICT sub-indicators for each of the 17 indicators. Each sub-indicator is also staged on a scale of 1 to 4 and the average used to stage the corresponding main indicator.

Using a diagnostic e-readiness framework makes it easy for the results to be used in institutional ICT strategy development and to monitor progress of ICT strategy implementation. The research study has therefore identified a set of 15 strategic ICT sub-indicators for higher education institutions that could be monitored by the institutions on an annual basis and that are critical for determination of degree of readiness to use ICT.
Two sets of detailed questionnaires were used to collect data, namely:

a. A hard facts questionnaire that was completed by heads of ICT and other senior university administrators such as finance managers and academic registrars.
b. A perceptions questionnaire (soft facts) that was filled by students and staff in each of the 25 higher education institutions surveyed.

The questionnaires were administered in 25 KENET member institutions that included 17 universities, and eight tertiary institutions. Although the original TOR aimed to collect data from some 42 member institutions, the non-teaching members of KENET, especially the research institutions, were not assessed mainly because of the focus of the survey on students and the learning environments.

All of the data (hard facts and survey data) was entered into a Web-based database by students from the different universities (see: http://eready.kenet.or.ke) and is available to each of the member institutions.

The results show that students and faculty exhibit a high degree of readiness to use ICT, with only 7% stating that they have never used the Internet. However, access to ICT in universities and tertiary institutions is limited. For example only one university was in stage 3 in average of network access indicators while the other public universities were in stage 2 or lower. Every institution must aim to be in stage 4 for effective use of ICT. One of the strategic ICT indicators for higher education is the number of personal computers per 100 students. Only six universities had ratio of 10 and above among the 17 universities. For the large public universities, the ratio was less than three PCs for every 100 students. Consequently, the students had to use computers in cyber cafés at most of the institutions. Apart from the lack of access, students considered the campus networks of very low quality. For example, only 14.4% of the student respondents reported that campus-email always worked. This means higher education institutions are not able to provide and support reliable e-mail applications to students and faculty.

The results show that there is no significant gender difference in the use of Internet by the students or staff. For example, 30% of the female students reported that they use the Internet daily in contrast to 35% of the male students who reported to use the Internet daily. Similarly, 90% of the male students reported to have an e-mail address compared to 89% of the female students. In addition, 48% of the female students use cyber cafés as their main access to computers and Internet as compared to 42% of the male students.

Another interesting finding was the lack of adequate budget allocation for Internet access by the universities. For example, when we calculated the percentage of Internet access costs to the total institutional expenditure (operational), we found that the majority of institutions allocated less than 0.5% of their expenditures to Internet access. This was lower than the percentage allocated for telephone access by the university administration (Internet access is for students). Although

Internet bandwidth costs are high in Kenya, our conclusion is that KENET institutions are not buying enough Internet bandwidth because it is not yet a priority expense in the institutions.

The results also show that universities have not yet started integrating ICT into their curriculum. Students are also not required to use Internet resources for learning for the majority of university courses. A few institutions have installed course management software like Moodle, WeBCT or Blackboard and faculty are using them to supplement their classroom teaching. However, none of the institutions had data on the percentage of courses that use the e-learning platform.

One of the unexpected results of our perceptions survey was that students pursuing professional courses (e.g. medicine, education, and engineering) use the Internet much less than students in the humanities or general science. For example, 15.8% of the medical sciences respondents reported that they had never used the Internet while in the university compared to 3.5% for humanities. This is an area that requires further study to establish the reasons for the significantly lower use of Internet among students pursuing professional degree programs compared to students pursing general degree programs in humanities and science.

On the whole, students and faculty registered a high degree of dissatisfaction with Internet services on campus. For example, 75% of the students considered the Internet speed in cyber cafés better than that provided by the institutional networks.
This report is organized as follows. Chapter 2 contains a description of the methodology used, and the frameworks developed and used in the survey. Chapter 3 contains our results for all the indicators. Chapter 4 summarizes the critical issues identified by the survey and our recommendations. The conclusions are contained in Chapter 5.

2. METHODOLOGY AND STAGING FRAMEWORK

2.1. THE CID E-READINESS ASSESSMENT TOOL

E-readiness assessment tools can be classified into two broad categories (Bridges, 2001), namely,

a. E-economy readiness tools that focus on a nation's or communities readiness to exploit ICT for economic development (i.e., to take part in the digital economy).

b. E-society readiness tools that measure the ability of the overall society to benefit from ICTs.

In general, e-society tools can also assess the readiness of a nation or community for participation in the digital economy. The CID e-readiness tool titled, "Readiness for the Networked World – A Guide for developing countries," is an example of an e-society tool (CID, 2001). It was developed by the Information Technology Group at the Center for International Development (CID), Harvard University. It is a diagnostic tool that had also been used to conduct the first e-readiness assessment of Kenya in the year 2002 (Waema and Kashorda, 2002). However, it needed to be modified for use by the higher education community.

The CID Readiness for the Networked World tool monitors 19 indicators grouped into the following five categories:

1. Network access (six access indicators – information infrastructure, Internet availability, Internet affordability, network speed and quality, hardware and software, service and support)

2. Networked learning (three Internet usage in education indicators – schools access to ICTs, enhancing education with ICTs, developing the ICT workforce)

3. Networked society (four indicators – people and organizations online, locally relevant content, ICT in everyday life, ICTs in the workplace)

4. Networked economy (four indicators – ICT employment opportunities, B2C electronic commerce, B2B electronic commerce, e-government)

5. Network policy (two indicators – telecommunications regulation, ICT trade policy)

Each of the indictors is staged on a scale of 1 (not ready) to 4 (completely ready) using both hard facts data (e.g. PCs per 100 employees, telephones per 100 employees, etc.) and perception or "soft" data collected using field-based surveys. Hard facts data could be obtained from ICT professionals in each institution. Although the CID assessment tool provides a general basis for staging the different indicators, this survey has modified the tool by introducing new categories of indicators, indicators, and sub-indicators appropriate for higher education institutions. The new sub-indicators were especially useful in interpreting the data and therefore staging each of the readiness 17 indicators. We note that sub-indicators were derived specifically for the higher education community in Kenya and are not specified by CID tool.

2.2. ADAPTATION OF THE CID TOOL FOR ASSESSMENT OF HIGHER EDUCATION INSTITUTIONS IN KENYA

The original CID tool specified 19 indicators. However, some of the indicators are not relevant for higher education. For example, ICT Trade Policy, Telecommunications Regulation and Networked Economy indicators defined in the CID tool were not relevant for higher education institutions.

Apart from eliminating some of the 19 indicators, we introduced six new indicators and renamed two of the categories. The two new networked learning indicators (i.e., ICT Research and Innovation and ICTs in Libraries) were motivated by the guidelines for institutional self-assessment developed for the Association for African Universities (AAU) (AAU, 2000). The resulting set of 17 relevant indicators was grouped into five categories as follows:

(i) Network Access (four indicators – information infrastructure, Internet availability, Internet affordability, network speed and quality)

(ii) Networked Campus (two indicators – network environment, e-campus)

(iii) Networked Learning (four indicators – enhancing education with ICTs, developing the ICT workforce, ICT research and innovation, ICTs in libraries)

(iv) Networked Society (four indicators – people and organizations online, locally relevant content, ICTs in everyday life, ICTs in the workplace)

(v) Institutional ICT Policy and Strategy (three indicators – ICT strategy, ICT financing, ICT human capacity)

In order to stage each of the 17 indicators, we developed a new staging framework. In the following section, we briefly describe the staging framework for each indicator.

2.2.1. Network access category of indicators

The *information infrastructure* indicator is derived by measuring two sub-indicators, namely, the external teledensity and the internal teledensity. The external teledensity was measured by the number of external exchange lines terminated at the PBX (either mobile or fixed lines) per 100 employees. The internal teledensity is the number of PBX telephone extensions per 100 employees. The information infrastructure therefore measures access to telephones by staff of the university. Data for staging was obtained using the hard facts questionnaires.

The *Internet availability* indicator was measured using three sub-indicators, namely the uplink bandwidth per 1000 students, the download bandwidth per 1000 students, and the networked PCs per 100 students. Data for calculating the values of the sub-indicators was obtained from the hard facts questionnaires. The research study determined the range of values for each sub-indicator based on researchers' experience with Kenyan institutions but taking into account internationally comparable values.

Internet affordability attempts to determine whether institutions find Internet access expensive. It was measured using two sub-indicators, namely Internet bandwidth costs as a percentage to the total expenditure of the institution or campus. A high percentage indicates that institutions have to spend a large fraction of their expenditure on Internet access and therefore it is not

affordable. A very low percentage indicates that Internet access is affordable. Another sub-indicator that was measured was the cost of Internet per 1000 students. The study recommends 1 Mb/s Internet bandwidth per 1000 students. Although 1 Mb/s bandwidth per 1000 students appears to be low by standards of developed countries, higher figures might not be affordable by most Kenyan higher education institutions at current bandwidth costs. For example, 1 Mb/s Internet bandwidth costs about Ksh 2.4 million per annum in Kenya. Sub-indicators were measured using the hard facts questionnaires data.

Network speed and quality indicator was measured using the perceptions or field survey data. Four sub-indicators were used to measure this indicator. Two of the sub-indicators measured the percent of student and faculty respondents who thought campus e-mail always worked. A percentage greater than 50% was considered stage 4 and a percent less than 10% was considered to be stage 1. Another two sub-indicators measured percentage of students and faculty who think campus Internet speeds are better than that of cyber cafés. A percentage greater than 50% put the institution in stage 4 while an indicator less than 10% was stage 1. Determination of the stages was derived from the new staging framework.

2.2.2. Networked campus category of indicators

The networked campus category of indicators is closely related to the network access indicators. For example the network environment indicator measures both the ICT power supply environment and the security for ICT equipment and software. ICT power supply and security are big challenges for most of the campus networks and systems and determine availability of ICT on campus. To be in stage 4 in this indicator means that an institution is in stage 4 in the ICT power supply sub-indicators as well as ICT security sub-indicators.

The second indicator of the networked campus indicator category is the electronic campus or E-campus indicator. This indicator measures ICT usage for internal as well as external operations. A stage 4 campus would have fully automated internal operations and would also be using ICT to interact with suppliers and students. This means that the campus and associated departments would have interactive and transactional websites that are regularly updated. Data for staging this was obtained from the hard facts questionnaires.

2.2.3. Networked learning category of indicators

Table 1 shows the indicators and the sub-indicators in this category of indicators and the main purpose for the indicators.

Table 2.1 – Networked learning indicators

Indicator	**Key Sub-indicators**	**Purpose**
Developing ICT Workforce	% of ICT staff with professional certification	Sub-indicators measure the extent to which an institution is preparing and training its ICT workforce. In stage 4, institution has proficient users of ICT who are regularly trained.
	% of employees trained on productivity tools	
	% of ICT staff who have received network administration training	
ICT in Libraries	On-campus OPAC	Sub-indicators measure the degree of automation of library and usage of ICT for back-end library operations. In stage 4, library is fully automated
	Off-campus OPAC	

Indicator	Key Sub-indicators	Purpose
	Availability of Internet databases	(front-end and bank-end operations) with support and training of users
	Information literacy training	
	Local digital content (digital library)	
	Use of E-mail updates to library holdings	
Enhancing Education with ICT	Educational software usage	This indicator measures the integration of ICT in curricula and the readiness of institution to offer e-learning courses and use ICT in the classrooms. Stage 4 institutions have integrated the ICT in curricula and ICT used in all stages of learning and projects (even non-ICT projects)
	Usage of course management system (Moodle, WebCT)	
	% Integration of ICT in curricula	
	Use of ICT in the classroom	
	Use of ICT in student projects	
ICT Research and Innovation	ICT undergraduate degree program	This indicator measures ICT research and innovations. The sub-indicators selected as indirect measures of ICT research and innovations. For example, Master's and doctoral ICT programs offered increase the research output of institutions. Stage 4 institutions have ICT doctoral degree programs and students participate in ICT exhibitions and competitions.
	ICT Master's degree program	
	ICT PhD degree program	
	Participation in international design projects and exhibitions (e.g., IEEE exhibitions)	

2.2.4. Networked society category of indicators

The networked society category of indicators measures the readiness of the community to use ICT for teaching, learning, research, and management (or administration). Data for staging this category of indicators was obtained from the analysis of the data collected using the perceptions questionnaire. Table 2 summarizes the indicators and the associated sub-indicators used for staging.

Table 2.2: Networked society category of indicators

Indicator	Key Sub-indicator	Purpose
People and Organizations Online	% of respondent who have never used the Internet	Indicator measures the intensity of use of on-line resources and what they need the Internet for. Stage 4 means less than 1% have never used the Internet, over 75% of students and faculty use the Internet daily and all students and faculty have e-mail
	% of respondents who consider Internet most important for e-mail	
	% of students who consider Internet most important for academic work	

Indicator	Key Sub-indicator	Purpose
	% of faculty using Internet daily	addresses.
	% of students using Internet daily	
	% of students who think institutional website interactive	
	% of students who do know about their institutional website	
	% of students with e-mail accounts	
Locally Relevant Content	% of students visiting 1-2 local websites	Indicator measures availability of websites with local content. It could be academic, news or entertainment. It also measures the degree to which users are attracted to the locally relevant websites. In Stage 4, students, faculty and staff have access to relevant local content
	% of students visiting 1-2 local websites	
	% of students and faculty looking for academic information from Internet	
	% students looking for news/entertainment	
	% of students and faculty visiting Web portals with Kenyan information	
ICTs in Everyday Life	% of students with campus access to computers	This indicator measures access and usage of ICT on- and off-campus.
	% of faculty with campus access to computers	
	% of students whose main access to computers/internet is cyber café	
	% of students with home access to computers	
	% of faculty with home access to PC	
	% of students and faculty using computers for e-mail/Internet	
	% of students and faculty using PC for word processing	
ICTs in the Workplace	% of faculty using Internet for academic work	Data obtained from staff (academic and non-academic staff). Measures readiness and usage of ICTs at work (e-mail, ERPs, e-learning platform, Productivity tools)
	% of faculty using e-mail for internal communications	
	% of faculty who access Internet from office	
	% of faculty staying on-line for more than 1 hour	

2.2.5. Institutional ICT Policy and Strategy indicators

The Institutional ICT Policy and Strategy indicator is composed of three indicator categories. The first is ICT strategy, which addresses strategic planning for ICT; the championship of ICT; and the organizational structure of ICT. To be in stage 4 in this indicator, an institution needs to have an ICT policy and strategic plan that is tightly linked to corporate strategic plan and to have the head of ICT report to the CEO and a member of the top decision-making body.

The second indicator of this category is ICT financing. This measures the degree to which an institution has sufficient budgetary allocation for ICT. The framework defined 3 sub-indicators, namely,

a. Percent of Internet costs to the total institution or campus expenditure
b. Percent of ICT budget to total institutional budget
c. Total annual ICT software and hardware

Data on ICT total expenditures was not available for most institutions and this indicator was staged using only the percent of Internet costs to the total institution budget.

The final category is ICT human capacity. This indicator measures the degree to which an institution has competent and well trained ICT professional and support staff. The ICT staff must be especially well trained in networking technologies.

To be in stage 4 of this dimension, an institution needs its senior ICT staff to have both business and ICT skills and experience, and with the head of ICT having predominantly business skills and experience. The ICT professional staff must have relevant ICT degrees, to have regular upgrade of the technical skills of professional ICT staff and to have high retention for professional ICT staff.

Data for staging this category of indicators was obtained from hard facts questionnaires. We note that stage 3 or better readiness in this category of indicators is a pre-requisite for readiness in all the other indicators especially network access and networked learning.

2.3. STRATEGIC ICT SUB-INDICATORS

This study defined sub-indicators for each of the 17 indicators as shown in Table 2.3. Although the 17 indicators are necessary for assessing the overall readiness of the institutions, the study defined a set of 15 sub-indicators that can easily be monitored by the heads of institutions. These sub-indicators include the number of PCs per 100 students and the Internet bandwidth per 1000 students. We refer to these indicators as strategic sub-indicators because they could easily be included in the list of institutional performance indicators in the institutional strategic plans.

A detailed hard facts questionnaire was developed to collect the demographic data and other data required for staging all of the sub-indicators. A perceptions questionnaire was also developed to conduct field-based survey of the students, faculty, and staff of higher education institutions. Appendix 1 and 2 contains samples of the questionnaires used to collect data. The next section describes how the data was collected and analyzed.

Table 2.3 shows the strategic sub- indicators.

Category of indicators	Indicators	ICT Strategic Sub-indicators	Comments
A. Networked access	Internet availability	1. Internet bandwidth per 1000 students	▪ Both absolute value and staged value needs to be used. ▪ Both uplink and downlink Internet bandwidth used in the calculation and staging.
		2. Networked PCs per 100 students	▪ Sub-indicator data easily available and should be used to determine level of ICT investments
	Internet affordability	3. % of Internet BW cost to total campus expenditure	▪ Sub-indicator easy to calculate and measure if institution Internet bandwidth spending aligned to strategic importance.
	Network speed and quality	4. % of students who think network speed better than cyber café	▪ This indicators require that institutions conduct satisfaction surveys regularly ▪ Perception survey data
		5. % of students who think on-campus e-mail always works	▪ Perception survey data
B. Networked learning	Developing the ICT workforce	6. % of ICT staff with professional certification	▪ Measures the competence of the ICT professional staff; higher chance they will train other users
	ICT in libraries	7. Availability of OPAC off-campus	▪ This is necessary for e-learning and digital library services
	Enhancing education with ICT	8. Integration of ICT in curricula	▪ Institutional leadership can monitor this indicator
	ICT research and innovation	9. Student participation in international ICT-based exhibitions and competitions	▪ Measurable indicator of quality and innovation of ICT degree programs offered.
C. Networked society	People and organizations online	10. % of students using Internet daily	▪ This depends on integration of ICT in curricula, access, and readiness of students
	Locally relevant content	11. % of students visiting 1-2 local websites	▪ This is easily monitored by the institutions; however, necessary to conduct field survey of the
	ICTs in everyday life	12. % of students whose main access to computers is on campus	▪ This is perceptions indicator not captured elsewhere
	ICTs in the workplace	13. % of faculty staying on-line for more than 1 hour per day	▪ This could be monitored on campus if most faculty access Internet at workplace; field survey necessary
D. Institutional policy and strategy	ICT strategy	14. % of ICT strategy implementation	▪ ICT head needs to monitor and report ICT strategy implementation; Institution head gets quarterly reports
	ICT human	15. % of ICT staff	▪ This is a measure of retention,

Category of indicators	Indicators	ICT Strategic Sub-indicators	Comments
	capacity	worked for > 3 years (retention)	important for quality ICT services. Easy to measure for different categories of ICT staff (e.g., network engineers, Database administrators)

3. DATA COLLECTION AND DATA ANALYSIS

3.1. SAMPLING METHOD AND SAMPLE SIZES

This survey used both a hard facts questionnaire and a perceptions questionnaire. The hard facts questionnaire was completed by the institutional heads of ICT in consultation with other department heads (e.g. finance, registrar). Each hard facts questionnaire took an average of 1 month to complete, and for some universities it took over three months to obtain the data. This is because most heads of ICT do not have even basic demographic data such as student numbers and the number of employees. It also took especially long to obtain any financial data. Most of the higher education institutions did not have annual reports with financial expenditures for ICT. In the end, some of the hard facts data was obtained from secondary sources such as audited financial reports and institutional strategic plans submitted to the Ministry of Education.

The sample sizes for perceptions questionnaires took into account the student population, different categories of students (undergraduates, post-graduates), faculty and staff. In addition, the sample included students, faculty, and staff from eight broad categories as shown in Table 3.1. For each institution, the sample size was determined to be statistically significant. For the large universities, sample sizes also took into account different campuses (e.g., six campuses for University of Nairobi, three campuses for Moi University, etc.). Initially, the student enrollment data in the Economic Survey of 2005 was used to determine the overall sample sizes.

Table 3.2 shows the different categories of respondents. A total of 8,159 valid perception questionnaires were entered into the database and used for analysis (90% of the respondents were students). In sampling the students, there was an additional requirement for gender balance as shown in Table 3.1. Overall, 43% of the respondents were female, consistent with the gender distribution of students in higher education institutions in Kenya. The students' sample was also representative of students in different years of study as shown in Table 3.3.

Table 3.1: Sample size for different academic departments

	Gender		
Academic Departments	Male	Female	Total
Humanities, Social Sciences	780(54.1%)	661(45.9%)	1441
Languages, Communications, Journalism	100(40.5%)	147(59.5%)	247
Computing (IT, IS, Computer Science, Computer Engineering)	645(61.6%)	402(38.4%)	1047
Engineering (Electrical, Mechanical, Civil)	539(77.7%)	155(22.3%)	694
Biological Science, Physical Sciences	354(66.0%)	182(34.0%)	536
Education	641(50.8%)	622(49.2%)	1263
Medical Sciences	290(55.6%)	232(44.4%)	522
Other	655(51.2%)	625(48.8%)	1280
Total	4004(57.0%)	3026(43.0%)	7030

Table 3.2: Categories of respondents

Main occupation	Frequency	Valid Percent	Cumulative Percent

Valid	Professor/Associate	19	.2	.2
	Senior Lecturer/ Lecturer/ Assistant Professor	199	2.4	2.7
	Assistant Lecturer/ Tutorial Fellow/ Graduate Assistant	123	1.5	4.2
	Administrative Staff	402	4.9	9.1
	Student	7372	90.4	99.5
	Other	44	.5	100.0
	Total	8159	100.0	

Table 3.3: Students year of study

	Frequency	Percent
First	1878	26.1
Second	1826	25.3
Third	1716	23.8
Fourth	1518	21.1
Fifth	144	2.0
Masters	104	1.4
Doctoral	5	0.1
Other (Pre-university, certificates)	18	0.2
Total	7209	100

One of the challenges of obtaining a random sample was the lack of student and staff data in electronic form in most institutions. For example, the survey intended to sample the students and staff at random from an electronic list obtained from the academic registrars. This was not possible. The research assistants were therefore forced to use student government offices and/or the ICT departments to select students from the different categories. The student data enumerators or data collectors were identified either by the student government or by the ICT department staff. The enumerators included students from each of the categories of students, excluding graduate students, and were trained by the research assistants and given guidelines for selecting students in the different categories. The guidelines ensured that the resulting data samples were random.

In the future, we plan to use strictly random data generated from the information systems of the higher education institutions.

3.2. DATA COLLECTION

Both the hard facts and perceptions questionnaires were directed questionnaires. The hard facts data was collected by research assistants drawn from four different universities: Strathmore University, USIU, University of Nairobi, and Jomo Kenyatta University of Agriculture and Technology (JKUAT). The research assistants had been trained by the researchers and participated in pilot surveys and therefore understood the data required.

A research assistant was sent to each institution or campus and had then to recruit and train the students in that institution who would administer the questionnaires. Guidelines for data gathering specified the percentage of respondents for each category (e.g., first years, graduate students, faculty members etc.).

All of the hard facts and valid perceptions data was entered into hard facts and perceptions databases and analyzed. The data was entered into the on-line databases by student assistants

working at different universities (USIU, Strathmore, University of Nairobi, and JKUAT). The hard facts database is available to each institution at http://eready.kenet.or.ke

3.3. DATA ANALYSIS

The detailed staging framework described in Section 2 guided the analysis of the data. Data from the database was first exported into the SPSS tool that was used to analyze the data. Results of the analysis and staging are contained in Section 4. The results are presented in tables, charts, and radar diagrams as shown in Section 4.

The staging framework developed in this research study was used to calculate the values of the different sub-indicators. For example, a sub-indicator PCs per 100 students was calculated from the data. This value had then to be converted to a staged value in the range 1 to 4 as explained in Section 2. The staging framework was used by the researchers to manually assign a value of 1 to 4. Once the stage for each sub-indicator (there were over 60 sub-indicators defined), the rest of the process of calculating averages and generating charts was automated. Section 4 describes the results for each category of indicators.

4. E-READINESS ASSESSMENT AND STAGING RESULTS

4.1. NETWORK ACCESS STAGING AND RESULTS

4.1.1. Overall staging

The network access category of indicators includes the following four indicators.

a. Information infrastructure (in the campus)
b. Internet availability (by the higher education institutions)
c. Internet affordability (by the institutions)
d. Network speed and quality (as perceived by users on campus)

The information infrastructure is measured using two sub-indicators, namely, internal teledensity and external teledensity. Thus, it measures the availability of telephone extension to employees of the university (faculty and staff) as well as access to external telephone lines (mobile or fixed) from the PBX of the higher education institutions.

The Internet availability indicator depends on availability of networked computers as well the international bandwidth purchased. The sub-indicators used to measure this indicator therefore include PCs per 100 students and Internet bandwidth per 1000 students (both uplink and downlink measured separately). Each of the sub-indicators is staged and the unweighted average used to derive the stage for the indicator.

Stage 4 for the PCs per 100 students' sub-indicator is achieved when institution provides 10 PCs per 100 students or better. An uplink Internet bandwidth of 1 Mb/s per 1000 students means stage 4 for that sub-indicator.

Figure 4.1 shows the staging of the network access category of indicators. Overall, the institutions are stage 1.4 in Internet availability and in stage 1.7 Information infrastructure indicators. That means that higher education institutions neither have adequate number of telephones for staff or Internet access for students and staff.

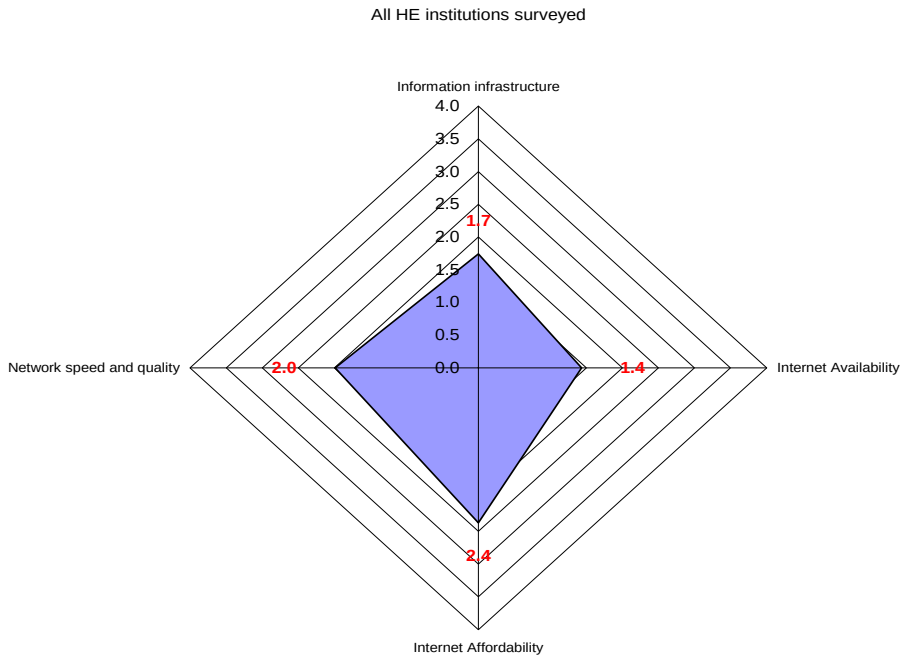


Figure 4.1 – Overall staging of network category of indicators

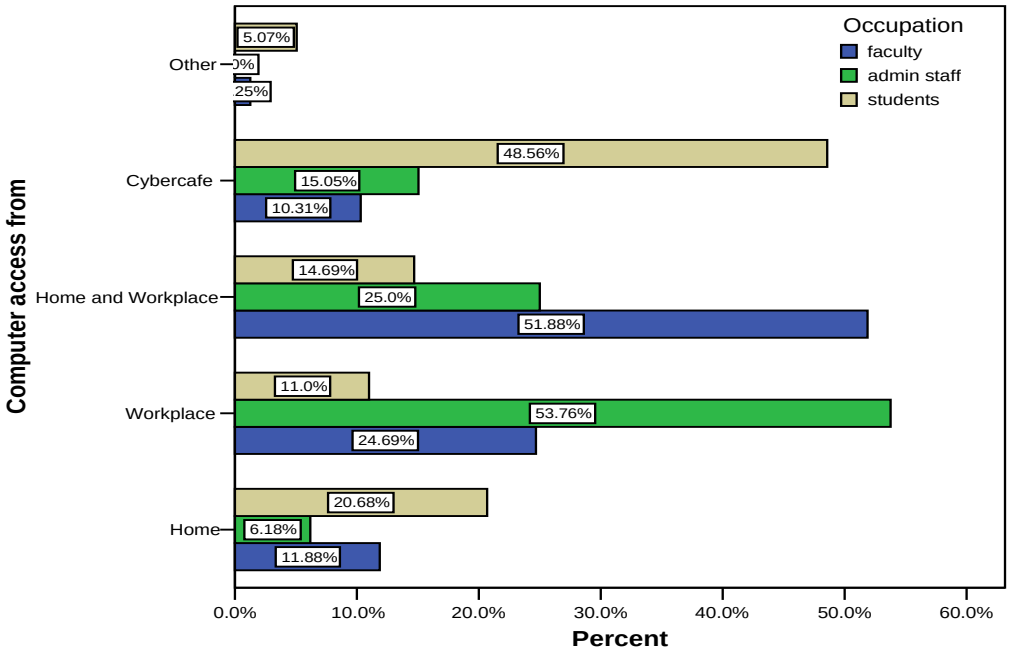
Information infrastructure

A score of 1.7 on this indicator means that the internal teledensity is under 50% and the external teledensity is under 10%. For example, only 43% of the faculty respondents reported that they had access to a telephone extension in the office. In order to achieve stage 4 in this indicator, the PBX capacity must be increased so that 75% have an extension and the external teledensity is greater than 10%.

Internet availability

Internet availability indicator is only in stage 1.4, which suggests that most of the institutions are not ready for Internet access. For example, this means that higher education institutions are providing an average of less than 128 kb/s per 1000 students of uplink bandwidth and less than 512 kb/s per 1000 students of downlink bandwidth. Such bandwidth is only useful for campus-based e-mail and would provide low quality of service for Web-based e-mail. Stage 4 in this indicator would require at least 4 Mb/s of download bandwidth per 1000 students and 1 Mb/s of uplink bandwidth. HE institutions will therefore need to increase the bandwidth purchases.

Internet access on campus also requires availability of networked PCs in labs and offices. This was measured using the sub-indicator of PCs per 100 students. The large institutions (e.g. public universities) provide less than three PCs per 100 students while most of the private universities provide more than 10 PCs per 100 students. This drives many students to cyber cafés in the neighborhood of the universities. Figure 4.2 shows that up to 49% of students' access computers from cyber cafés.



source: KENET 2006

Figure 4.2: Location of primary access to computers by users in higher education institutions

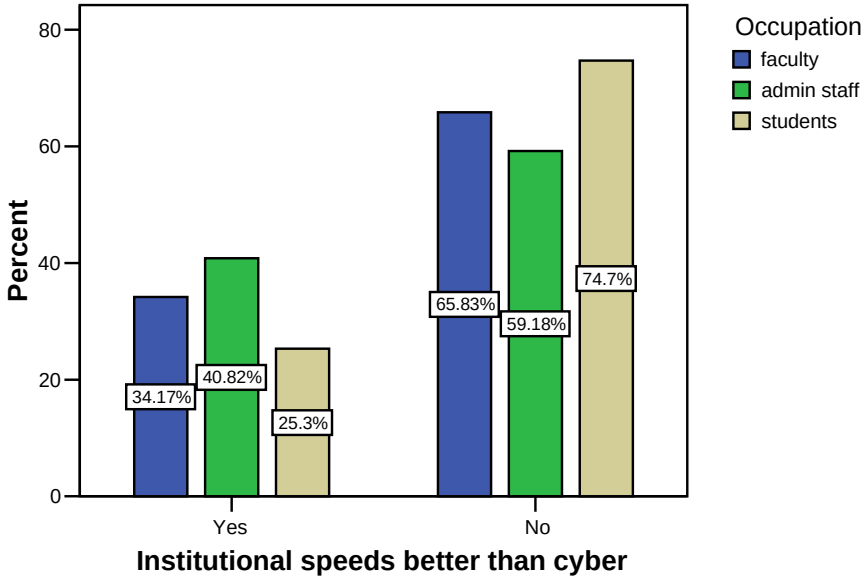
Internet affordability

The institutions achieved stage 2.4 in this indicator. This actually means that institutions are spending less than 1.0% of their campus operational budgets on the Internet. For example, most of the public universities are spending less than 0.5% of their operational budgets on the Internet. We note that most of the institutions spend proportionately more on telephones (mobile and fixed) than on Internet access.

Stage 2.4 also means that most of the higher education institutions are spending less than Ksh 1 million per 1000 students. In order to achieve stage 4 in availability, higher education institutions would need to spend more than Ksh 2.4 million per 1000 students on uplink bandwidth at current prices of US$2,330 per Mb/s.

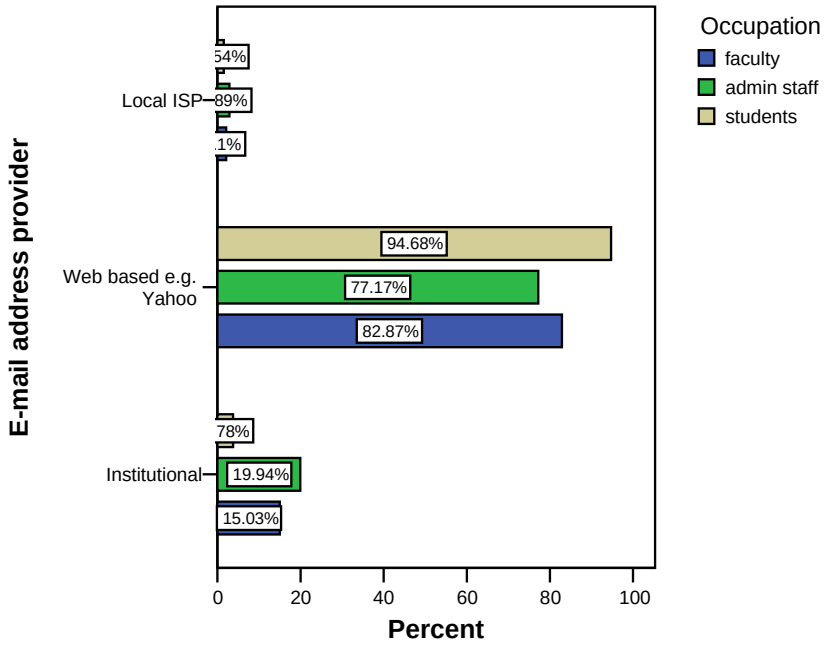
Network speed and quality

The data for staging this indicator was obtained from the field survey of students, staff, and faculty. Six sub-indicators that measured quality and speed perceptions of the students and faculty were used to stage this indicator. Stage 2.0 means that most of the students are dissatisfied with the quality of service as well as the network speed. For example, about 61% of the students find the campus networks are unstable as shown in Figure 4.3. Moreover, 95% use the dependable Web-based foreign e-mail accounts (e.g., Yahoo, Google Mail, and Hotmail) and less than 3% of the student use institutional e-mail accounts as shown in Figure 4.4.
Another sub-indicator of this network speed and quality was the perceived speed of the campus Internet when compared to cyber cafés. Figure 4.3 shows that up to 75% of the students consider cyber cafés to provide better speeds than the campus networks. In addition, all of the users consider the Internet speeds to be frustrating and slowing down their academic work. For example, about 80% of the student respondents and 83% of faculty considered campus Internet speeds to be frustrating or slowing down their academic work.



source: KENET 2006

Figure 4.3: Perceived quality of campus networks and Internet by users



source: KENET 2006

Figure 4.4: Providers of e-mail addresses in institutions

Satisfaction levels could be increased by increasing the Internet availability (i.e., more PCs per 100 students and higher Internet bandwidth per 1000 students). Higher education institutions also need to conduct regular satisfaction surveys to ensure that investment levels in campus networks match population of users.

4.1.2. Network access average stages of higher education institutions

The average stage for the indicators for each institution is useful for comparing the performance of different institution in this category of indicators. All the institutions should aim to be in stage 4. Figure 4.5 shows the average staging for all universities while Figure 4.6 is for tertiary institutions.

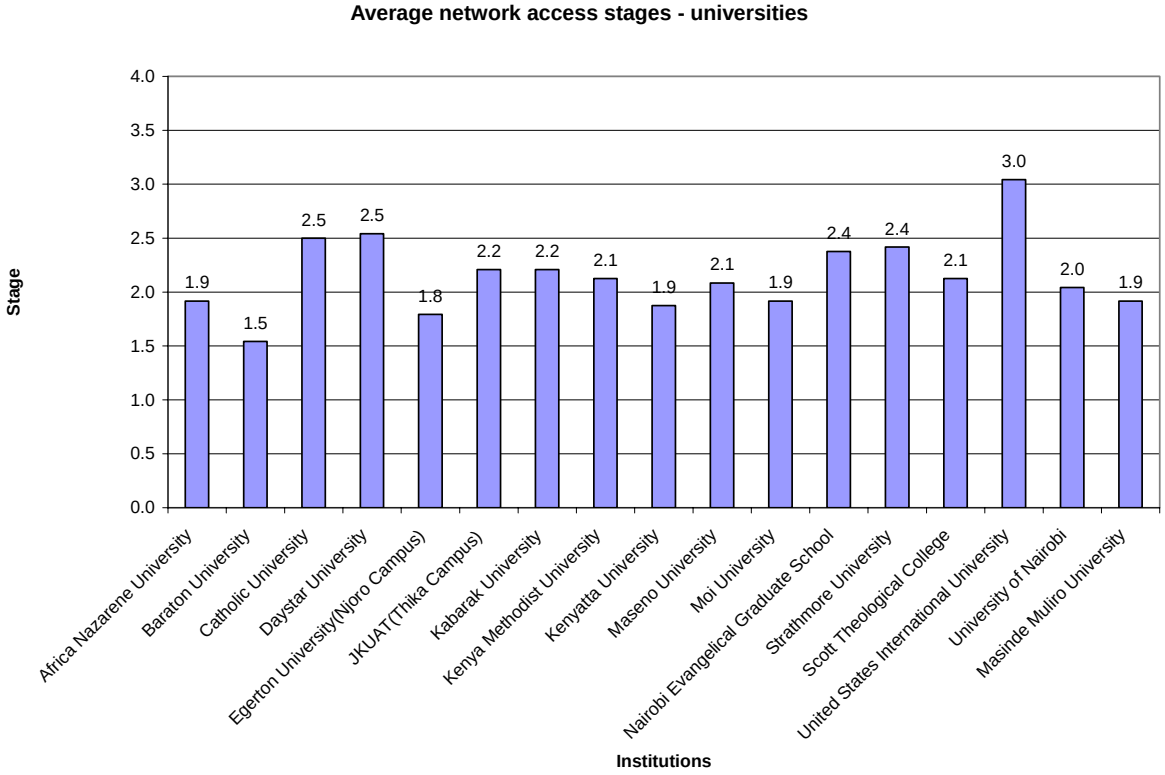


Figure 4.5 – Network access average staging for universities

Note that only three of the 17 universities achieve a readiness of stage 2.5 and above and only one university (USIU) achieves stage 3 of readiness. The University of Nairobi was the only one of the six large public universities that achieved stage 2.0 in network access category. That means that the majority of university students (over 80% of students) do not have an acceptable level of access to Internet. Universities are therefore not ready to start using ICT for e-learning except in niche departments of IT and business.

Tertiary institutions have even lower levels of readiness in this category as shown in Figure 4.6. In this case, none of the institutions are in stage 2.5 or higher. The Kenya Polytechnic with an enrolment of close to 10,000 students is only in stage 2.1.

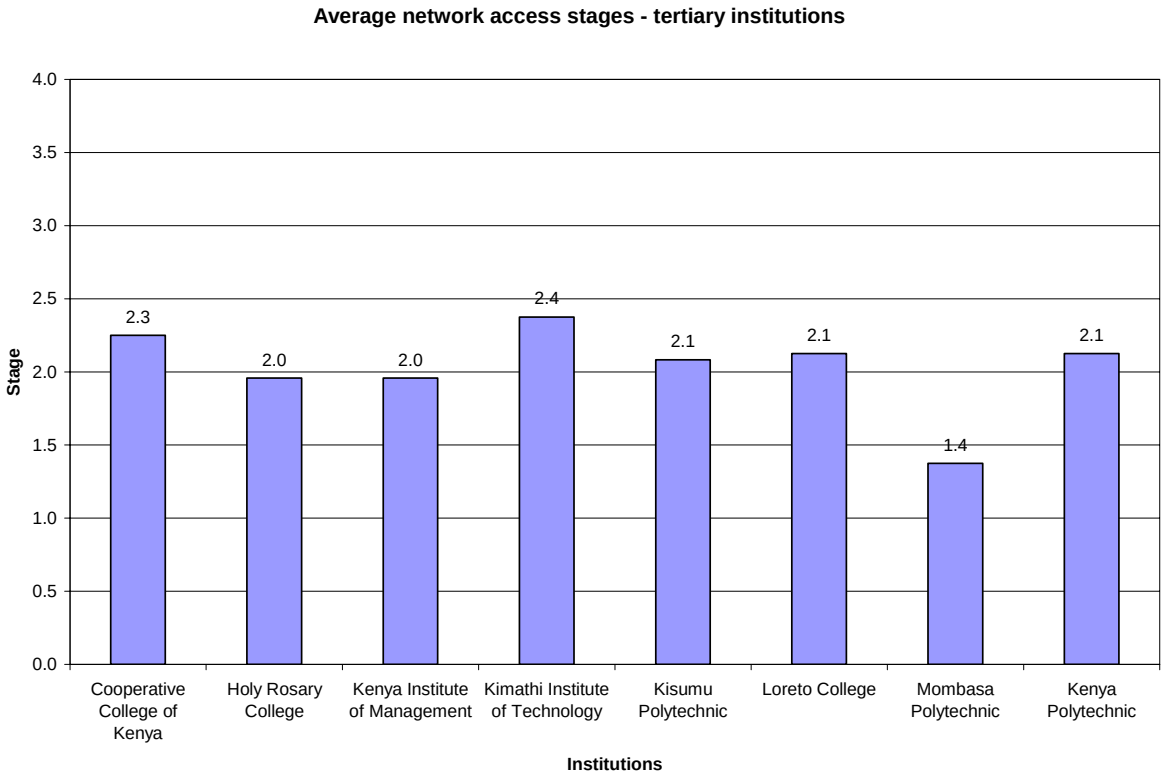


Figure 4.6: Network access average staging for tertiary institutions

Figure 4.7 shows the staging for the 4 indicators for USIU and Figure 4.8 for Kenyatta University (KU). Note that USIU is in stage 4 on information infrastructure while Kenyatta University is in 1.0. That means most faculty members at KU do not have a telephone extension in their offices. USIU is in stage 2.0 in terms of Internet availability while KU is in stage 0.8. That means that students at KU have very low levels of access to Internet. USIU, however, still needs to invest a lot more in computer labs. The perceived quality and speed of the network at KU is only 0.7 (unprepared) while that at USIU is now 2.7. This is expected due to the low access levels at KU.

Stage 4 in Internet affordability indicator for Kenyatta University simply means that the university has the capacity to spend a lot more on Internet bandwidth (i.e., it is not purchasing Internet bandwidth in sufficient quantity for student population). For example, KU with over 20,000 students spends only Ksh 232,000 per 1000 students. USIU on the other hand has an enrolment 3,500 but spends Ksh 1 million per 1000 students. This partly explains the differences in the perceived quality of Internet service in the two institutions.

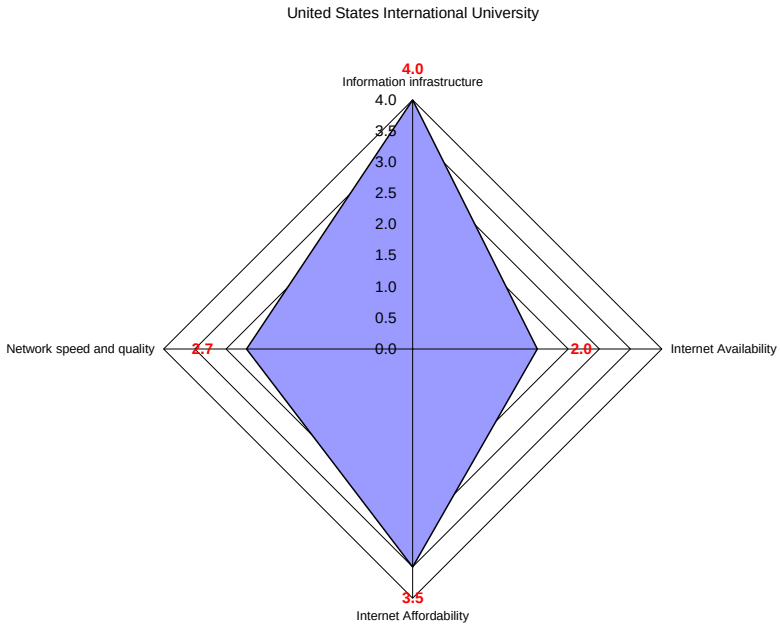


Figure 4.7: Staging of network access category of indicators for USIU

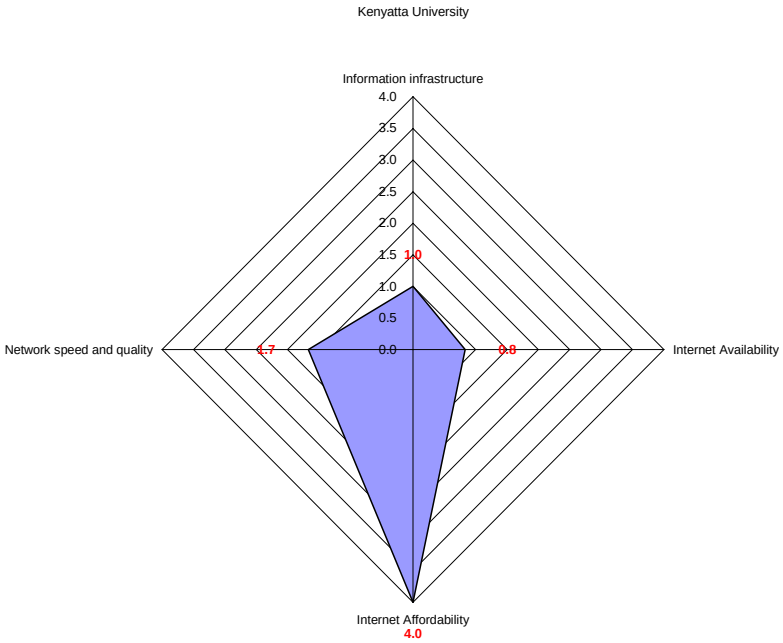


Figure 4.8: Staging of network access category of indicators for Kenyatta University

Tertiary institutions have lower levels of network access in their campuses. For example, the network access staging for Kenya Polytechnic is shown in Figure 4.9. Affordability is at stage 4 yet the information infrastructure is in stage 1 and Internet availability in stage 0.8. This means that the polytechnic has the capacity to purchase sufficient Internet for the student population. As it is, the polytechnic is not ready to use ICT for e-learning or even to enhance learning on campus.

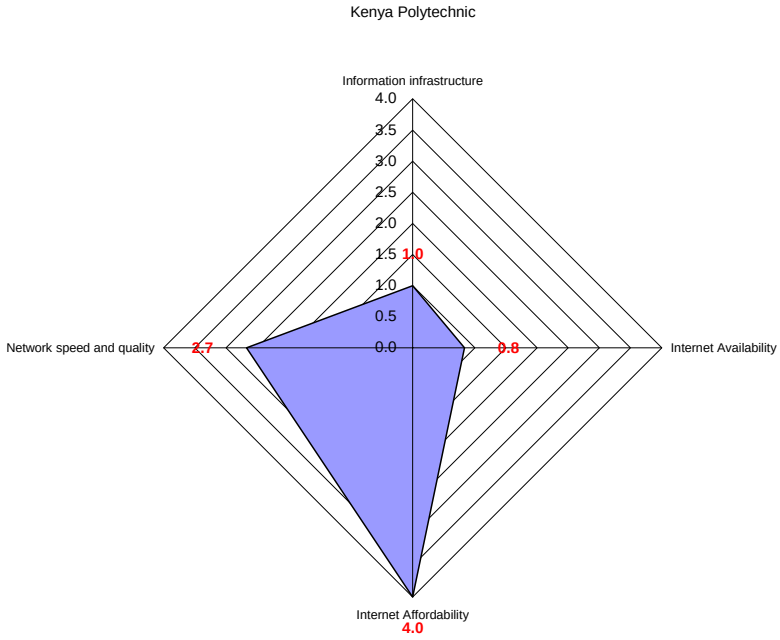


Figure 4.9: Network access staging for Kenya Polytechnic

4.2. NETWORKED CAMPUS STAGING AND RESULTS

4.2.1. Overall staging

The networked campus category contains only two indicators, namely, network environment and the e-campus indicators. The network environment category of indicator is closely related to the network access and contains sub-indicators that measure the ICT power supply availability and security of ICT equipment and software, which includes disaster recovery, plans. The e-campus indicator simply measures the degree of automation of internal processes (i.e., existence of appropriate information systems) and electronic interactions of the campus with students, suppliers, and other stakeholders. Figure 4.10 shows the overall staging of these indicators for all the higher education institutions surveyed.

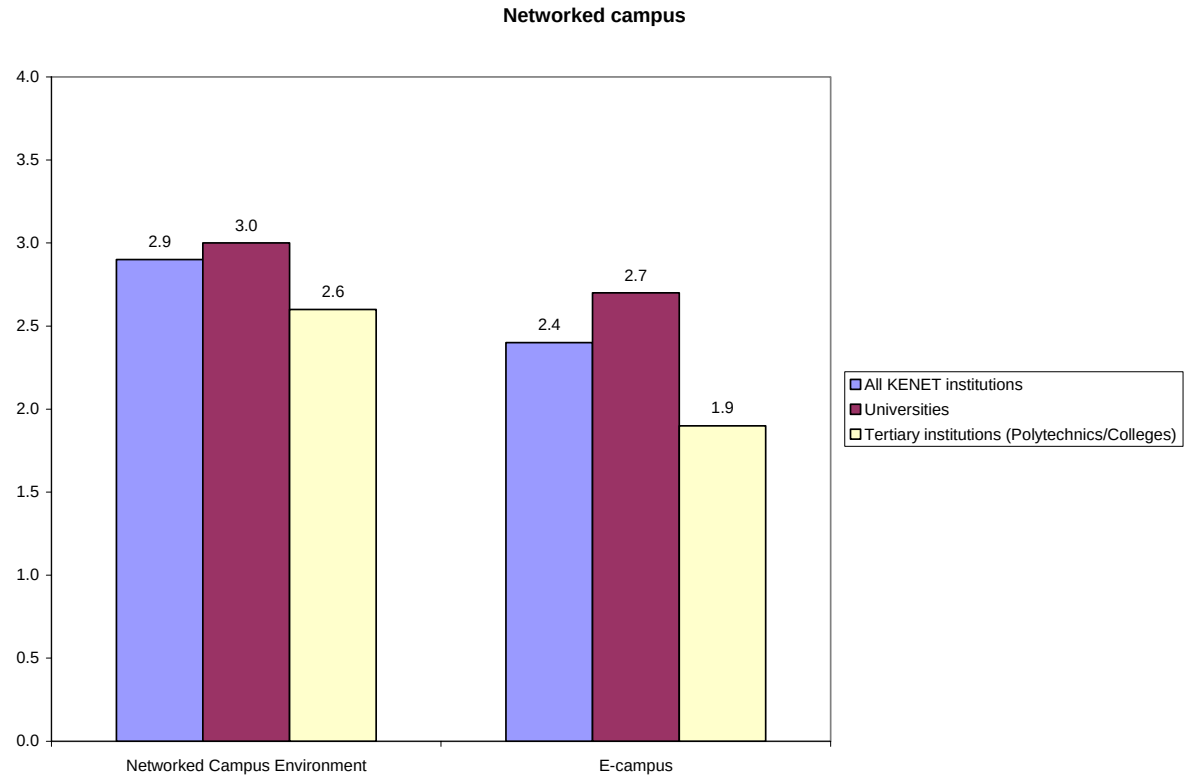


Figure 4.10: Overall staging of networked campus category of indicators

Network environment

At stage 2.9, most of the institutions are ready to start using ICT. For example, 66% of all institutions have Uninterruptible Power Supply (UPS) for PCs in the office while 46% of the PCs in the student labs have a UPS. Stage 4 requires that 75% of the student lab PCs have a UPS and that the campus have a backup diesel generator.

With respect to security of ICT facilities in campuses, about 85% of the higher education institutions have a firewall to protect their Intranets. This means that majority of the institutions take external threats to their networks very seriously. However, only 44% of the institutions have an off-site back-up and 46% have a disaster recovery plan. This means that over 50% of KENET member institutions surveyed do not yet consider disaster management a priority. This

is a critical issue that needs urgent attention and should be included in institutional ICT strategic plans.

E-campus indicator

This indicator was measured using a variety of sub-indicators such as the frequency of updates of the websites, the extent of on-line interaction with suppliers, the degree of automation of the campus processes and the integration of the information systems. The fact that the institutions are in stage 2.4 in this category means that websites are not being updated frequently (at least weekly) and there is limited on-line and e-mail interaction with suppliers, students, employees, and other stakeholders. For example, only 35% of higher education institutions update their websites weekly. However about three quarters (76%) of the institutions update their web information at least once per month. This is an indication that information in most institutions is at least a month old.

Most of the institutions were unable to provide information on extent of electronic interaction with suppliers or the value of the on-line business transactions. However, one university conducts full B2B e-commerce with software and book suppliers, including electronic payment for goods and services. This means that it is possible to achieve stage 4 in this indicator.

4.2.2. Networked campus average staging of HE institutions

Figure 4.11 shows the average staging of the 17 universities surveyed. The results show that two of the universities (USIU and University of Nairobi) are in stage 3.5 in this indicator. This is a very high level of readiness. Another four universities are in stage 3 and above. Overall, the universities exhibit a high degree of readiness for networked applications. However, 6 universities are still in stage 2.5 and below and two are in stage 2.0 and below. Such institutions will need to focus on the networked campus indicators in their ICT strategic plans.

Figure 4.12 and Figure 4.13 illustrate the staging of networked campus indicators for universities in high state of readiness (> 3.5).

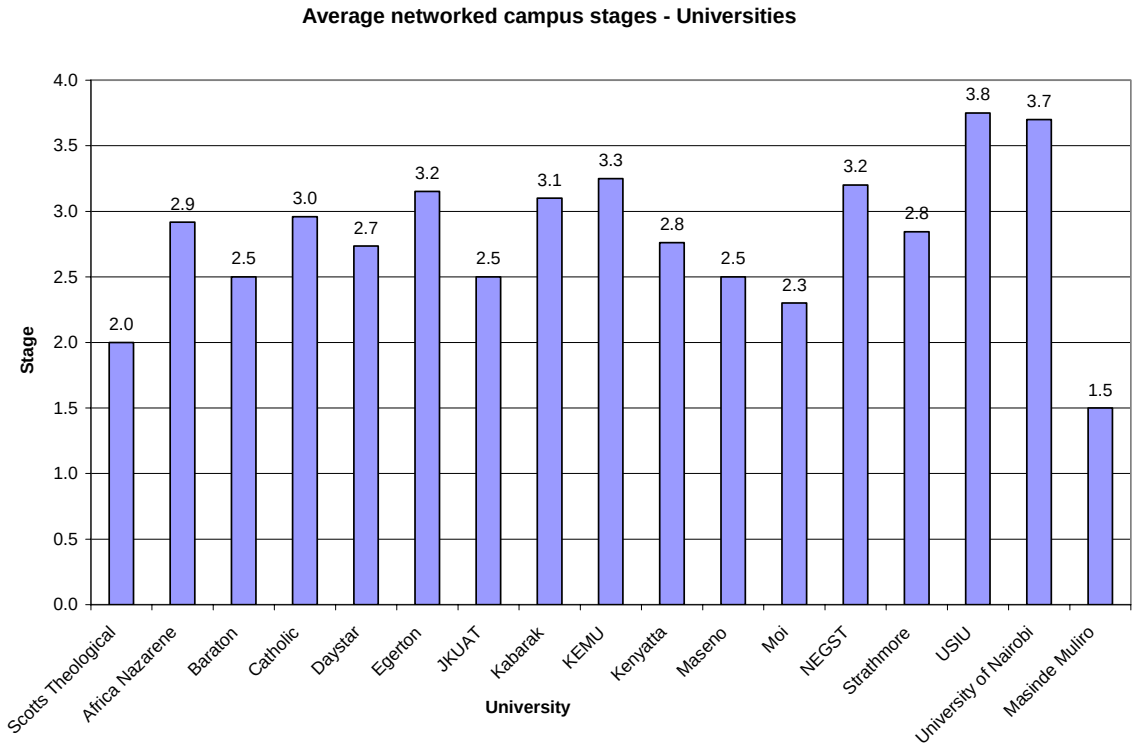


Figure 4.11: Networked campus stages for universities

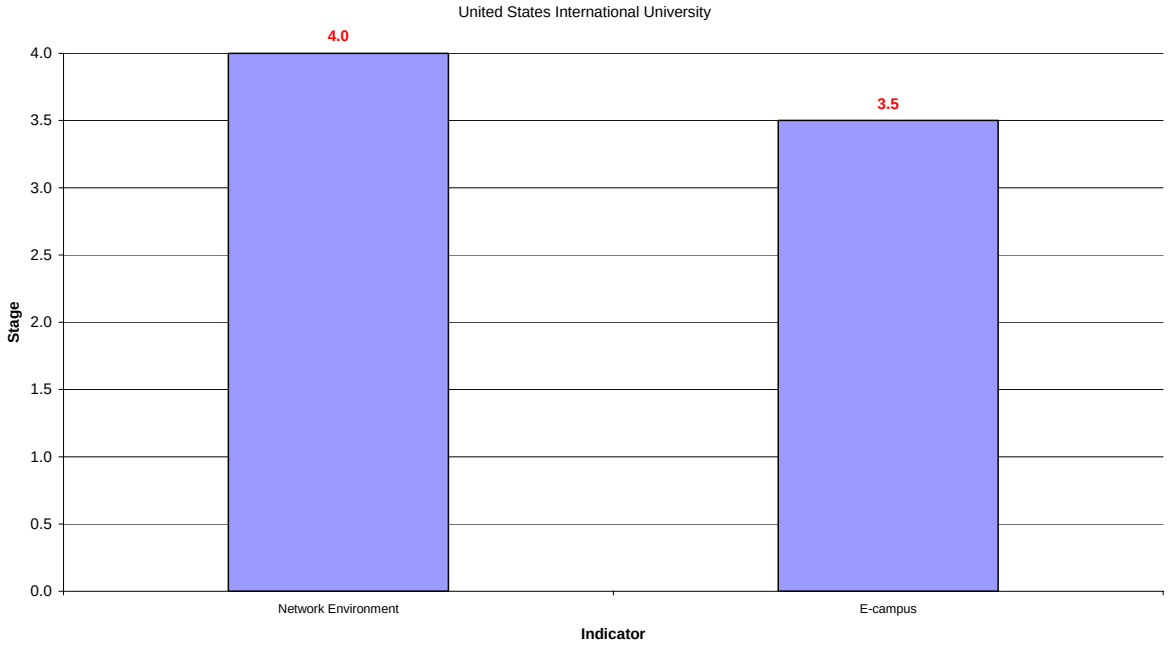


Figure 4.12: Networked campus staging for USIU

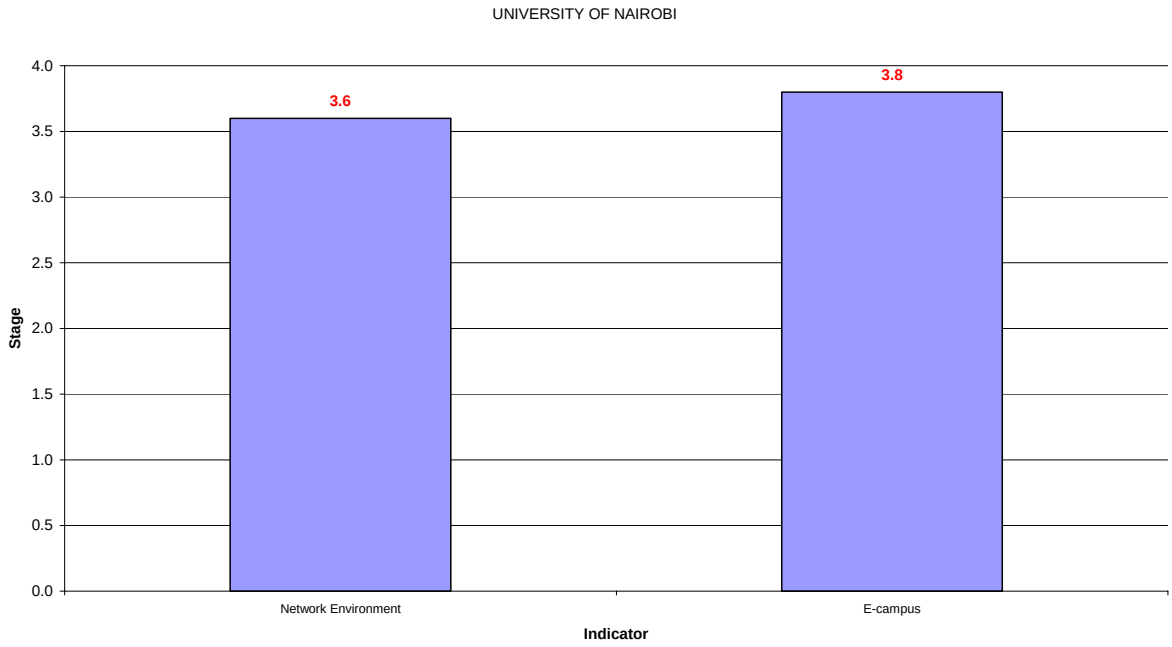


Figure 4.13: Networked campus staging for University of Nairobi

The performance of the tertiary institutions is similar to that of the universities in the two indicators in this category (network environment and e-campus) as shown in Figure 4.14. Overall, tertiary institutions do not have computer-based information systems (financial or student information systems) and have very limited e-mail or on-line off-campus interaction with suppliers, students, faculty and other stakeholders. For example, Figure 4.15 shows the staging of Kisumu Polytechnic that has an enrolment of 2,200 students.

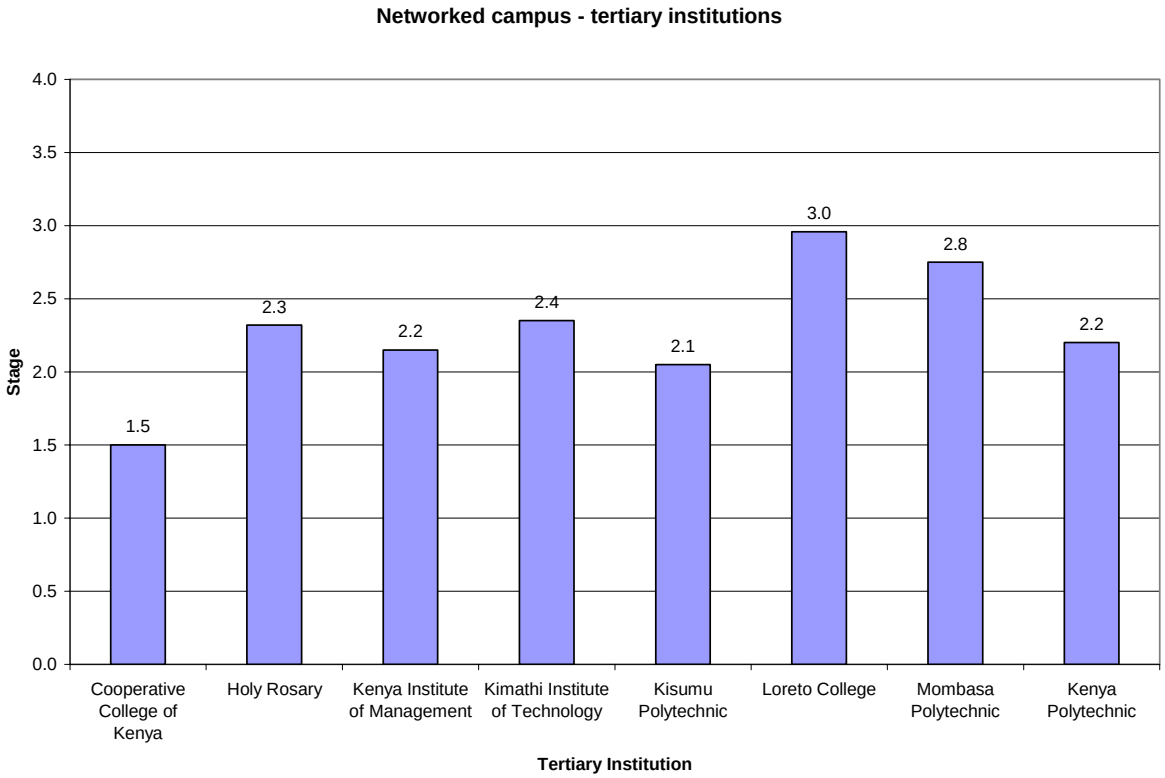


Figure 4.14: Networked campus staging of tertiary institutions

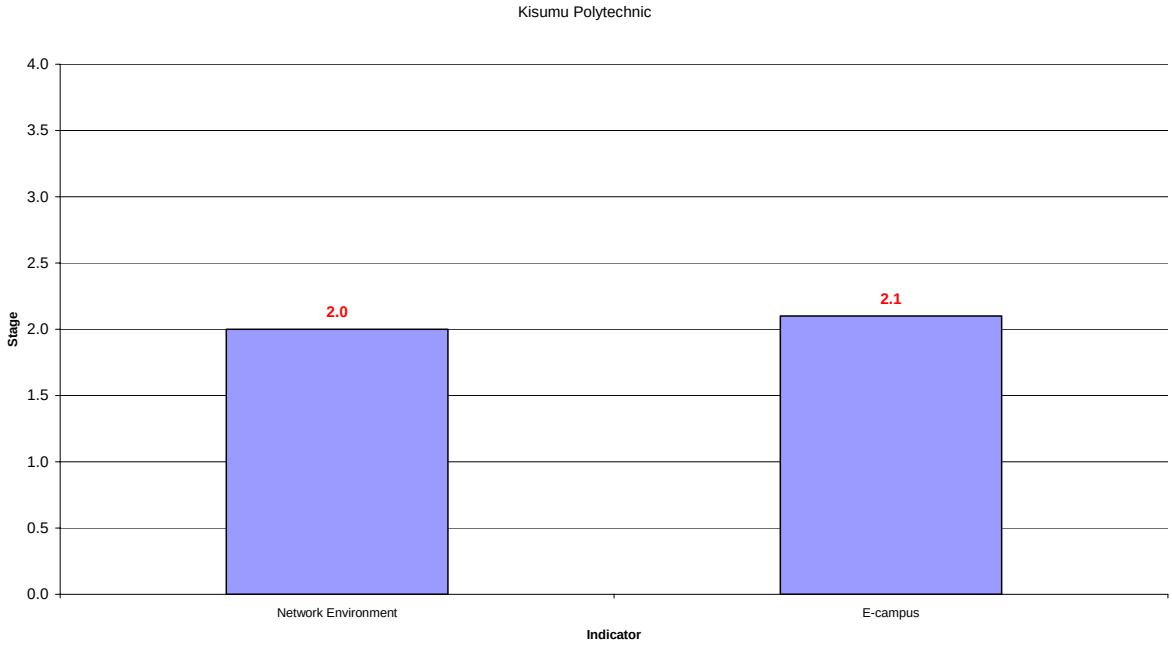


Figure 4.15: Networked campus staging of Kisumu Polytechnic

4.3. NETWORKED LEARNING STAGING AND RESULTS

The networked learning category contained four indicators as explained in Section 2. The indicators are, namely:

i. Enhancing education with ICT
ii. Developing the ICT workforce
iii. ICTs in the libraries
iv. ICT research and innovation

Although initially we intended to include another indicator on enhancing research with ICTs, data collected was incomplete for staging. This indicator was therefore not analyzed. However, some of the ways that faculty are using ICT for their work was captured and analyzed although not used for staging.

4.3.1. Overall staging of networked learning category of indicators

Figure 4.16 shows the staging of the four indicators for all the higher education institutions surveyed

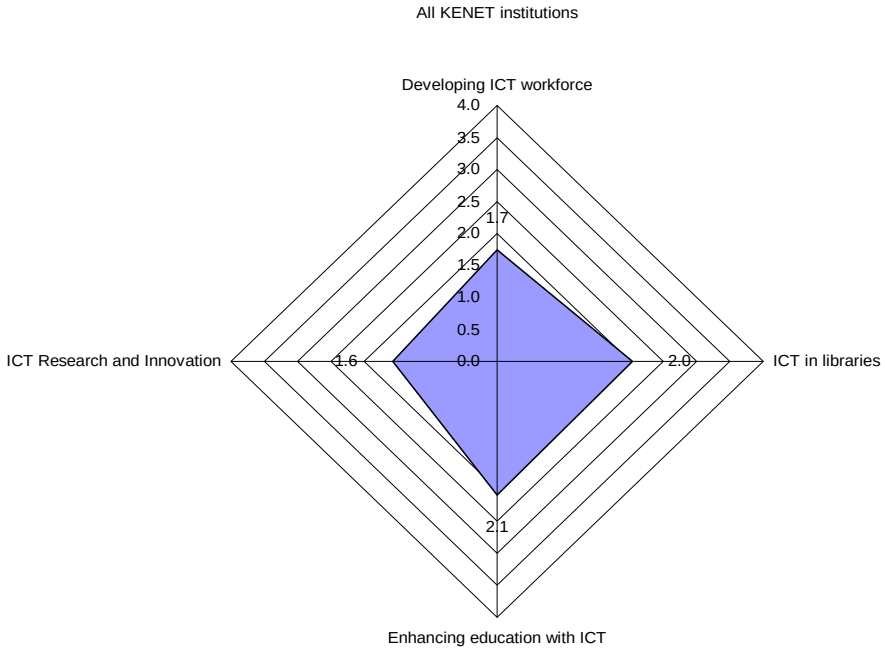


Figure 4.16 – Staging of networked learning category of indicators

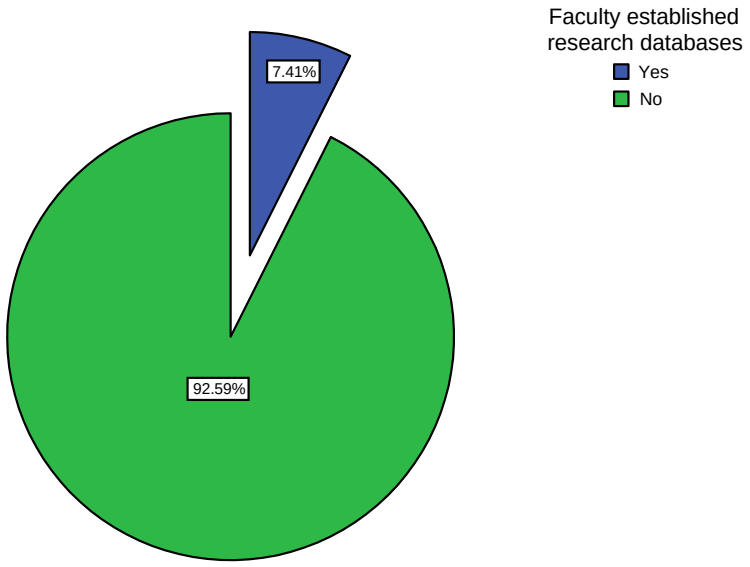
The sub-indicators for enhancing education with ICT include integration of ICT into the curricula, availability and use of e-learning platforms, and also use of ICT in student projects. The fact that this indicator is still in stage 2.1 means that institutions are only starting to use ICT in learning and teaching.

The staging for developing ICT workforce is at 1.7 and it means that institutions are not training their workforce (academic and non-academic staff) on the use of ICT.

The score of 2.0 in ICTs in libraries means that the level of automation of the institutional libraries is low. The libraries are not yet ready to provide digital library services. Institutions that were in stage 3 or better were supporting users using ICT and also performing all their back-end

operations, including procurement, using ICT. For example, only 21% of the libraries have an OPAC available off-campus and about 40% of the libraries offer regular e-mail updates to their users. About 36% of the automated libraries the automated libraries interact with their suppliers electronically.

The ICT score on the ICT research and innovation is a low of 1.7. This indicator was measured indirectly using the sub-indicators of ICT degrees (undergraduate, Masters, and PhD) and participation of students in international ICT exhibitions and competitions. A low score suggests that few institutions are offering masters and doctoral degrees in ICT or few are participating in the exhibitions. For example, only 18% of the institutions are offering Master's degrees in ICT and only the University of Nairobi has a doctoral degree program in ICT (information systems and computer science). Further, results show that only a small number of lecturers are setting up research databases or even using research databases as shown in Figure 4.17.



source: KENET 2006

Figure 4.17 – Lecturers participating or establishing research networks

In general, universities were in a higher state of preparedness than tertiary institutions as Figure 4.18 and Figure 4.19 illustrate. It appears that tertiary institutions are not making any effort to even develop their workforces. They are also not innovating even by participating in ICT project exhibitions. This is surprising considering that most of the ICT diploma programs are only offered by the three polytechnics surveyed.

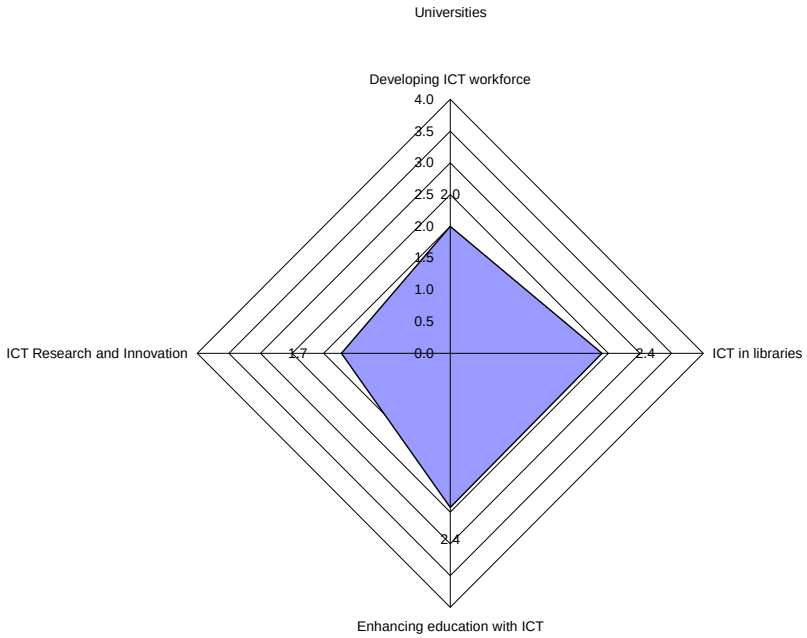


Figure 4.18 – Networked learning indicators staging for universities

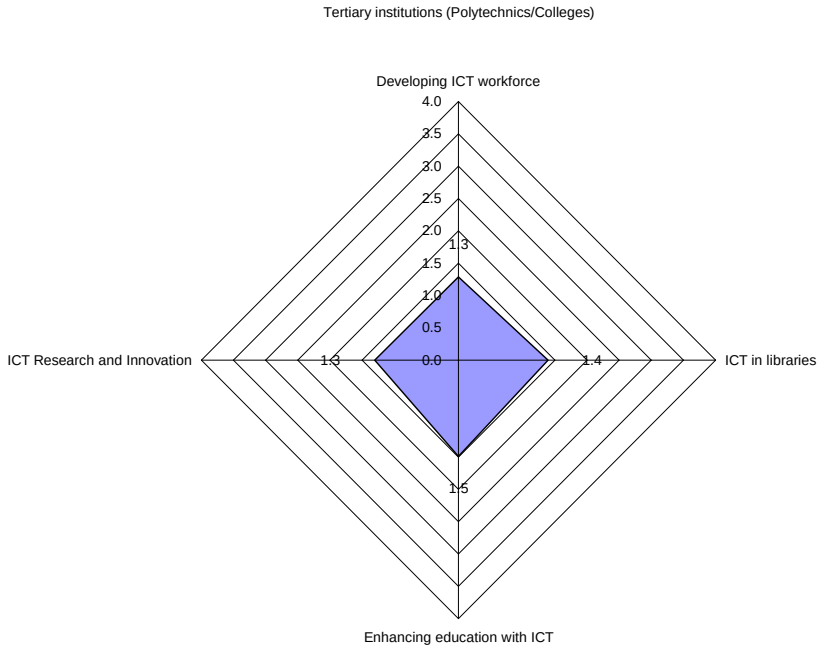


Figure 4.19 – Networked learning indicators for tertiary institutions

4.3.2. Institutional stages of networked learning indicators

Overall, only four of the 17 universities achieved a staging of 2.5 and only the University of Nairobi was above stage 3 in networked learning as shown in Figure 4.20. The university is also

the only public university that achieved stage 2.5 and above in this category. All the other six public universities are below stage 2.0. Overall, universities in Kenya have not yet started using ICT for learning in an integrated fashion.

Figure 4.21 shows the corresponding chart for the tertiary institutions surveyed. Tertiary institutions are all in stage 1.6 or lower and are yet to start using ICT for learning.

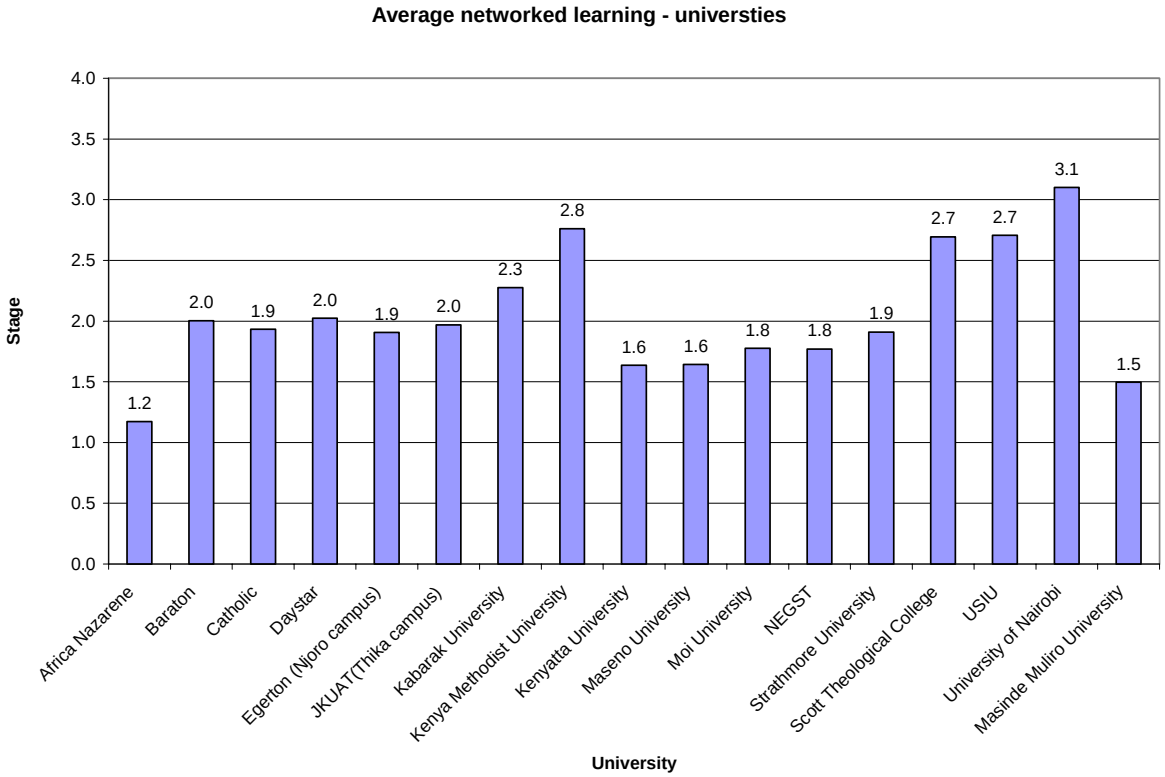


Figure 4.20 Networked learning stages for universities

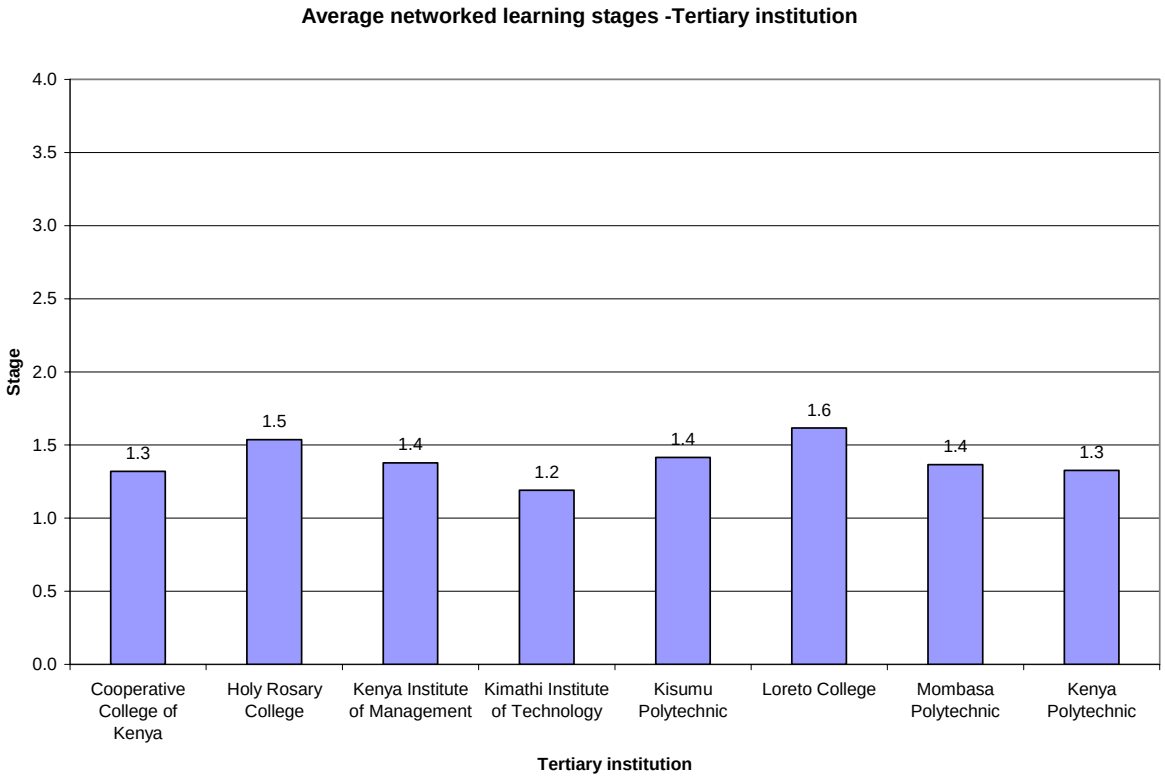


Figure 4.21: Networked learning stages for tertiary institutions

In order to understand the meaning of the overall staging, it is necessary to examine the staging of the indicators and sub-indicators in this category. For example, Figure 4.22 shows the staging of the indicators for the University of Nairobi. The university is in stage 3.4 in developing the ICT workforce and in stage 3.0 in enhancing education with ICTs, ICTs in libraries, and ICT research and innovations.

In comparison, Kenyatta University, another large public university that has a focus on education degree programs, overall it is in stage 1.6. Figure 4.23 shows that it is in stage 1.3 for use of ICTs in libraries, which means they are not automated and neither do students have access to online resources or electronic databases. It is also in stage 1.3 in ICTs research and innovations yet it offers many ICT undergraduate degree programs. This means that ICT students are not participating in exhibitions and that the university does not offer graduate degree programs in ICT (e.g., no PhD program unlike University of Nairobi).

Private universities surveyed performed better than the public universities, especially in ICTs in libraries, enhancing education with ICTs and developing the ICT workforce (i.e., training of the technical and non-technical staff in use of ICT) as shown in Figure 4.24 for USIU. However, even the best performing private universities have relatively poor performance in ICT research and innovation (1.6 for USIU) because of lack of graduate degree programs in ICTs.

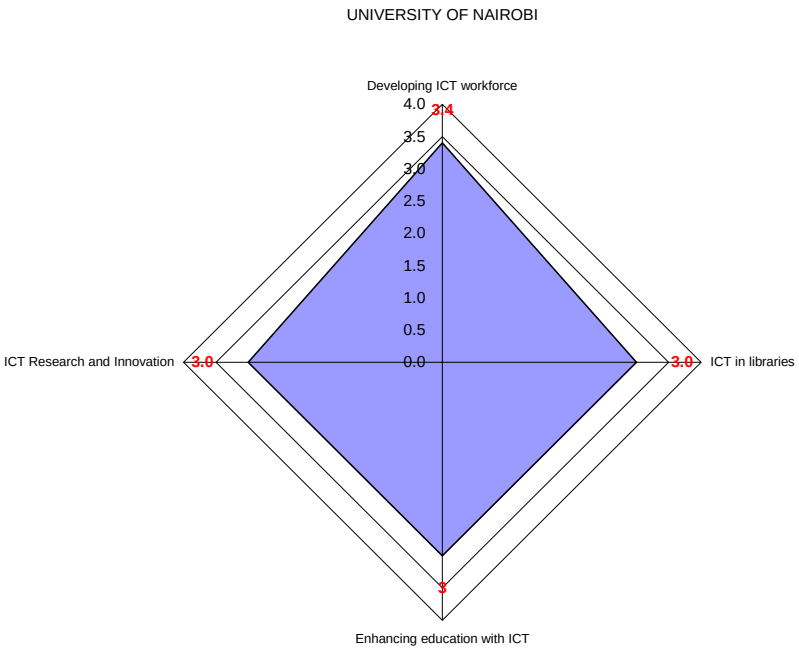


Figure 4.22: Networked learning indicator stages for University of Nairobi

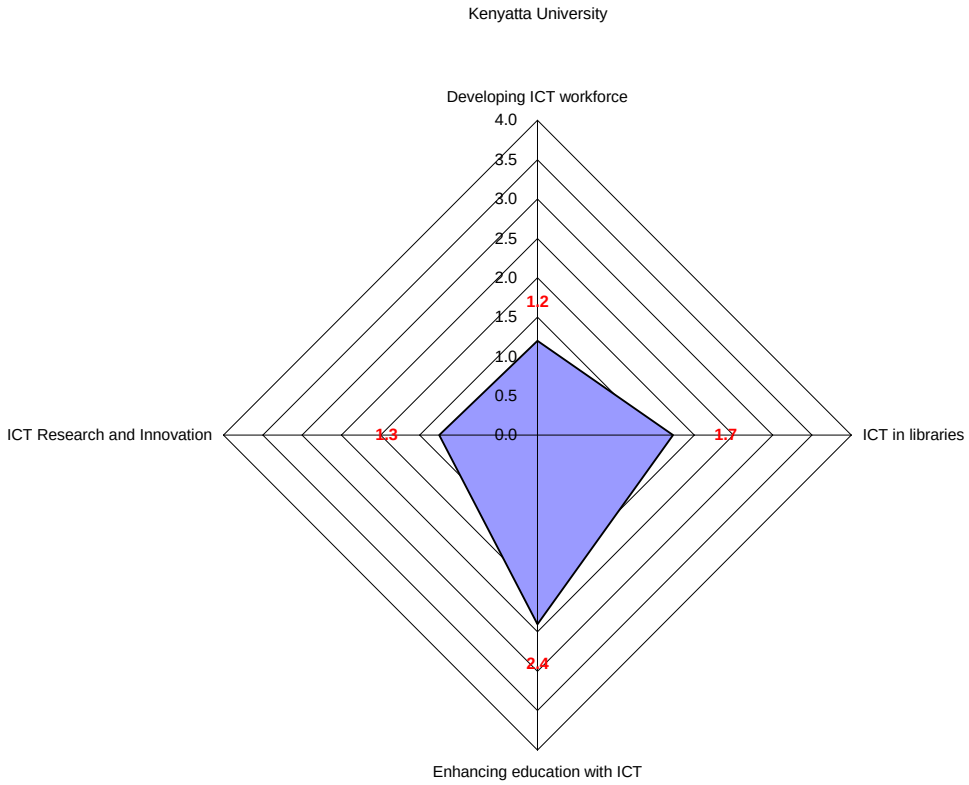


Figure 4.23: Networked learning indicators for Kenyatta University.

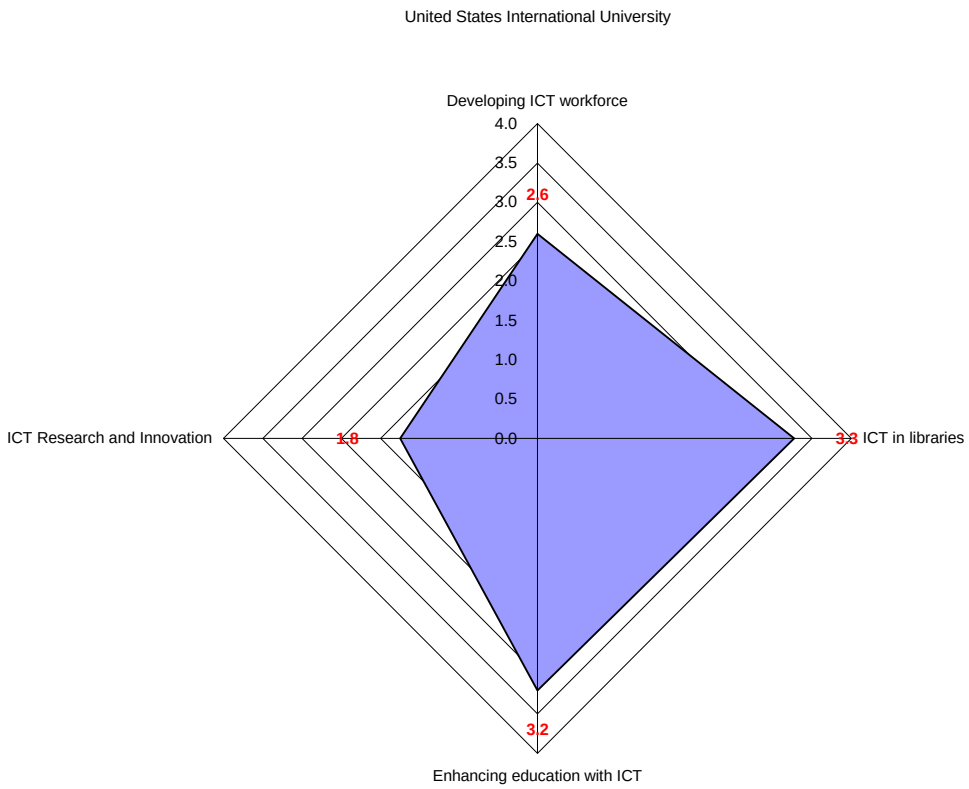


Figure 4.24: Networked learning indicators for USIU

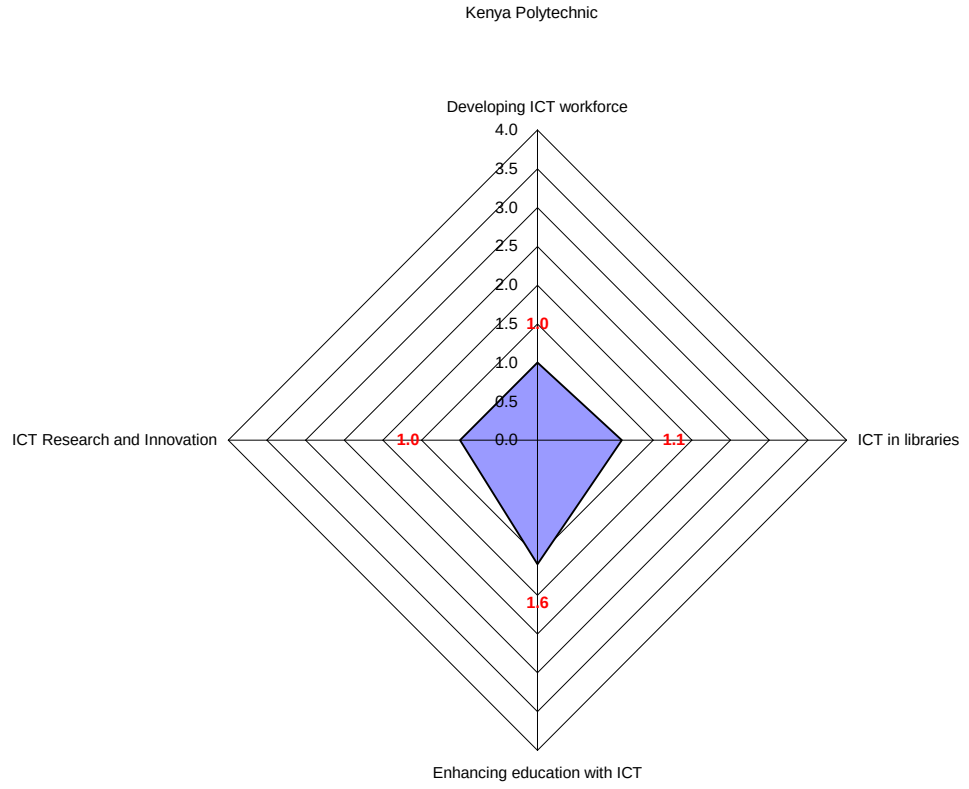


Figure 4.25: Networked learning indicators for Kenya Polytechnic

Tertiary institutions performed poorly in the networked learning category of indicators. For example, Figure 4.25 shows the staging for the Kenya Polytechnic, which has the highest enrolment of 9,818 students. The polytechnic has not automated its library, it does not participate in ICT project exhibitions and neither is it preparing its workforce to use ICT.

The above results will therefore be used in different ways by the different institutions depending on the focus of the ICT strategic plans and the indicators that require attention.

4.4. NETWORKED SOCIETY STAGING AND RESULTS

4.4.1. Networked society category of indicators

The networked society category consists of the following group of indicators:

a. People and organizations online
b. Locally relevant content
c. ICTs in everyday life
d. ICTs in workplace

Each of these indicators was sub-divided into sub-indicators that were then staged. The *people and organizations online* indicator measures the use of Internet resources for learning, research, news and entertainment. It assumes that users have access to e-mail as well as informational, interactive and transactional websites. E-mail accounts could be provided either by the institutions or other ISPs.

The *locally relevant content* indicator measures the degree to which local on-line resources are available in Kenyan higher education institutions websites or other websites hosted in Kenya. Such local websites could contain local news and entertainment or locally developed learning resources like databases or e-learning courses. The indicator measures the extent to which Kenyan Internet content has been locally developed and its relevance to the higher education academic community.

ICT in everyday life indicator measures the readiness and use of a variety of ICT services and equipment by the higher education community. For the purpose of this indicator, ICTs are defined broadly to mean computers, PDAs, mobile phones or fixed line phones, televisions, and radios. Such ICTs equipment or services need not be provided by the institutions but could be available at cyber cafés or even at home. Data for this indicator was collected using the field-based perceptions survey.

ICT in the workplace indicator was specific for academic and non-academic staff of HE institutions. It measures the readiness and usage of ICT at work. For an academic staff member, this means using ICT for classroom presentations, preparation of notes and e-learning content, and for Web-based research. It is also used to measure the use of ICTs for internal and external communication. Non-academic (administrative) staff, for example those in an accounts department could use institutional information systems for their daily work. Administrative staff could also use ICTs to interact with suppliers, government, off-campus students and staff.

4.4.2. Overall staging of Kenyan HE institutions

Figure 4.26 shows the staging of the networked society category indicators.

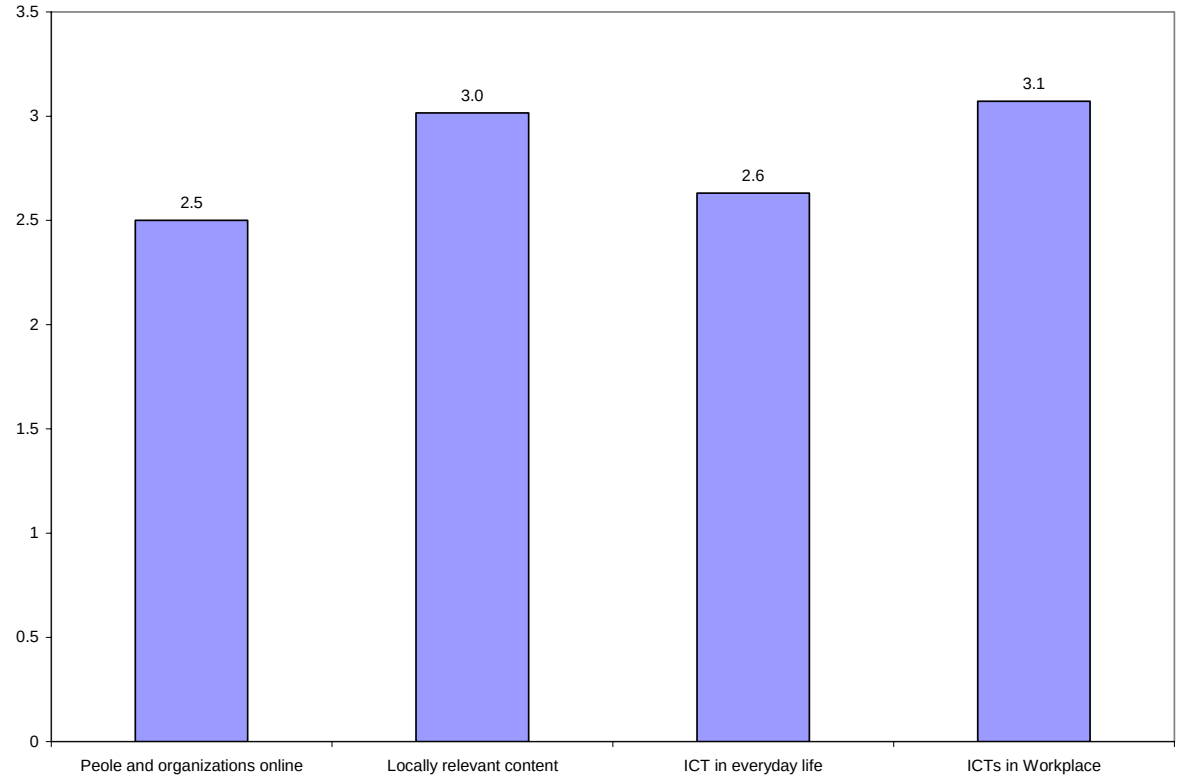


Figure 4.26: Networked society category of indicators stages

We note that the institutions surveyed are all in stage 2.5 or better in all the indicators, a relatively high degree of readiness by the academic community to use ICT for learning, teaching, and management. However, the usage is still relatively low due to network access challenges and that is why the scores are still below 3.0 for people and organizations online and locally relevant content. In the following, we briefly discuss the meaning of the overall stage for each of the four indicators.

People and organizations online

Figure 4.26 above shows that the people and organization online indicator was in stage 2.5, the lowest in the networked society category. As explained in Chapter 2, some of the sub-indicators used to stage this indicator include:

a. The percent of respondent using Internet for e-mail
b. Percent of students and faculty who consider Internet most important for academic work
c. Percent of students and faculty who use Internet daily
d. The percent of institutional websites considered by users to be interactive or transactional

This indicator therefore almost wholly depends on the campus on-line environment of the institution. The score of 2.5 suggests that staff and students in HE institutions have only slightly more than average access to on-line resources in the campus networks. For example, although stage 4 score requires that over 50% of the students are using the Internet daily, only about 30% of the students are using the Internet daily as Figure 4.27 shows. About 50% of the student

respondents reported that they use the Internet for less than three days per week and only 19% use the Internet once a month. This is a very low usage of Internet by the student community.

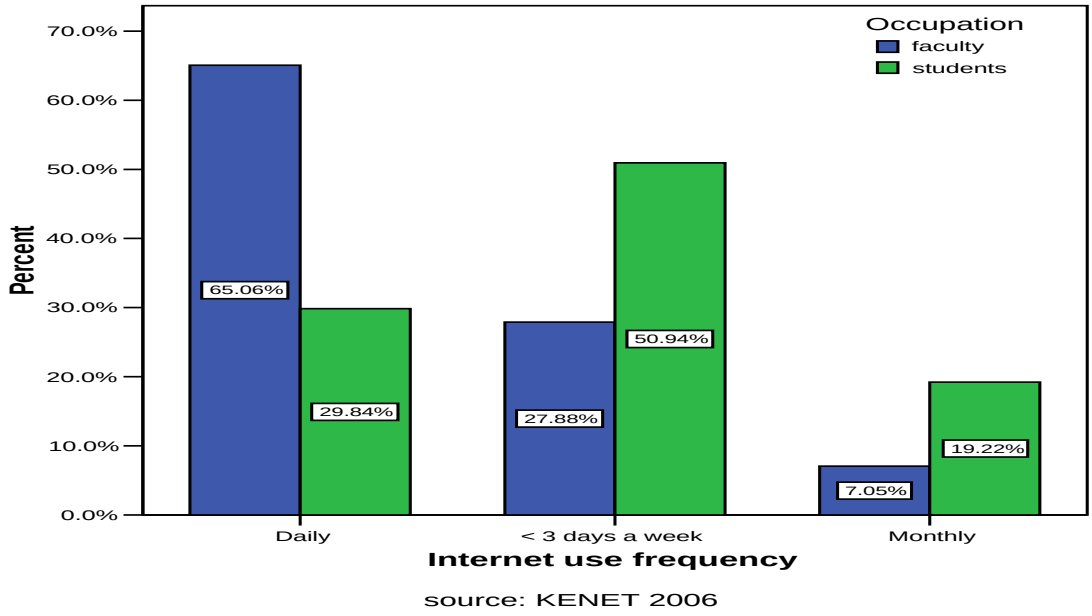


Figure 4.27: Frequency of use of Internet resources

Internet usage by gender

An analysis of the usage of Internet by gender is shown in Figure 4.28. The results show that 35% of male respondents use the Internet daily compared to 30% of the female respondents. However, 20% of the female respondents reported that they use the Internet at least one a month compared to 16% of the male respondents.

Another sub-indicator of Internet usage is percentage of respondents who visit at least one Web portal regularly. Figure 4.29 shows that about 40% of the female respondents did not visit any Web portals compared to 33% of the male respondents. On the whole, these results suggest that the male respondents were relatively more intense users of the Internet than the female users. This is an area that requires further investigation to determine reasons for the differences in intensity of Internet use by male and female respondents.

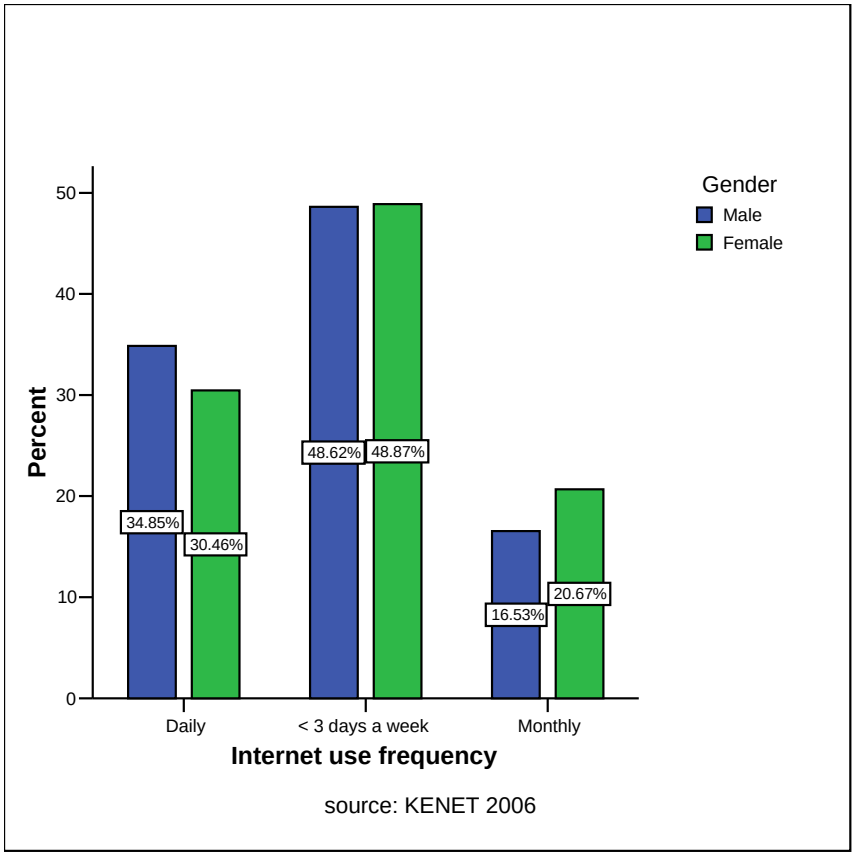


Figure 4.28: Frequency of Internet use by gender

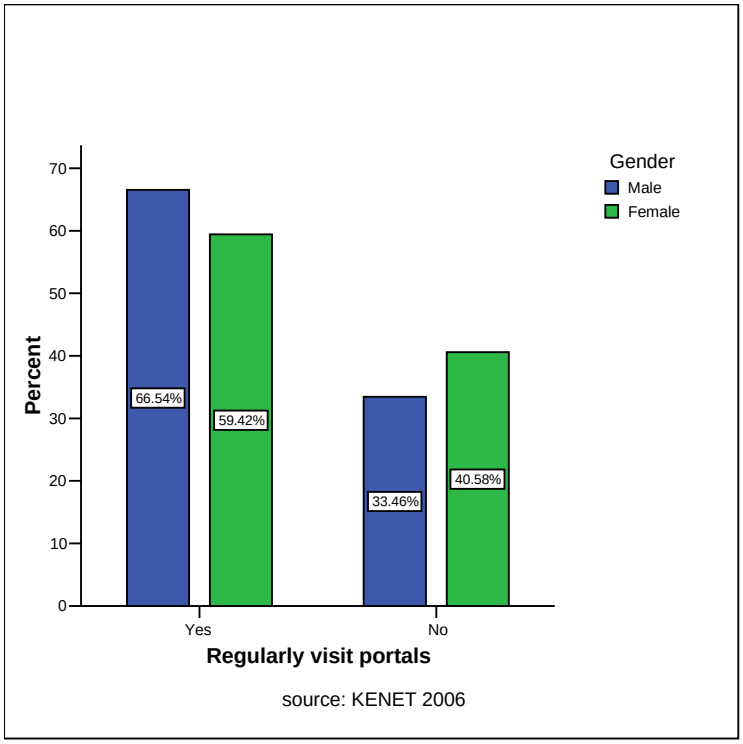


Figure 4.29: Regular visit to Web portals by gender

The heads of ICT reported that 87% of the websites are informational and only 8% are interactive or transactional. About 4% of the institutions do not yet have a website. Although about 60% of the users surveyed thought their websites were informational, Figure 4.30 shows that 42% of the users did not know the type of websites their institutions had. This suggests that the respondents never visit their institutional websites. Stage 4 in this indicator required that 75% of the websites are interactive. This means that most of the institutions surveyed will need to develop interactive websites in order to achieve stage 4 of readiness in this sub-indicator.

Institutions could therefore improve the stage of this indicator by simply building interactive websites. However, that would require that that institutions automate their internal processes and have operational information systems (e.g., student information systems, financial information systems or other enterprise resource planning systems). Our analysis later in this report shows that this is an institutional leadership challenge for most of the institutions surveyed (see institutional policy and strategy category of indicators).

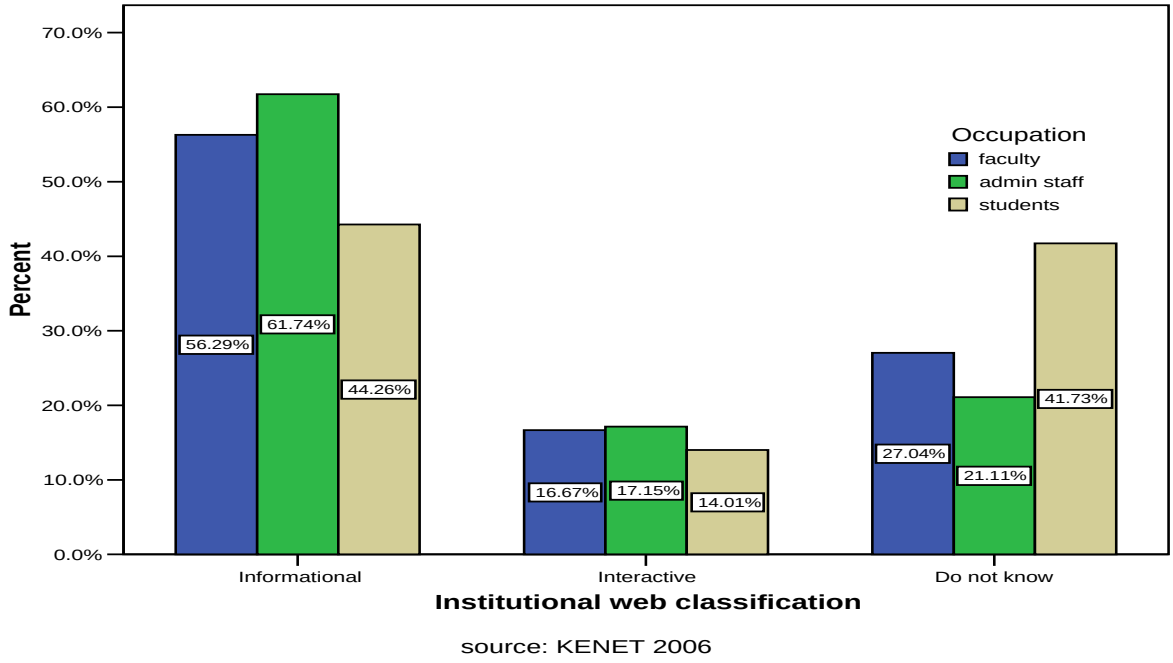


Figure 4.30: Classification of institutional websites by users

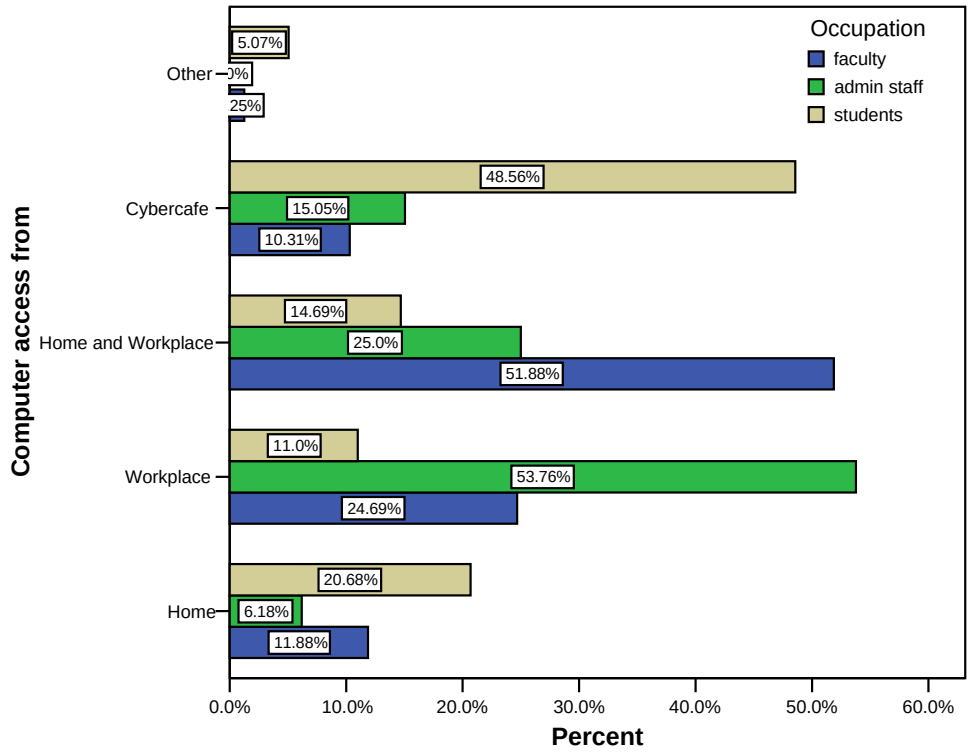
ICTs in everyday life indicator

The key sub-indicators for the ICTs in Everyday life were:

a. Percent of students and faculty with campus access to computers.
b. Percent of students whose main access to computers is the cyber café.
c. Percent of students and faculty using computers for e-mail, word-processing and data analysis.

The overall score of the ICT in everyday life is 2.6, which again suggests limited use of ICT in all of the above sub-indicators. This could be due to the fact that most of the students and faculty do not have access to computers at home or on campus and have to use computers in cyber cafés. For example, Figure 4.31 shows that about 49% of the students' access computers and the

Internet in cyber cafés. Only 11% of the students reported that their primary access to computers was on campus. It is therefore possible that the inconvenience and cost of accessing Internet and computers in cyber cafés could explain the relatively low intensity of use of Internet resources for learning.



source: KENET 2006

Figure 4.31: Location of user access to computers

Location of computers and Internet user access by gender

The researchers analyzed the gender dimension of access to computers as shown Figure 4.32. The figure shows that 48% of female respondents reported to access computers at cyber cafés compared to only 42% of the male students. This was a surprising result considering that cyber cafés are often off-campus. There was also no significant difference between the female and male respondents (students and staff) at other locations of access to computers (i.e., on campus, at home). For example, only 13.7% of the female respondents reported that their primary access to computers was on campus compared to 14% of the male students.

The results in Figure 4.31 and 4.32 are consistent with the low stages of the network access indicators (e.g., Internet availability). It is also clear that both male and female students and even staff are ready to pay for Internet services provided by cyber cafés.

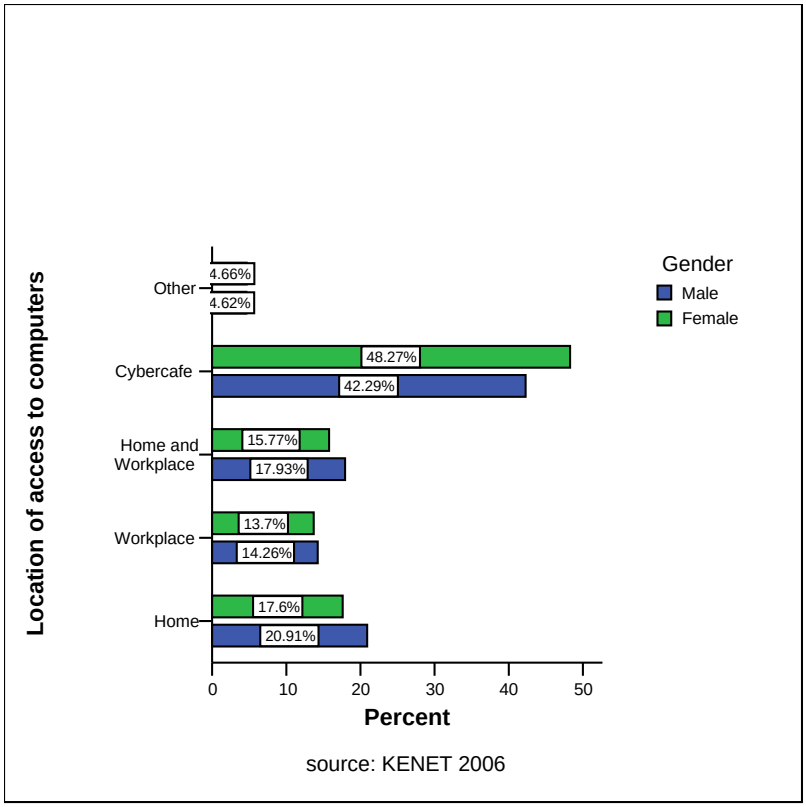


Figure 4.32 Location of user access to computers by gender

Purpose of using computers

Table 4.1 shows the purposes of using computers by the academic community. About 68% of respondents use computers primarily for Internet and e-mail. About 46% are also using the computers for word-processing and 29% for data analysis. Again, there was no significant difference in the way male and female respondents used computers. Stage 4 in this sub-indicator required that 75% of users used computers for word-processing to prepare teaching materials or for assignments (i.e., learning or teaching related purposes).

Table 4.1 Purpose for using the computer

Purpose for computer use	% responses
email/internet	68.1
Word processing	46.6
Entertainment	46.0
Data analysis	29.5
Other purposes	2.7

Mobile Internet usage faculty and staff

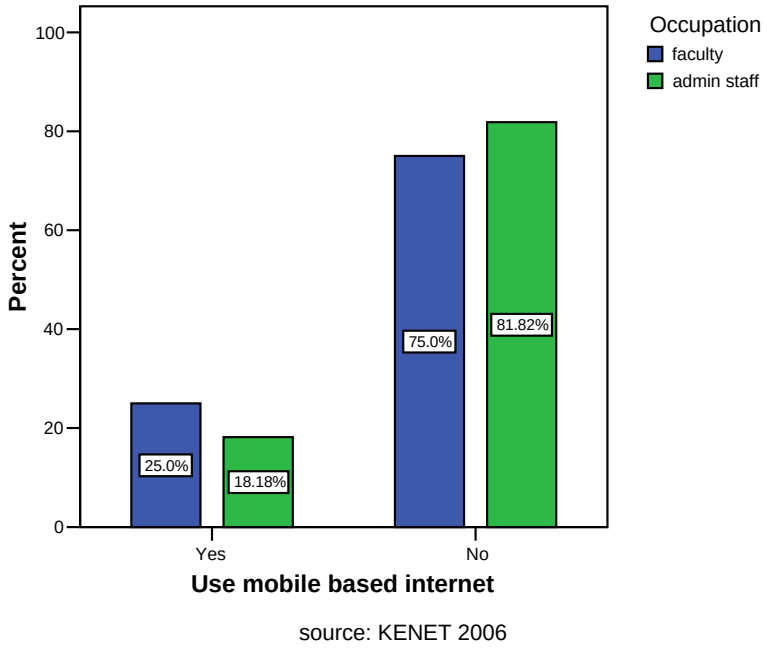
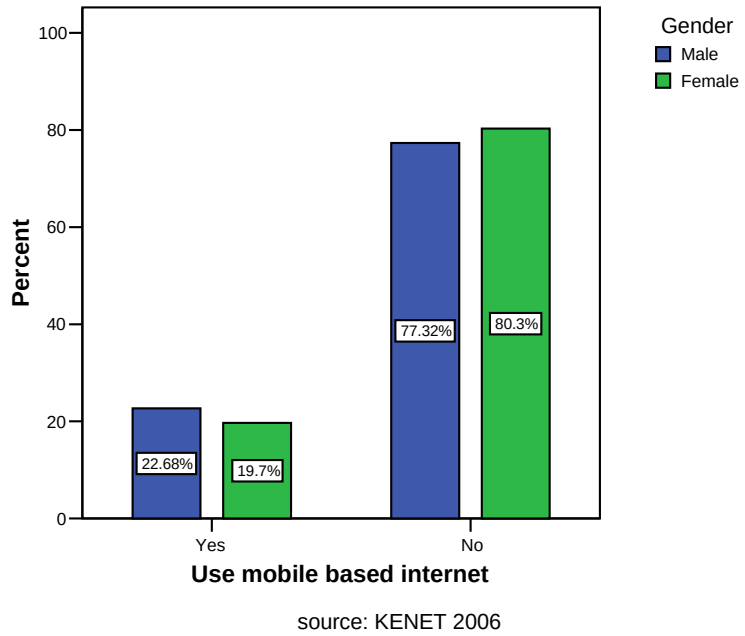


Figure 4.33: Mobile Internet usage by faculty and staff

The results of the survey show that over 97% of the students, faculty, and staff reported to have access to mobile phones. This means that in the future this could be the dominant ICT device for accessing on-line resources. Figure 4.33 indicates that 25% of the faculty members were already using mobile Internet services that were introduced in Kenya in 2005. The results of the analysis of the mobile Internet usage by gender for both staff and faculty are shown in Figure 4.34. The results show that 20% of the female faculty and staff are already using Mobile Internet services compared to 22% of the male respondents. There was therefore no significant difference in the use of mobile services by staff in the HE community. Data for mobile Internet usage by students was not collected in this research.

The mobile Internet could therefore soon be the dominant off-campus access method to the Internet especially since the mobile teledensity was already above 20% in December 2006 compared to a fixed telephone teledensity of only 1%.



source: KENET 2006

Figure 4.34: Mobile Internet usage by gender of faculty and staff

ICTs in the workplace

The average for this indicator was 3.1, which suggest a relatively high usage of ICTs, especially computers, in the workplace. About 68% of faculty have access to computers in their offices compared to about 70% of non-teaching staff have access to computers at work. This is very near stage 4 that requires that 75% of users have access to computers at work. This shows that higher education institutions have been investing in computers for staff and faculty.

However, data shows that the access and usage of computers in the institutions is not uniform for all departments in the university. For example, Table 4.2 shows that only 50% of faculty members in engineering departments have access to Internet from their office computers. A surprising result was that 53% of faculty members in education departments do not have access to Internet from an office computer while over 79% of faculty members in humanities and social sciences departments have access to Internet from their office computers or from their workplace. The results in Table 4.2 also show that only about 50% of faculty in engineering degree programs access the Internet from their offices. The low usage of computers by the faculty members in education would especially have a large impact on ICT diffusion in schools in Kenya. It was not possible to identify the reasons for the differences and this is an area that requires further investigation in future research.

Table 4.2 Faculty Academic Departments by internet use from office computers

	Internet from office computer	Total

Academic department	Yes	%	No	%	
Humanities, Social Sciences	42	79.2	11	20.8	53
Languages, Communications, Journalism	7	63.6	4	36.4	11
Computing (IT, IS, Computer Science, Computer Engineering)	28	75.7	9	24.3	37
Engineering (Electrical, Mechanical, Civil)	8	50	8	50	16
Biological Science, Physical Sciences	15	83.3	3	16.7	18
Education	14	46.7	16	53.3	30
Medical Sciences	6	54.5	5	45.5	11
Other	19	73.1	7	26.9	26
Total	139	68.8	63	31.2	202

The results also show that only about 30% of faculty respondents are staying on-line for up to one hour per day. Stage 4 requires that 50% of faculty spend more than one hour on-line per day researching, reading, or communicating.

Locally relevant content indicator

Some of the key sub-indicators used for staging the locally relevant content include:

a. Percent of students and faculty visiting 1-2 local websites
b. Percent of students and faculty visiting local Web portals with Kenyan information
a. Percent of students looking for local news and entertainment
b. Percent of students looking for academic information from local websites

The overall score of 3.0 for this indicator suggests that students and faculty are looking for local content for news and entertainment and for academic information. This is despite the fact that over 95% have Web-based e-mail hosted outside Kenya (e.g., Yahoo, Google mail, Hotmail etc.) and only 4% are using institutional e-mail addresses.

Percent of students and faculty visiting local websites sub-indicator

Figure 4.35 shows the percent of students, faculty, and staff visiting 1-2 local websites. About 26% of the student respondents reported that they do not visit any local websites while 48% of the student respondents reported that they regularly visit 1-2 local websites (i.e., contain local information). About 48% of faculty respondents reported that they visit 1-2 local websites and only 16.5% reported that they do not visit any local websites. Stage 4 for these sub-indicators required that 75% of students or faculty visit at least 1-2 websites (i.e., 25% or less do not visit any local websites). This means that students, faculty, and staff are all in stage 4 in our framework.

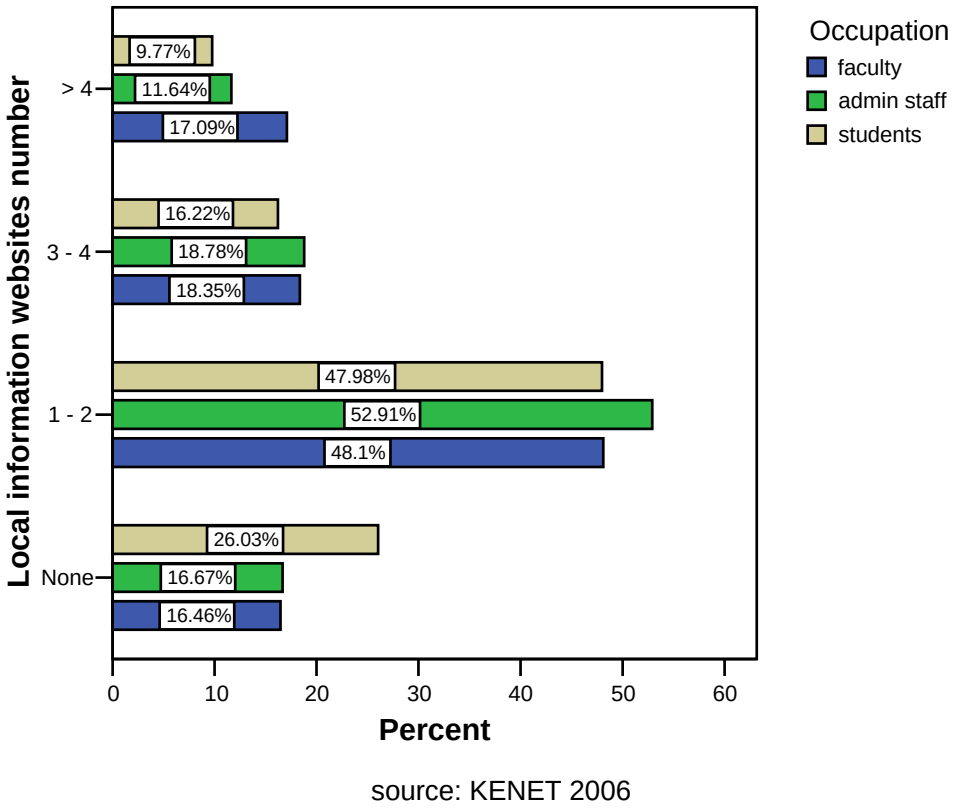


Figure 4.35: Local websites visited by the users

Percent of respondents visiting local websites by gender

Figure 4.36 shows that 30% of the female respondents did not visit any local websites compared to 21% of the male respondents. This means that female respondents would be in stage 3 in this sub-indicator while male respondents would be in stage 4. The results also show that only 7% of female respondents visited more than four local websites compared to 12% of the male students. However, an equal proportion of female and male respondents visited one local website. These results suggest that male students are more intense users of local Internet resources.

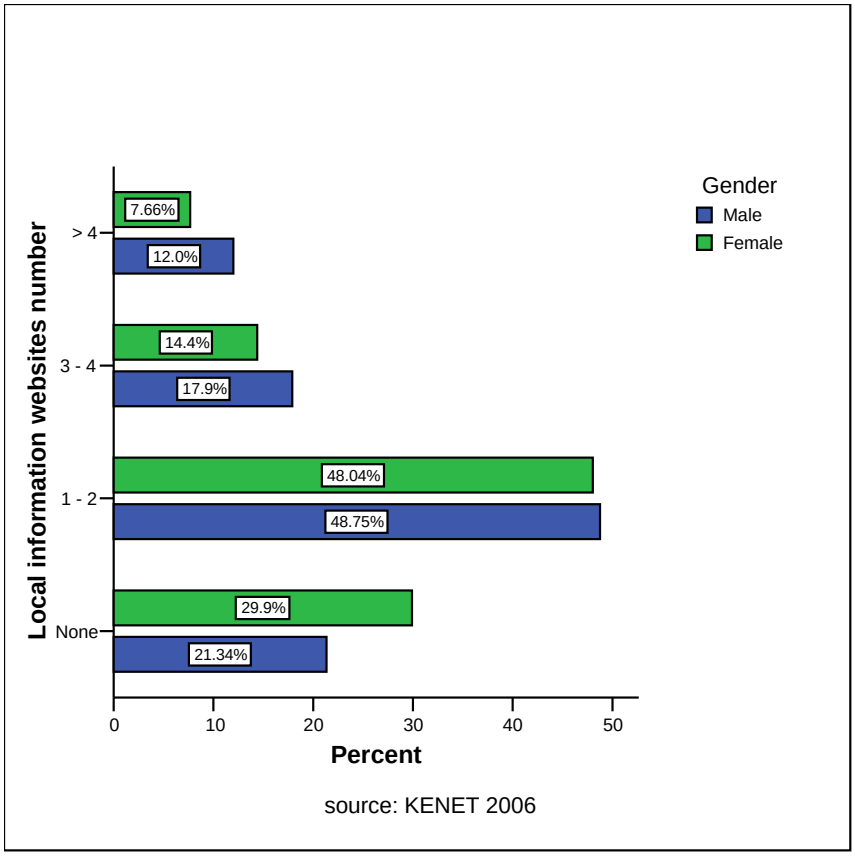


Figure 4.36: Local Websites visited by users by gender

4.4.3. Networked society average stages of institutions

The average stage of the networked society for each of the institutions surveyed was calculated in order to estimate the ICT readiness of the higher education community (students, staff, and faculty) at different institutions.

Average networked society readiness of universities

Figure 4.37 shows the averages for the universities. Only seven of the 17 universities have an average score of 3.0 or better and these are all private universities that are relatively small compared to the public universities. However, all of the public universities are in stage 2.5 or better, an illustration that with increased access, the community is ready to use ICT for learning, research, and workplace and for academic work and

management.

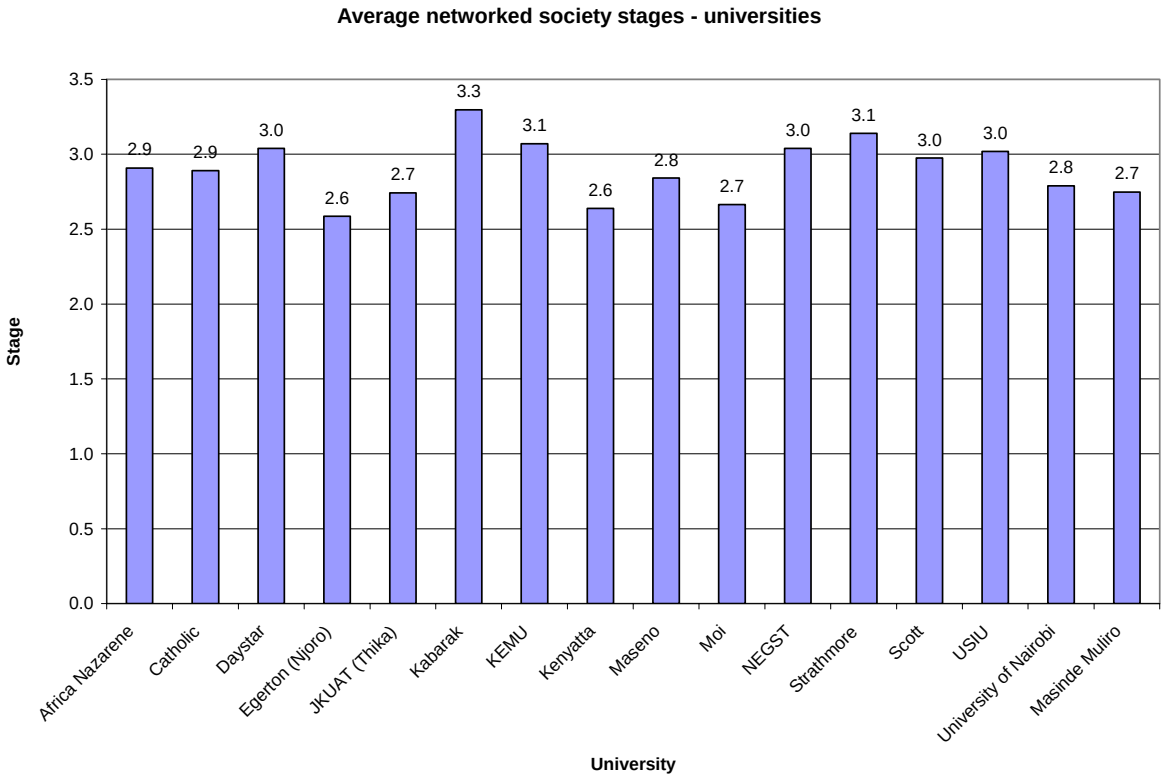


Figure 4.37: Average networked society stages

It is also possible to show the stages for each of the four indicators for all the universities. For example, Figure 4.38 shows the stages for Strathmore University, one of the private universities with an average score better than 3.0 in the category of networked society. The figure shows that Strathmore University is an especially intense user of networked applications (e-mail and Intranet) at the workplace with a score of 3.8. However, the staging for ICT in everyday life indicator is 2.6, which reflects limited access to ICT and the Internet outside the campus.

In comparison, Figure 4.39 shows the staging of the different indicators for Egerton University, which has an average score of just above 2.5. ICT in the workplace indicator is in stage 2.4 probably because fewer applications are automated and the lack of a sufficient number of ICT equipment, especially PCs. This correlates well with the staging for network access category of indicators for Egerton University. Egerton University is in stage 2.4 in the people and organizations online indicator. This means that the institution has not created interactive websites or even provided e-mail to the community. There is similarity in the score for locally relevant content and ICTs in everyday life indicators.

Although the scores in some of the indicators in this category partially depend on the national information infrastructure, most of the sub-indicators could be improved by the institutions. Overall, the universities reveal a reasonably good readiness of their communities to participate in an e-society.

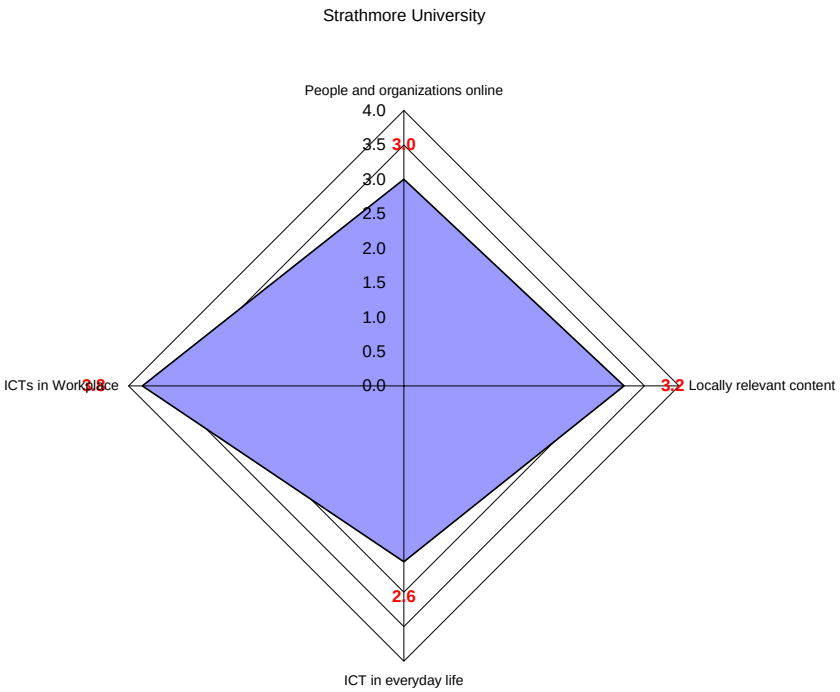


Figure 4.38 – Strathmore University stages

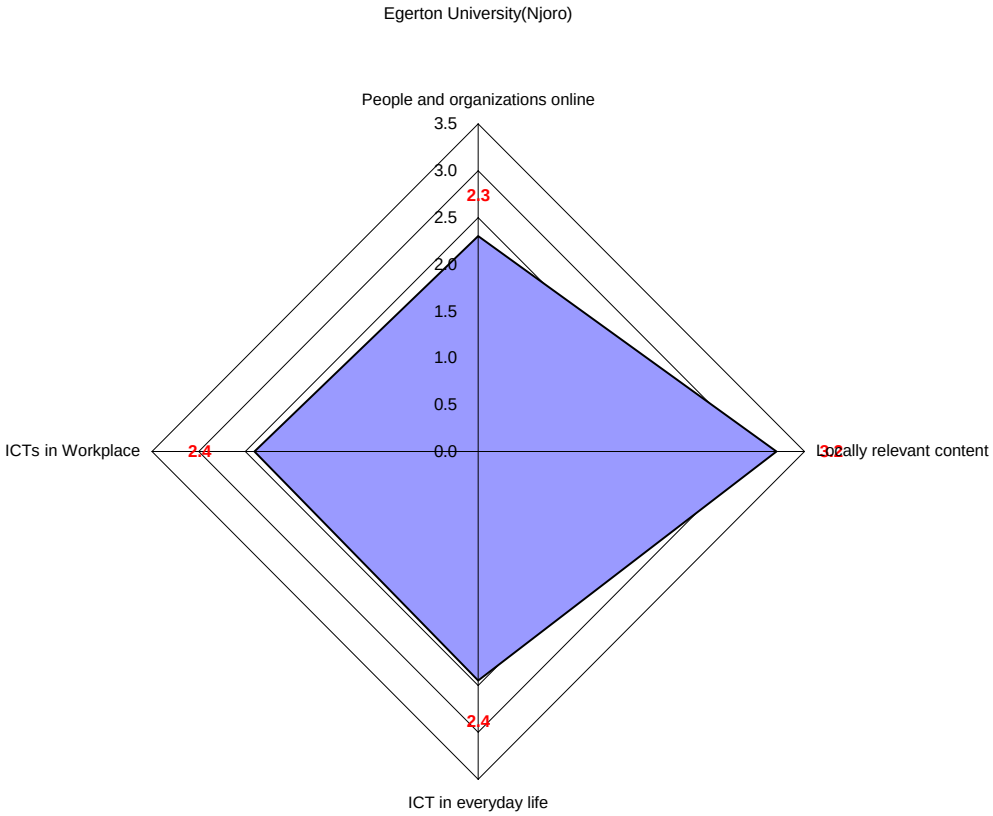


Figure 4.39: Networked society indicator staging for Egerton University

Networked society readiness of tertiary institutions

Tertiary institutions, in general, do not perform as well as the universities in the networked society category of indicators as Figure 4.40 shows. Only two of the eight institutions (Kenya Institute of Management and Loreto College) have a score of 3.0 or better but all the institutions have a score of 2.4 or better. This correlates well with the stages of the network access indicators presented in Section 4.1 of this report.

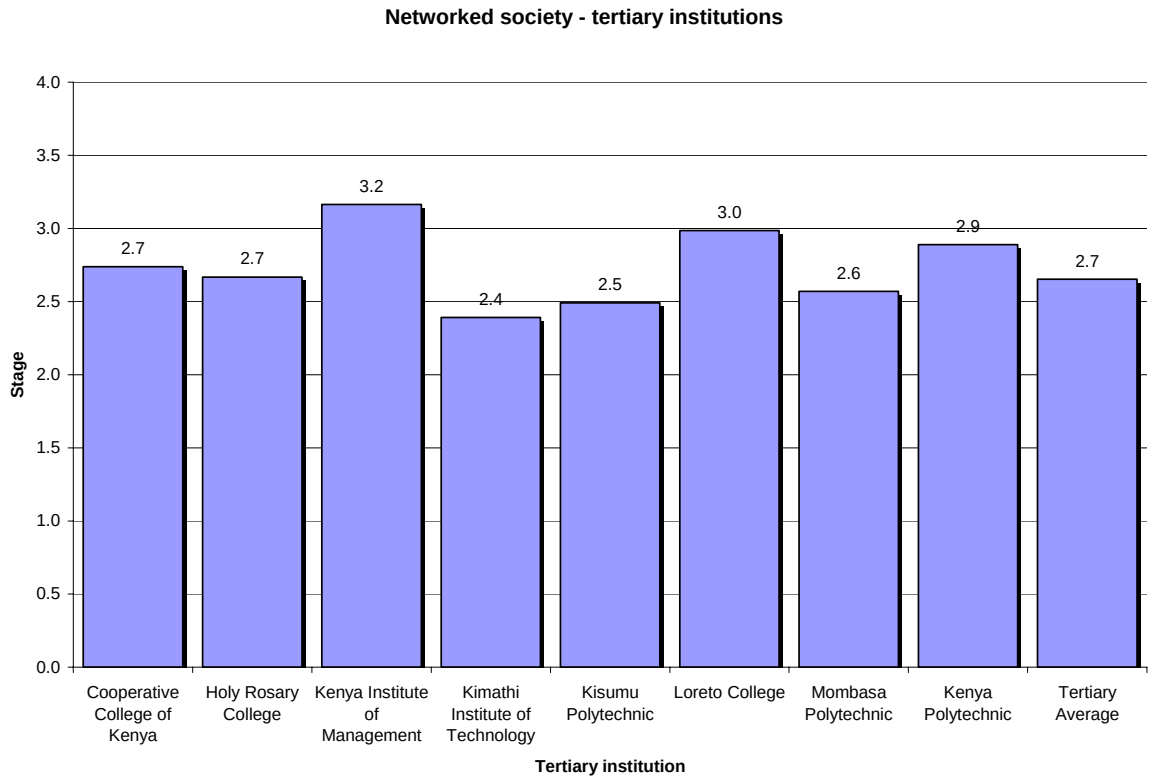


Figure 4.40: Networked society average stages for tertiary institutions

Figure 4.41 illustrates the stages of the different networked society indicators for Mombasa Polytechnic, which has a student enrolment of 4,938 and is also located outside Nairobi. The stage for people and organization online indicator is low at only 1.3. This means that there is no interactive institutional website or an operational e-mail system. This is an organizational issue rather than a problem of the national information infrastructure. Again we note that these low stages are consistent with the low quality of the campus network at the Mombasa Polytechnic.

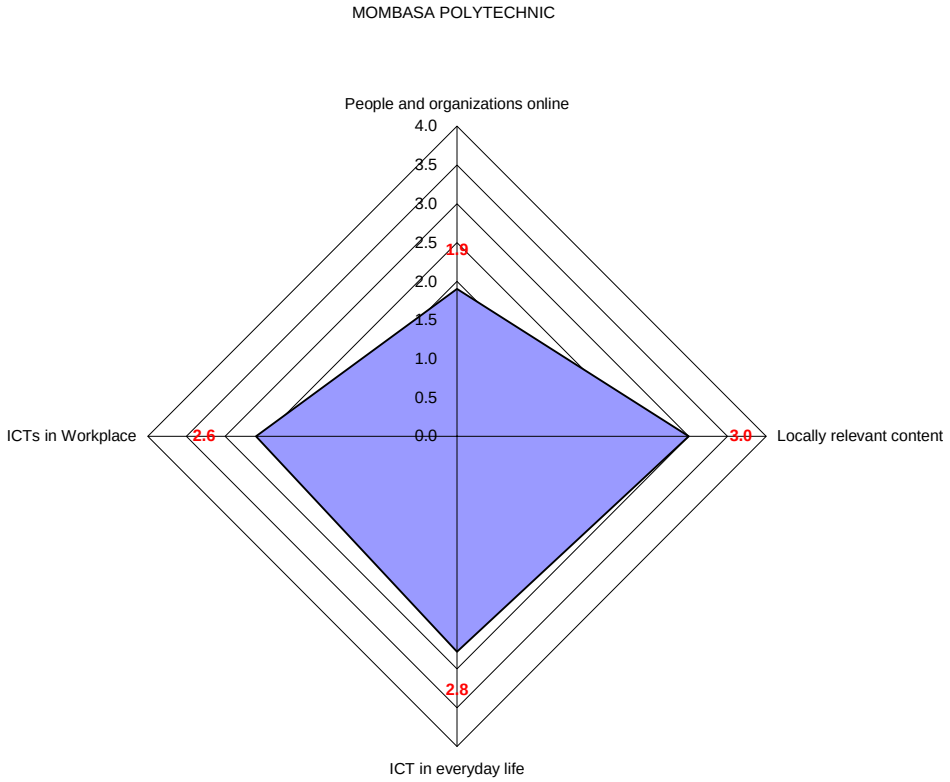


Figure 4.41 Networked society indicator stages for Mombasa Polytechnic

In conclusion, we observe that the higher education community has a relatively high degree of ICT readiness. The institutional ICT strategic plans should therefore focus on improving the stages for ICTs in the workplace and on people and organization online indicators. This would require automation of internal processes, setting up operational Intranets, and developing interactive and transactional institutional websites. These are all internal e-readiness indicators and can be improved even when the national infrastructure is not well developed.

The ICT in everyday life indicator could also be improved if the networked campus indicators and network access indicators improve to at least stage 3. Currently, locally relevant content is provided by newspapers because of the limited availability of locally relevant e-learning content. Stage 4 in this indicator could therefore be achieved indirectly if the average in networked learning stage was 3.0 or better. The development of the national information infrastructure could also improve the performance in this indicator.

4.5. INSTITUTIONAL ICT POLICY AND STRATEGY STAGING AND RESULTS

4.5.1. Overall staging of institutional policy and strategy indicators

The Institutional ICT Policy and Strategy category of indicators is composed of three indicators, namely:

a. ICT strategy
b. ICT financing
c. ICT human capacity

ICT strategy was measured using several sub-indicators that included the alignment of ICT strategy to the corporate strategy, the extent of ICT strategy implementation, and the reporting levels of the Head of ICT. ICT financing was measured using the sub-indicator of percent of annual institutional expenditure used to purchase Internet bandwidth. Although a sub-indicator that measures the percent of budget allocated to ICT was specified as described in Chapter 2, most of the institutions could not provide the required data to calculate the percentage. The ICT human capacity indicator was measured using several sub-indicators that included the business and technical experience of the Head of ICT, the frequency of upgrading the skills of the ICT staff, and the retention of ICT staff.

The data for staging the three indicators was obtained from hard facts questionnaires. Figure 4.42 shows the overall staging for the three indicators for all the institutions surveyed. The figure shows low scores of less than 2.0 in ICT strategy and ICT financing.

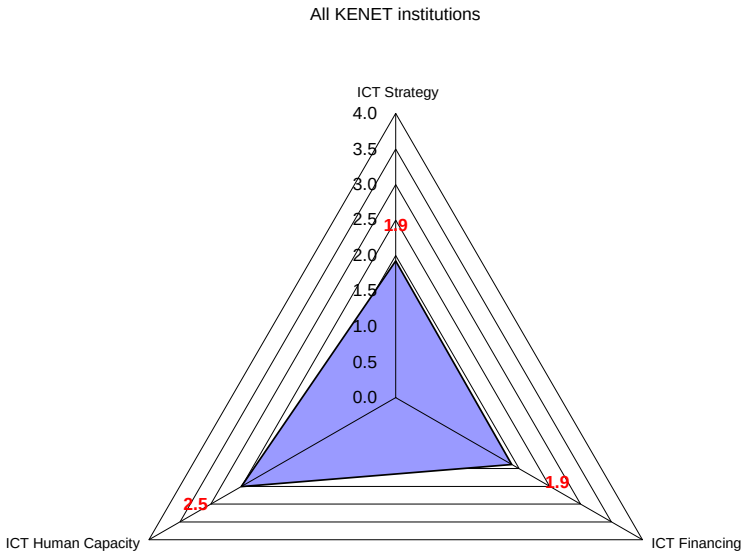


Figure 4.42: Overall staging of the institutional policy indicators

ICT strategy

The overall stage for ICT strategy is 1.9 for all institutions and 2.1 for universities alone. This suggests that most of institutions have not developed detailed ICT strategic plans and the extent of implementation of ICT strategy is low. For example, only 40% of the institutions reported to have a 75 to 100% alignment of their ICT strategies to the corporate strategic plans as shown in Figure 4.43. The percent of institutions that reported that at least 50% of their ICT strategies are aligned to the corporate plans was 65%. This means that there are many ICT projects and activities that do not support the core mission of the institutions, such as, improved learning outcomes of the graduates or management efficiency. This study, however, did not analyze the institutional ICT and corporate strategic plans. It is possible that a higher percentage of ICT strategies are out of alignment with the corporate strategies than were reported by the heads of ICT who completed the questionnaires. This is a critical issue that requires further detailed study by the institutions.

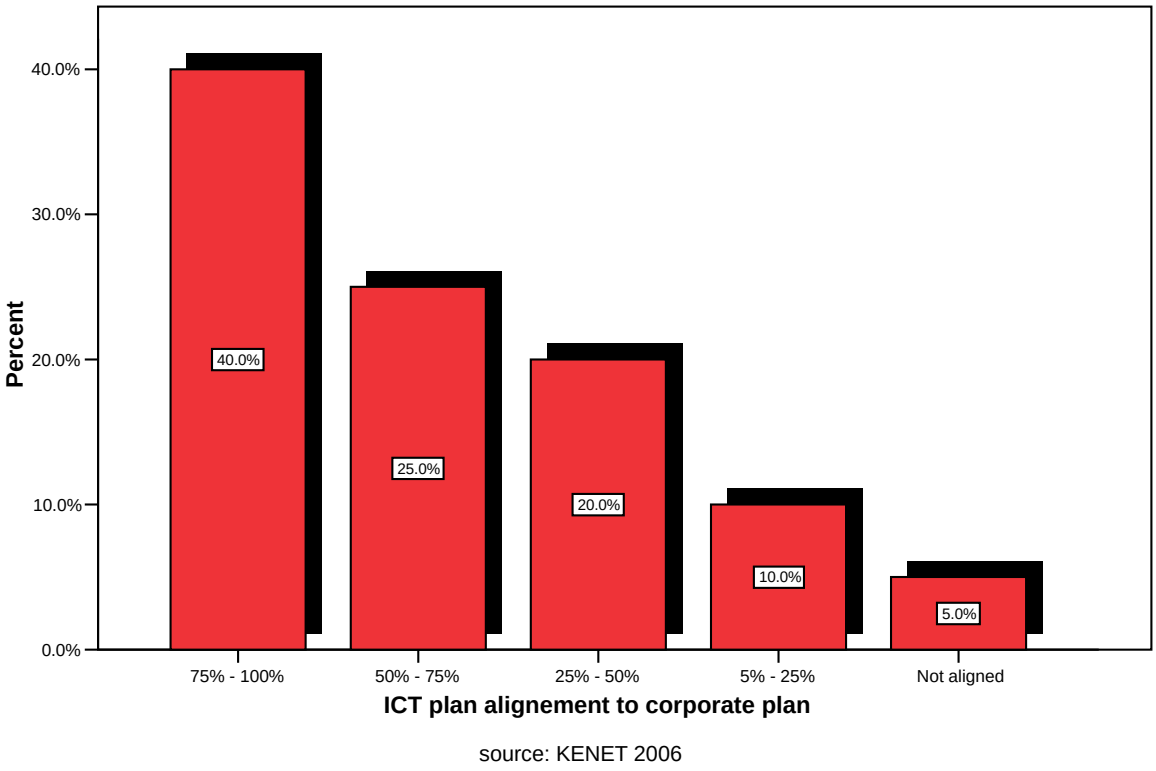


Figure 4.43: Alignment of ICT strategy to corporate strategic plans

One of the strategic sub-indicators is the percentage of ICT strategy implementation. The results show that on average, the KENET member institutions are below stage 2 (stage 1.9). In our methodological framework, this means that on average every institution has implemented less than 50% of its ICT strategies. This represents a major challenge if ICT is to play a strategic role in the institutions.

ICT financing

This indicator is in stage 1.9 for all the institutions and at 2.0 for universities alone. Since the target should be stage 4.0, this is an average performance. The results show that most of the

large universities are allocating less than 0.5 % of their institutional budgets for purchase of Internet bandwidth. On average, stage 1.9 shows an Internet bandwidth budget allocation of less that 1% for all the institutions. Since Internet bandwidth is expensive at $2,330 per Mb/s per month, stage 4 would demand that institutions allocate up to 2% of their institutional budgets for purchasing Internet bandwidth. This means that to get to stage 4, most institutions will have to more than double their institutional budgets for Internet bandwidth. We believe that all of the institutions could sustain a 2% operational budget allocation for Internet if they considered ICT important for learning. This could be achieved, for example, by reducing the fixed and mobile telephone bills of the institutions.

Similarly, most of the institutions are spending less than Ksh 1 million per 1000 students on Internet bandwidth per month (i.e., about 512 Kb/s of downlink bandwidth per 1,000 students). Again at the Kenyan high bandwidth prices, stage 4 would require institutions to be spending about Ksh 8 million per 1000 students (or at least 4 Mb/s per 1,000 students). We note that some of the large universities spend a higher percentage of their campus budgets on telephone bills (mobile and fixed) than on Internet bandwidth. A switch in allocation is necessary since Internet bandwidth is more for supporting academic programs and student learning while telephones only support the administration.

ICT human capacity

Figure 4.44 shows that only in 11% of the institutions do the heads of ICT report to the Chief Executive Officer (CEO) of the institutions (e.g., the vice chancellor). This means that the strategic profile of ICT is still low at most of the institutions. About 60% of the institutions reported that ICT is only a section in a department. In addition, only 18% of the institutions reported that the champion for the ICT strategy is the CEO as Figure 4.45 shows. In general, institutions where the CEO is the champion are on average at a higher stage than those where the champion was at a lower level in institutional organizational structures. For example, the ICT champion at USIU is the vice chancellor while the champion at Kenyatta University (KU) was at a lower level. The results show that USIU is in stage 2.8 in the institutional ICT policy and strategy while KU is at stage 1.3 as results presented later in this section show. A further example is in network access category of indicators where USIU is in stage 3 while KU is below stage 2. This difference in performance is repeated for all other categories of indicators as well as for the strategic sub-indicators.

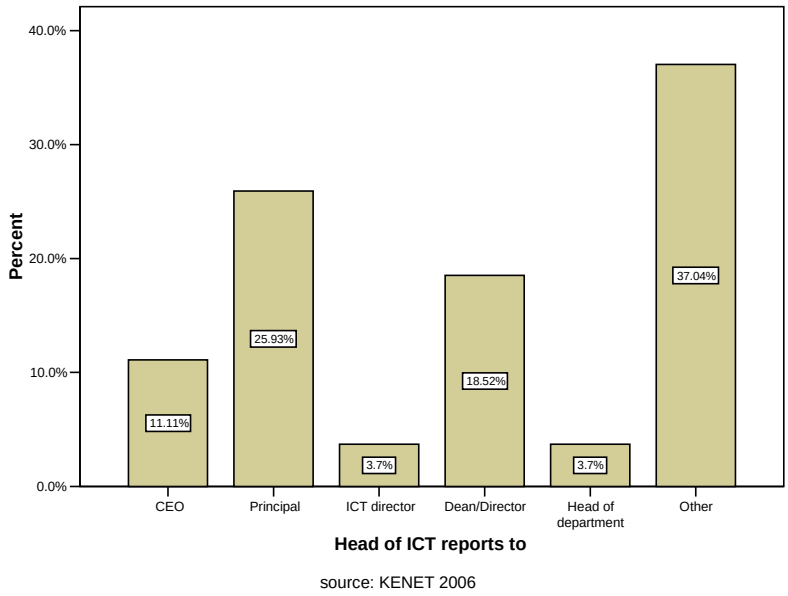


Figure 4.44: Reporting level of Head of ICT

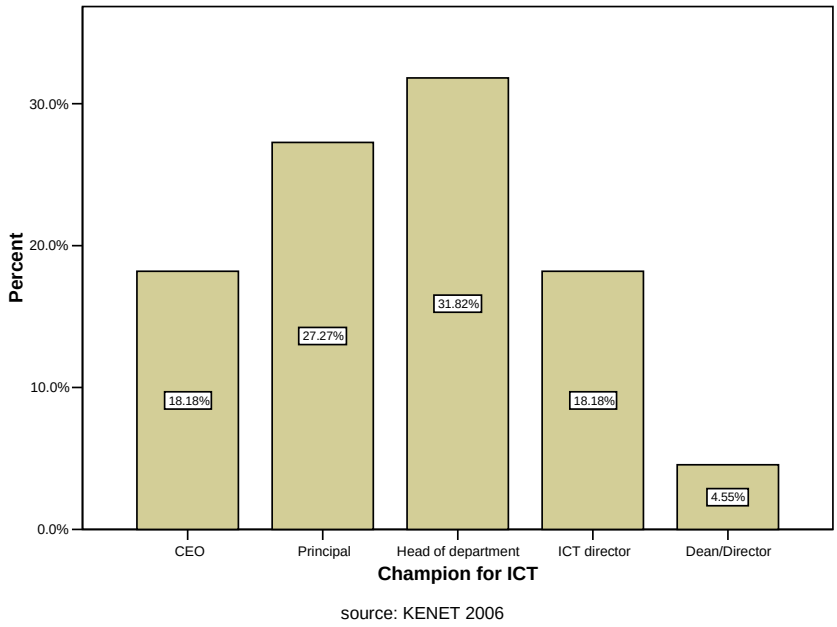


Figure 4.45: Champion of ICT in the institutions

One of the relevant strategic sub-indicators is the percentage of professional ICT staff members who have worked for more than three years in a particular institution, as a measure of retention for ICT staff. Results show that on average all institutions are just above stage 2.5 (stage 2.58). From our methodological framework, this means that the institutions on average only retain just more than 25% of their professional staff over a three year period. This confirms that most institutions cannot retain their professional ICT staff, which is a serious challenge. Higher education institutions then need to create mechanisms for retention of professional ICT staff.

4.5.2. Institutional category of indicators average stages

The average stage for all the indicators in the institutional policy category was calculated for each institution surveyed and the results are presented in Figures 4.46 and Figure 4.47 for universities and tertiary institutions respectively. Only six of the 17 universities have an average of stage 3 in this category. This is an indication that these six institutions have began to take ICT as a strategic resource, raising its profile, increasing its funding and have qualified ICT staff with the right mix of skills. The University of Nairobi was the only public university that was above stage 2.5 (stage 2.7) in this category. It therefore appears that most of the private universities already consider ICT as a strategic resource.

Tertiary institutions surveyed were in stage 2.0 and below except for Loreto College as shown in Figure 4.47. Loreto College is a small private ICT college. The Kenya Polytechnic, a public institution, with an enrollment of about 10,000 students is in stage 1.7. This is despite the fact that the Kenya Polytechnic offers many engineering and ICT courses that require high usage of ICT. We note that all of the stages of all the other indicators depend on improvement in this category of indicators.

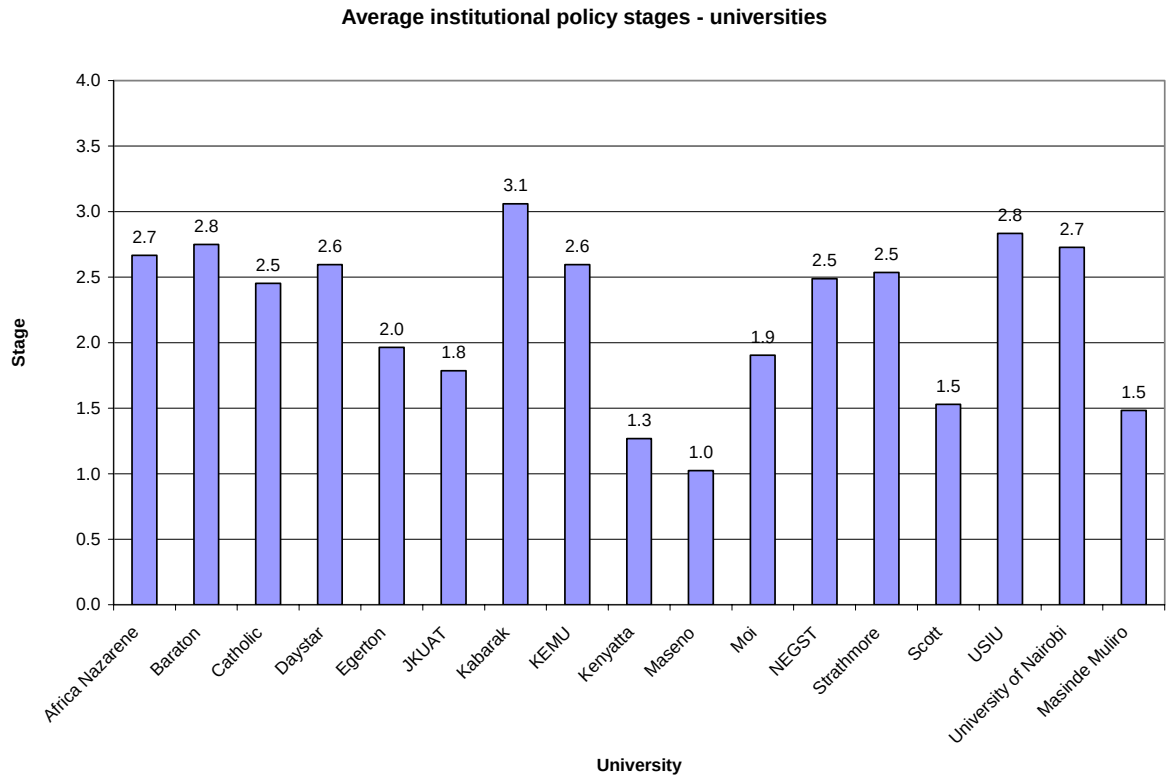


Figure 4.46: Institutional policy average stages for universities

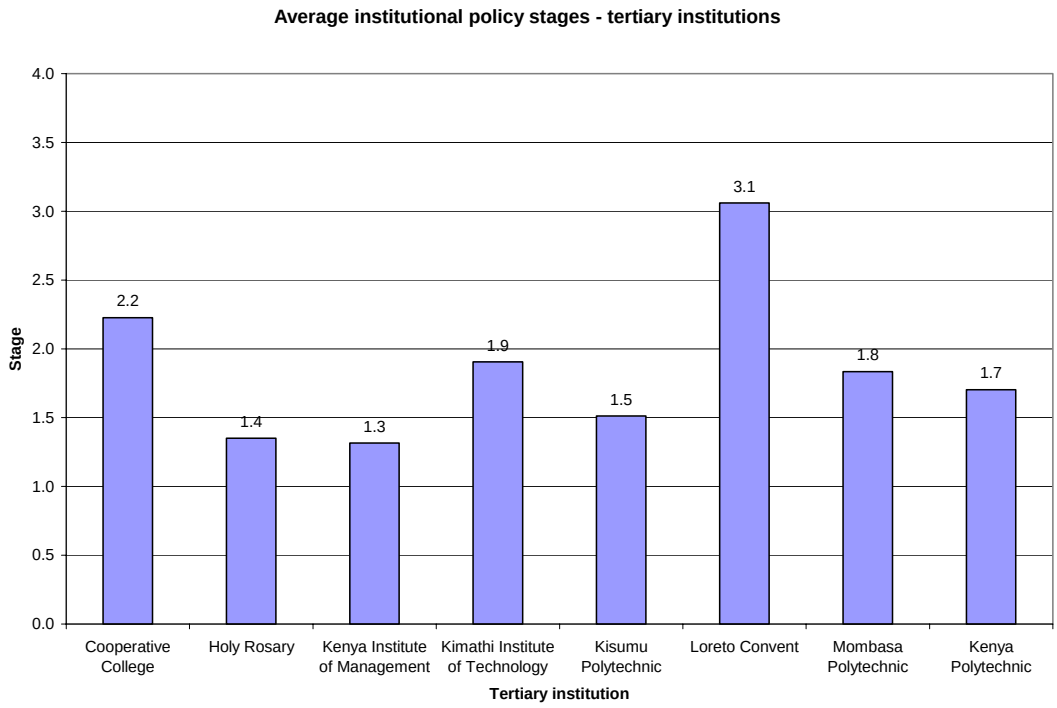


Figure 4.47: Institutional policy average stages for tertiary institutions

Example institutional indicator stages

Figure 4.48 shows the stages for the individual indicators for University of Nairobi (UoN). Although the university is in stage 3.8 in ICT human capacity indicator and stage 3.4 in ICT strategy indicator, it is in stage 1 in ICT financing. That means ICT has been recognized as being strategic resource for teaching, learning, and management with the head of ICT reporting directly to the vice chancellor. However, it is still not allocating sufficient financial resources for purchase of adequate Internet bandwidth for the large number of students. In general, private universities allocate larger percentages of their budgets for Internet bandwidth (e.g., USIU is in stage 2 in ICT financing).

Maseno University (MU) is another public university located outside Nairobi in the western Kenya city of Kisumu. It has an enrollment of less than 10,000 students compared to the over 30,000 enrollment at the University of Nairobi. The results in Figure 4.46 show that Maseno University is in stage 1 which suggests that it has not yet recognized ICT as a strategic resource. Figure 4.49 shows the stages for the 3 indicators in this category for Maseno University. It shows that it is in stage 1 in ICT Human Capacity and stage 1.6 in ICT strategy. The head of ICT is the head of an academic department and does not report to the vice chancellor. The ICT strategy is also not aligned to the corporate strategy. We noted that both UoN and MU are supported equally by KENET and the different stages are due to internal institutional differences.

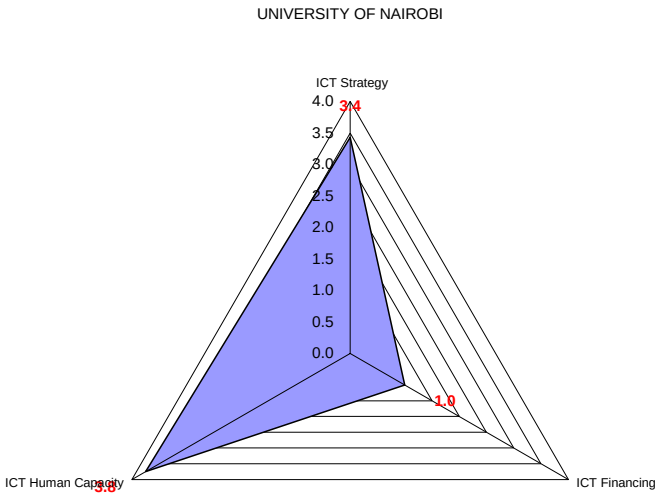


Figure 4.48: Institutional policy indicator stages for University of Nairobi

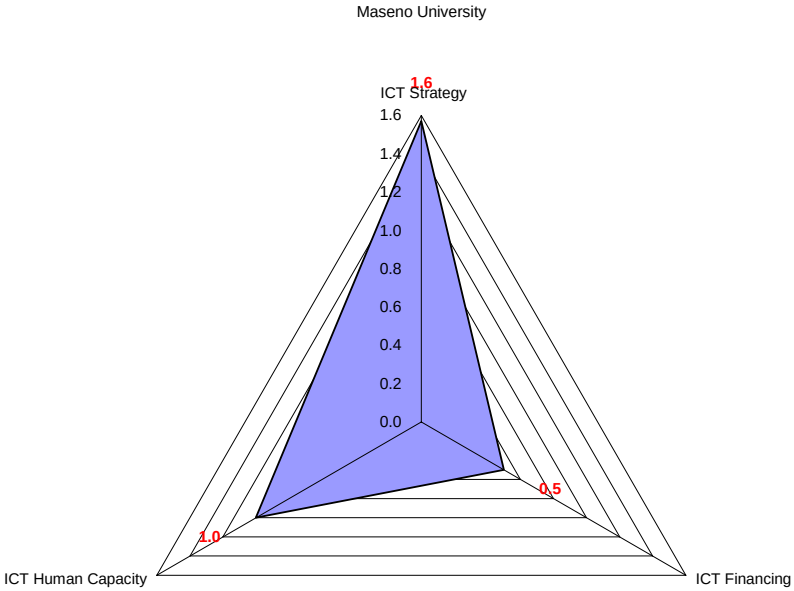


Figure 4.49: Institutional policy indicator stages for Maseno University

Tertiary institutions are, on average, in stages below that for universities in all indicators in this category. For example, Kenya Polytechnic achieved an average of 1.7 in this category (see Figure 4.47). This stage is higher than that of some of the public universities (e.g., Kenyatta University at 1.3 and Maseno University at 1.0 as shown in Figure 4.46). Figure 4.50 shows the staging for Kenya Polytechnic for the 3 indicators in this category. It was in stage 1.0 in ICT financing

which is means that it allocating less than 0.5% of operational budget to purchase of Internet bandwidth. Stage 1.9 in ICT strategy means that the ICT strategy of Kenya Polytechnic is not aligned to the corporate strategy.

In general, an institution which is below stage 2 in all indicators of the institutional ICT policy and strategy category means that the ICT function in these institutions has a very low profile (e.g. in terms of its stature and reporting level), Internet access budgets are a very small proportion of institutional budgets and that ICT professional staff are generally of low academic and technical quality and are retained for relatively shorter periods. These institutions have to make a fundamental shift to make ICT a strategic resource, raise its profile, resource it appropriately and employ staff with the appropriate mix of skills and experience.

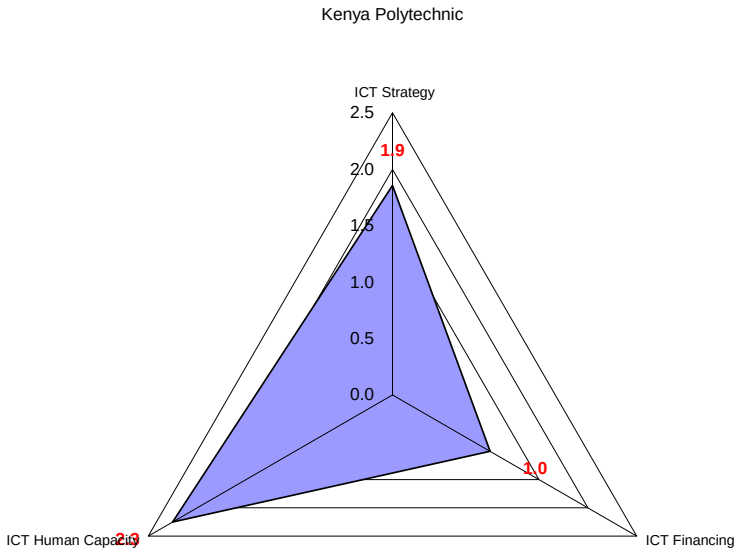


Figure 4.50: Institutional policy indicator stages for the Kenya Polytechnic

5. SUMMARY OF FINDINGS AND CONCLUSIONS

5.1 SURVEY METHODOLOGY, DATA COLLECTION AND DATA ANALYSIS

Survey methodology

The e-readiness assessment of higher education institutions in Kenya was conducted using a diagnostic tool derived from a similar one originally developed by the Center for International Development (CID) at Harvard University. The CID assessment tool, as it often called, stages 19 indicators grouped into five categories of network access, networked learning, networked society, networked economy, and network policy. Staging involves a combination of hard facts and subjective assessment on a scale of 1 to 4, where 1 means not ready to participate in the networked world and 4 means fully prepared to participate in the network work. The CID tool was specifically developed for developing countries. It was later to become the starting point for the widely used Networked Readiness Index (NRI) that is published annually by the World Economic Forum (http://www.weforum.org) and INSEAD business school for both developing and developed countries.

The survey modified the CID tool by eliminating indicators that were not relevant and developed quantitatively measurable sub-indicators that could be staged on the same scale of 1 to 4. The modified tool contains 17 indicators and over 60 sub-indicators. The survey introduced two new categories of networked campus (measures ICT power supply, ICT security, and ICT staff indicators) and an institutional policy and strategy (ICT strategy, ICT financing, ICT human capacity). The survey developed new quantitative criteria for staging. For example, one of the strategic sub-indicators defined in the survey is the number of networked computers per 100 students. The survey defined stage 1 to less than one PC per 100 students while stage 4 was 20 PCs per 100 students. The stages therefore represent a value judgment based on the experience of researchers in the Kenyan higher education ICT environment, situational data collected from higher education institutions and trends in learning environments at these institutions in middle-income countries. These criteria were set as minimalist standards for increasing the ICT readiness and usage in the different institutions. It is therefore possible for different institutions to set higher standards in their corporate and ICT strategic plans.

Data collection

This survey used a combination of hard facts questionnaires completed by the heads of ICT and a perceptions questionnaire to survey a representative sample of students, faculty, and administrative staff in each institution. Sample sizes were therefore chosen to be statistically significant for each institution. Data for measuring over 60 ICT sub-indicators was collected. The survey identified 15 strategic sub-indicators that could be included in the corporate and ICT strategic plans as performance indicators that would be monitored on an annual basis.

Data was collected from 25 KENET member institutions. Since the initial focus of this survey is the use of ICT for teaching and learning (e-learning), the non-teaching member institutions were not assessed (e.g., research institutions or Commission for Higher Education). These institutions will be assessed in the future. The institutions surveyed included seven public universities, 10 private universities and eight non-degree granting tertiary institutions with a total enrollment of 170,000 students. This was a much higher enrollment figure than the tertiary enrollment in the Kenya Economic Survey 2006. For example, the Economic Survey 2006 shows that the

university enrolment was 90,000 while the survey found it was 130,000. This is despite the fact that the enrollment data did not include data from private campuses affiliated to public universities.

The data was collected by six research assistants drawn from a mixture of public and private universities (USIU, Strathmore, JKUAT, and University of Nairobi). The research assistants were the enumerators for the hard facts and trained students as enumerators for each of the institutions. Thus, a participatory data collection method was used. The student sample at each institution was representative of the gender diversity and year of study.

All of the data collected using both the hard facts and perceptions questionnaires was entered into an on-line database hosted at the KENET website (http://eready.kenet.or.ke). It can be accessed by authorized members of the institutions or other analysts. The Web-based hard facts database could be updated on-line by the institutions. However, there is a need to conduct annual field surveys of the HE community to measure progress in ICT usage for learning and management.

The data was analyzed using the staging framework developed by the research study. The framework provides a method of calculating all the sub-indicators. The calculations have all been automated. However, the researchers converted the sub-indicator calculations into the corresponding stages using the staging framework. The stage of each indicator was then calculated by a simple average of the corresponding group of sub-indicators. The stages of each of the 17 indicators have been derived for each of the 25 institutions. Thus, each institution could use the results for its own strategic planning and annual self-assessment. In addition, the average indicator stages for all institutions as well as the universities and tertiary institutions sub-sets were calculated and charted. It is therefore possible to compare and rank the institutions in terms of readiness.

5.2 STAGING RESULTS FOR ALL INSTITUTIONS

This study has analyzed the results for each of the five categories of indicators and for each of the 25 institutions surveyed. The detailed results for each of the institution have not been presented in this report but will be presented to each institution that plans to use the results for strategic planning. This was the recommendation of the heads of institutions stakeholder meeting in March 2007 (Appendix 3 – Attendance list) when the overall results were presented. Figure 5.1 summarizes the results of this study by presenting the average stage for each of the 17 indicators. In the following, we summarize the results for each of the categories of indicators.

5.2.1 Network access

The results show that the higher education institutions scored 2.0 in most of the network access category of indicators. For example, institutions are in stages 1.7 and 1.4 in information infrastructure and Internet availability indicators respectively. This means that institutions do not have adequate number of networked computers for the students and therefore students have very limited access to the Internet. As expected, the network speed and quality indicator is in stage 2, which means that the higher education community, particularly the students, found the Internet slow and unreliable. In fact, 75% of the students reported that they find network speeds and quality better in the neighboring cyber cafés than in the campuses.

5.2.1 Networked campus

The networked campus category of indicators (network environment and e-campus indicators) is closely related to network access category. The results in Figure 5.1 show the institutions are in stages 2.9 and 2.4 for network environment and e-campus respectively. Although most institutions may be ready to start using ICT from the network environment staging, the staging of e-campus that most of the processes are also not automated (e-campus measure the level of automation). Achieving high score in this category of indicators depends almost wholly on internal factors rather than external factors like the cost of bandwidth or state of the national information infrastructure.

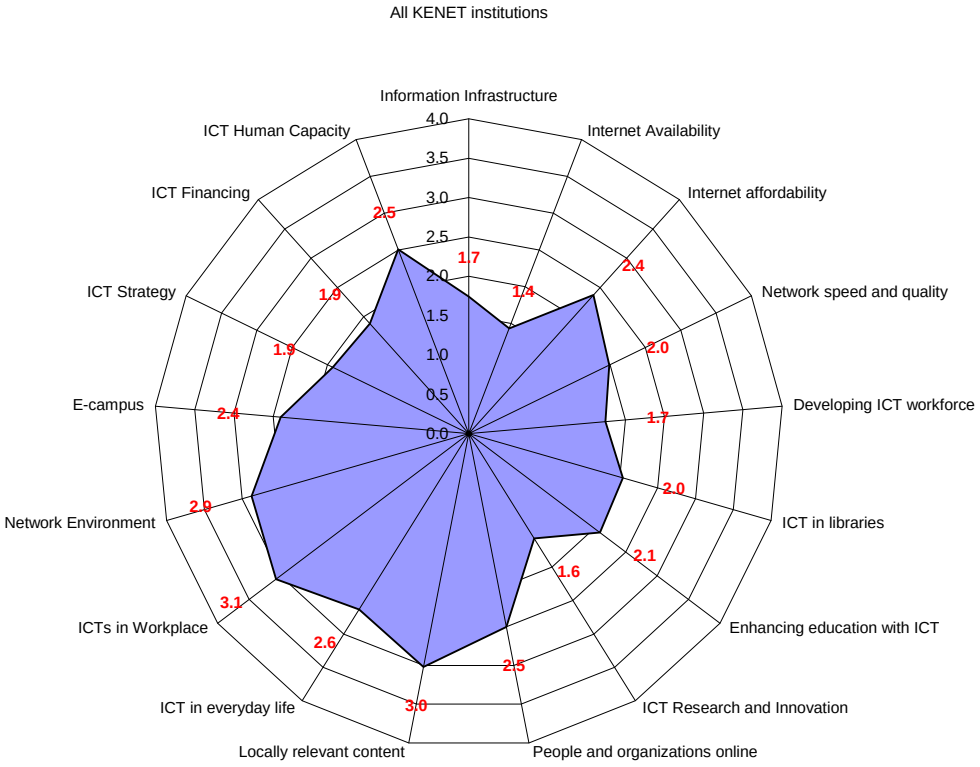


Figure 5.1: Average e-readiness indicator stages for all institutions

5.2.3. Networked society

The higher education community (i.e., students, faculty and staff) exhibits relatively high level of readiness to use ICT as shown by the networked society category of indicators (locally relevant content, people and organizations online, ICTs in everyday life, and ICTs in the workplace).

Each of the indicators is in stage 2.5 and above. The limited availability of ICTs in the institutions is forcing the community to visit cyber cafés and to use international Web-based e-mail (for instance over 95% of the students use Yahoo, Hotmail or Google mail) rather than institutional e-mails accounts (only 3.5%). It also means that the community is using the Internet largely for e-mail rather than for learning and research.

5.2.4 Networked society and gender

This study also conducted a gender analysis of some of the networked society sub-indicators that measure ICT usage and access. These sub-indicators include location of access to computers and Internet, the purpose of using computers, frequency of access to websites, and regular visit to local Web portals. The results show that there is no significant difference in ICT usage by both male and female students and faculty. In fact, a higher percentage of female users access computers, the Internet and ICT at cyber cafés (48%) compared to 42% male users. In terms of regular usage of Internet, male students are marginally more intense users of the Internet. For example, 30% of female respondents do not visit any local websites compared to only 21% of male respondents who do not visit local websites. In any case, the research shows that students in the humanities and languages are more intense of users of Internet than students in engineering, science and medical sciences. Although we did not analyze the gender enrollment in different programs, it is a fact that female students are fewer in engineering and science degree programs. In terms of ICTs in the workplace, the research did not find any difference in the usage and access levels of female and male faculty members and staff.

5.2.5 Institutional policy and strategy

One of the interesting findings is that higher education institutional leadership does not yet consider ICT a strategic priority. For example, Figure 5.1 shows that institutions are in stage 1.9 and below in ICT strategy and ICT financing. Stage 1.0 in ICT financing means that Internet bandwidth costs are less than 0.5% of the institutional operational budgets. Since Internet bandwidth costs in Kenya are very high at US$ 2,330 per Mb/s per month, a budget allocation of less than 0.5% means that institutions are purchasing less than 128 kb/s bandwidth per 1000 students. This is unacceptably low even by standards of some of the private universities in Kenya (e.g. Strathmore University in Nairobi that spends over 2% of its budget on Internet bandwidth). The results also show that the institutions in practice either do not have an ICT strategy aligned to the institutional mission or ICT has a low status. For example, only 10% of the institutions have the head of ICT reporting to the head of the institution and in over 50% of the institutions, the ICT strategy is not aligned to the corporate strategy.

5.2.6 Networked learning

Our results show that there is a correlation between stages of the institutional policy and strategy indicators and the indicators of network access and networked learning. That means that relatively low stages in institutional policy and strategy explains the corresponding low stages in networked learning indicators (i.e. developing ICT workforce, enhancing teaching with learning, ICTs in libraries, and ICT research and innovations). For example, the lack of an effective ICT strategy in institutions with an in-house e-learning platform (e.g. Moodle, WebCT, Blackboard) means that there was no motivation to monitor the percentage of courses that were using the platform or to develop internal quality assurance processes for e-learning. Consequently, e-learning platforms were being used as network folders to post the lecture slides.

However, the results show that some of the universities are in stage 3.0 and above in some of the networked learning indicators. For example, University of Nairobi is in stage 3.0 on ICT research and innovations, mainly because it is the only university with operational doctoral degree programs in ICT and their students participate in students exhibitions and competitions. In our framework, this is an indicator of the quality of ICT degree programs at undergraduate and graduate levels. USIU on the other hand is in stage 3.3 in ICTs in the libraries indicators because it has not only automated library operations but also use ICT to purchase books and to support library users.

The indicator levels were almost the same for universities as well as non-degree granting tertiary institutions as shown in Figure 5.2. However, tertiary institutions are in a lower state of e-readiness in almost all indicators. The Kenya Polytechnic and Mombasa Polytechnic that had the highest levels of enrollment scored poorly in almost all categories of indicators.

Each of the institutions will benefit from a detailed review of their strategic plans using the detailed results generated by this study. This is outside the scope of the current research study and would require additional funding for dissemination of results.

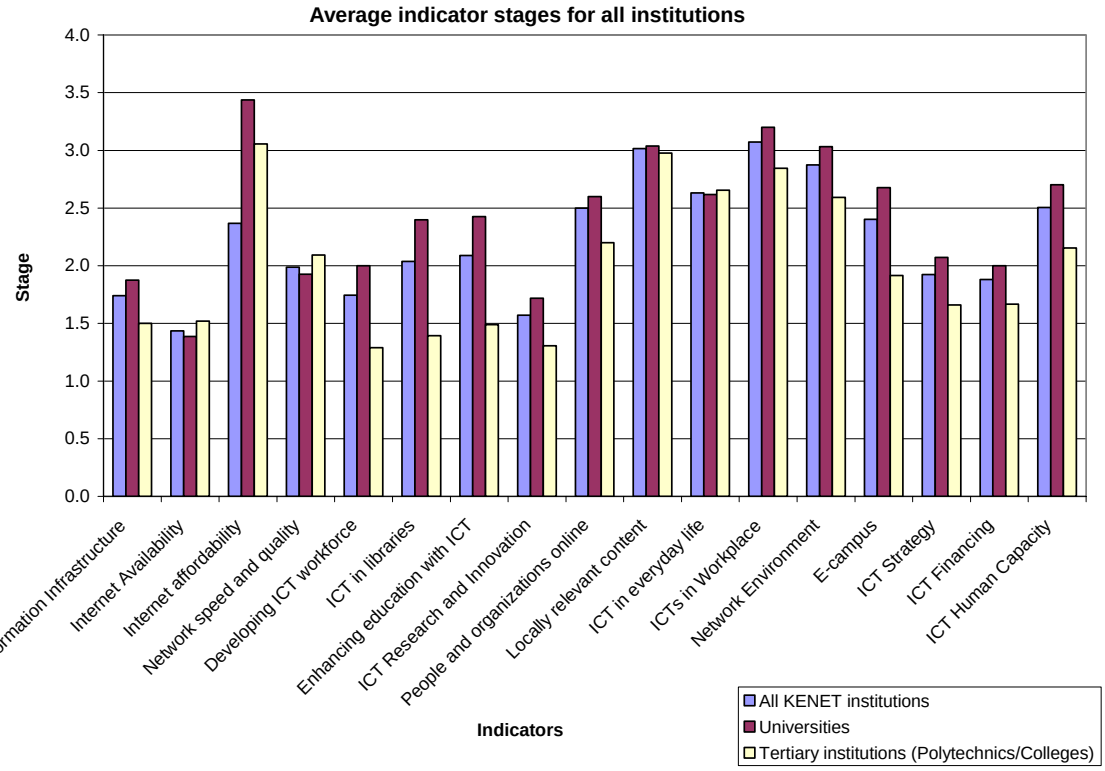


Figure 5.2: Comparison of average indicator stages for universities and tertiary institutions

The results also suggest that there is a correlation between institutional policy and strategy category of indicators and the scores in most of the other indicators. For example, Figure 5.3

shows that both USIU and University of Nairobi have a score of 3.0 and above in ICT strategy indicator. This translates in scores of 3.0 and above in enhancing education with ICTs, ICTs in libraries, ICT human capacity and the campus network environment. The contrast is Kenyatta University, which is in stage 1.5 in ICT strategy indicator and below stage 2 in ICT in libraries, ICT human capacity, and the internal network environment. This observation is also true for universities outside Nairobi as shown in Figure 5.4, which shows similar staging for Kenya Methodist University in Meru, Moi University in Eldoret and Maseno University in Kisumu. However this was a diagnostic study and this is therefore a status report. There is a need for a repeat of the study to analyze the correlations between different indicators. We note that the study did not even analyze the ICT strategies of the institutions and relied on the reporting of the heads of ICT. In the next study there will be a need to analyze the ICT and corporate strategies in order to assess alignment.

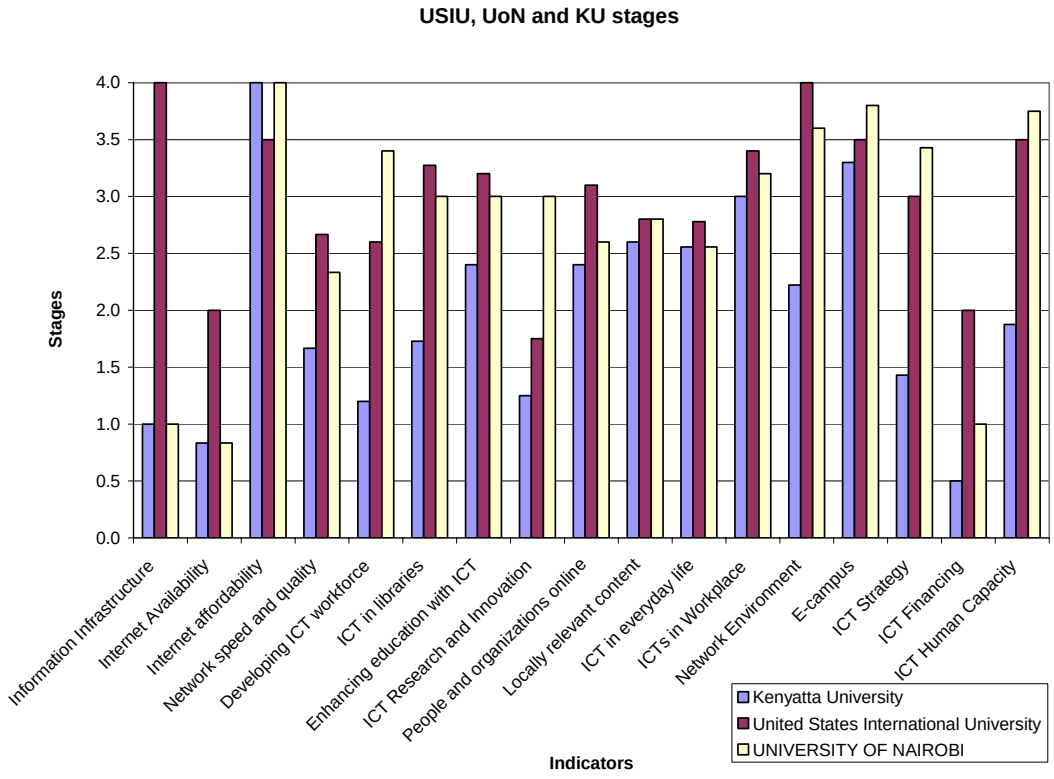


Figure 5.3: Comparison of the indicator stages for three universities in Nairobi

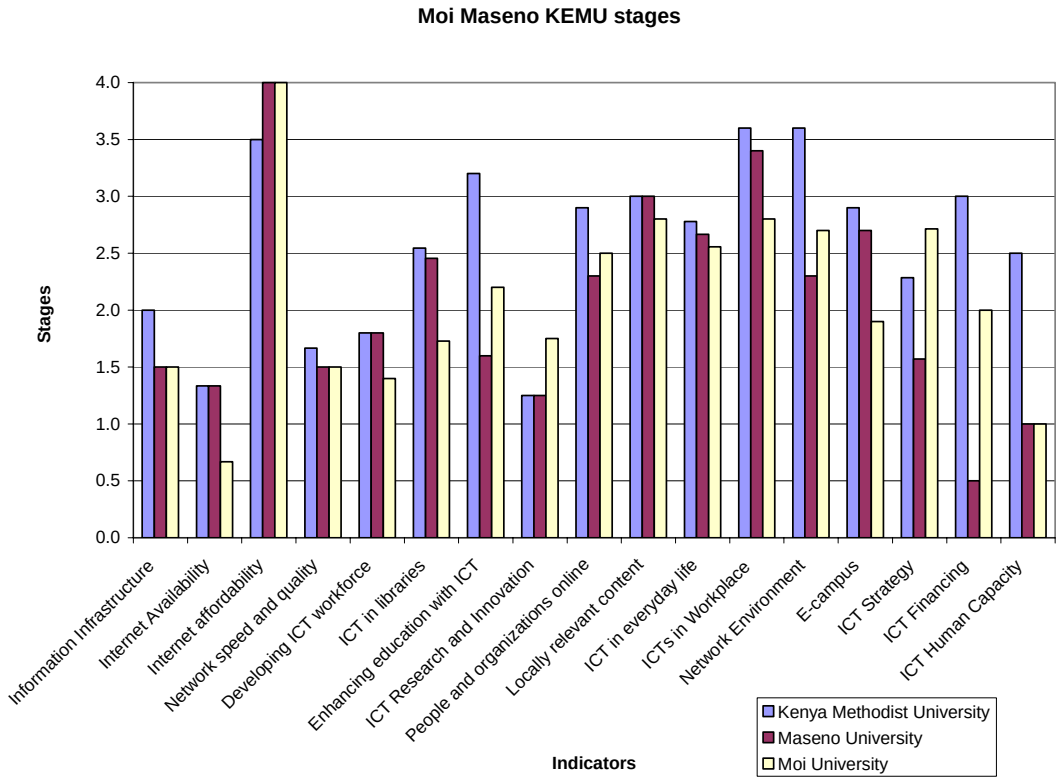


Figure 5.4: Comparison of indicator scores for three universities outside Nairobi

5.3 STRATEGIC ICT SUB-INDICATORS

This survey has used over 60 sub-indicators of the 17 indicators defined in our e-readiness assessment framework. Each of the sub-indicator has to be calculated in absolute terms and then converted into a stage using our staging framework described in Chapter 3 of this report. This is a large data set that cannot be easily incorporated into the corporate or ICT strategic plans of the institutions.

This study therefore identified a set of 15 core or strategic indicators that could be easily monitored by the institutions on an annual basis. For example, some of the 15 indicators could be incorporated in the corporate strategic plans and the rest in the ICT strategic plans and would be used as performance targets to monitor progress in ICT readiness and usage. Figure 5.5 shows the staging results for the 15 strategic ICT sub-indicators. For example, achieving stage 4 in PCs per 100 students simply means providing at least 10 PCs per 100 students. None of 25 institutions reported to be monitoring this indicator.

The Cape Penisula University in South Africa maintains a ratio of 12.5 PCs per 100 students according to a recent report of a Taskforce on the Development of University Education Strategy for Kenya (Taskforce, 2007). The taskforce also found that most of the students at Rhodes University in South Africa have computer labs open for 24 hours and the students have home PCs and only need a network access point in the campuses. Unfortunately, this is not the case for Kenyan university students.

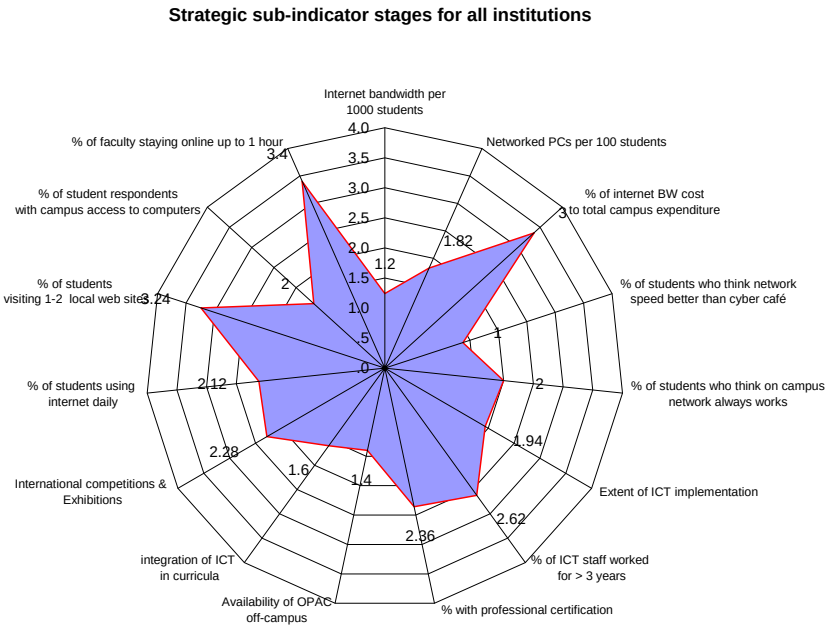


Figure 5.5: Average stages for 15 strategic indicators for all institutions

The study found that most of the institutions are providing less than three networked PCs per 100. Increasing the networked PCs per 100 students to above 10 as defined in our framework would ensure that students in a typical Kenyan university would have the same learning experience as students in South African universities (or other universities in middle-income countries).

Our conclusion is that heads of institutions have not been having simple ICT indicators for measuring ICT readiness and usage. That could explain, for example, why the institutions are spending more in percentage terms on telephones (including mobile phones) than on Internet bandwidth that could be used to enhance learning and research. However, institutions will need to invest heavily in institutional networks and information systems. This means automation of the institutions and the development of e-learning content. Success in information systems and e-learning content development depends on university strategies and leadership in addition to availability of campus ICT infrastructures. We note that the Internet bandwidth problem is expected to reduce significantly by the end of the year 2008 when national optical fiber backbone and undersea optical fiber projects are completed.

The study has identified the critical issues and made some recommendations as described in the next chapter.

6. CRITICAL ISSUES AND RECOMMENDATIONS

We shall outline critical issues and recommendations in accordance with the five categories of indicators used for e-readiness assessment framework described in Chapter 2 on Methodology. The critical issues are derived from the poor performance in the ICT strategic sub-indicators as shown in Chapter 5 on Summary of Findings and Conclusions.

6.1 NETWORK ACCESS CRITICAL ISSUES

One of the critical issues is that institutions do not purchase adequate Internet bandwidth for their students and staff. The study established that institutions purchased less than 512 Kb/s of download Internet bandwidth per 1,000 students. Although this may partly be due to the high cost of Internet bandwidth in Kenya, it is also a demonstration of the low status accorded to Internet connectivity in terms of institutional resource allocation. For example, the results show that most of the public universities are spending less than 0.5% of their operational budgets on Internet access. We therefore recommend that higher education institutions increase the total Internet bandwidth to at least 1 Mb/s per 1,000 students in the immediate to medium-term. In the longer term, this total should be at least 4 Mb/s per 1,000 students. To reach this level in the longer term, these institutions would need to spend more than Ksh 2.4 million per 1000 students per year on uplink bandwidth at current prices of US$2,330 per Mb/s per month.

A second critical issue is the low access to networked PCs by both staff and students. We recommend that higher education institutions increase the ratio networked PC to student ratio to an average of 1:10, with corresponding network access points. Although this ratio could be higher or lower for different departments depending on the degree programs offered and their ICT requirements, it is the ratio specified in our staging framework for the PCs per 100 students sub-indicator.

The final critical issue is the low quality of the network infrastructure and services. For example, over 70% of both the students and staff thought that the Internet speed at cyber cafés was faster than at the institutions. In addition, over 50% of both the students and staff thought that their network infrastructure was not stable. At the same time, only about 14% of the students thought the e-mail system in the campus always worked. In order to improve the quality of the network infrastructure and services, we recommend that institutions set-up reliable data centers. We also recommend that they hire and retain highly skilled technical staff.

Table 6.1 summarizes the critical issues and recommendations for the Network Access category of indicators.

Table 6.1: Critical issues and recommendations for institutional network access indicators

Critical issues	Recommendations
Inadequate Internet bandwidth	Increase the total Internet bandwidth to at least 1 Mb/s per 1,000 students in the immediate to medium term and at least 4 Mb/s per 1,000 students in the long-term
Low access to networked PCs by staff and students	Increase the ratio networked PC to student ratio to an average of 1:10 Implement adequate network access points
Low quality of the campus network infrastructure and services (e-mail services, network, PCs, etc.)	Setup a reliable campus data center Hire and retain highly skilled technical staff

6.2 NETWORKED CAMPUS CRITICAL ISSUES

Two key issues in networked campus concern power supply for ICT equipment on campus and the security ICT equipment, applications and data. For example, the lack of standby power and UPS for all PCs in offices and computer laboratories affects the quality of the network services on campus. Similarly, the lack of a disaster recovery plan is an indicator of low state of readiness to use ICT to support mission-critical operations of the institutions (e.g., student information systems). The study recommends that institutions install UPS and standby power for all their campuses and implement a disaster recovery plan.

A further critical issue is a general absence of integrated management information systems. To this end, institutions should acquire, implement and sustain integrated management information systems. As recommended under the section on networked society below, we also recommend that these systems are implemented and supported by qualified and motivated information systems professionals.

The critical issues and recommendations for networked campus are summarized in Table 6.2.

Table 6.2: Critical issues and recommendations for networked campus indicators

Critical issues	Recommendations
Lack of disaster recovery plan	Implement a disaster recovery plan
Lack of UPS for all campus PCs (in labs and offices)	Install UPS and standby power for entire campus
Lack of integrated management information systems	Acquire, implement and sustain integrated management information systems Hire and motivate qualified Information Systems professionals

6.3 NETWORKED LEARNING CRITICAL ISSUES

One critical issue was the minimal integration of ICT in curriculum. We recommend that institutions review their curricula with a view to integrating ICT. In this review process, industry stakeholders should participate in order to ensure relevance. We also recommend that there

should be an increase in the percentage of on-line courses. In the immediate to medium-term, over 25% of the courses should be on-line while in the long-term this percentage should be over 50%.

The second critical issue is the limited off-campus access to library resources by users. For example, only about 20% of users could access OPAC outside their campuses. This means that library resources are not on-line in the majority of the institutions. We recommend that institutions should enhance and accelerate their library automation activities and ensure that all resources are available over the Internet. Institutions could make use of open source library automation systems.

A further critical issue is the limited ICT research and innovations. For example, more than 80% of the institutions did not have ICT Masters degree programs. To this end, we recommend that larger private and public universities should develop ICT Masters and Ph.D. degree programs and increase enrollment in these programs. One of the measures of the learning outcomes of ICT graduates is the quality of ICT projects and participation in national and international competitions and exhibitions. We therefore recommend higher education institutions should improve quality of student ICT projects to international standards to ensure a higher level of innovation.

Another critical issue is the lack of operational course management system for e-learning. We recommend that institutions should set up a course management system. In addition, it is recommended that instructional designers and administrators should be hired in order to achieve the on-line courses targets given earlier.

The final critical issue is the lack of local research databases and limited participation in research networks. For example, only 7.4% of the faculty reported to have established research databases in their areas of specializations (e.g. chemistry or medicine). To this end, the study recommends an increase in research funding for development of research databases and integration of such activities in the evaluation of lecturers.

Table 6.3 summarizes the critical issues and recommendations for Networked Learning category of indicators and sub-indicators.

Table 6.3: Critical issues and recommendations for networked learning indicators

Critical issues	**Recommendations**
Minimal integration of ICT in curriculum	Review curricula and integrate ICT with industry input Increase the percentage of on-line courses to 25% in the immediate to medium-term and over 50% in the long-term
Limited off-campus access to library resources	Enhance accelerate library automation
Limited ICT research and innovations	Create in ICT Masters and Ph.D. programs and increase enrollment in these programs Improve quality of student ICT projects to international standards
Lack of operational course management system for e-learning	Set up a course management system Hire instructional designers and administrators
Lack of local research databases	Increase funding for development of research databases

6.4 NETWORKED SOCIETY CRITICAL ISSUES

The results presented in this report show most of the higher education institutions achieved stage 3 on the four indicators in this category (with an average of at least stage 2.5 for all institutions). This means they are ready to use ICT for learning, research, communications and management. For example, the study found that both students and staff were regular users of the Internet. However, most do not have campus access. The study also showed that the academic staff was making progress in creating on-line content. They are however frustrated by the low speed and low quality of ICT services as outlined under critical issues in network access. It appears that addressing the critical issues in the network access, networked campus and networked learning category of indicators would further improve performance in networked society indicators.

One critical issue in networked society is the lack of interactive institutional websites. The study found that less than 8% of the institutional websites were interactive, while about 85% of the websites were purely informational. The study recommends that institutions setup interactive websites that are driven by Internet-enabled academic and administrative information systems, especially the core business systems (student, finance and library information systems). We also recommend that these systems are implemented and supported by qualified and motivated information systems professionals.

Another critical issue identified in this category of indicator concerns lack of understanding of the needs of these institutions by the institutional leadership and ICT departments. For example, all of the staging for the sub-indicators of locally relevant content and people and organizations online was based on the perceptions survey of the HE community. In most cases, this is the first time such a survey had been conducted. This means that the institutions do not know, for example, that students are finding the cyber cafés better in services than the campus-based network services. The institutions also do not know how the community is using the Internet and campus networks. The study therefore recommends that each institution commissions user surveys once every year as a feedback to the ICT strategy implementation.

Table 6.4 summarizes the recommendations to support these critical issues.

Table 6.4: Critical issues and recommendation for networked society indicators

Critical issues	**Recommendations**
Lack of interactive institutional websites	Setup interactive websites Implement and sustain Internet-enabled core business systems (student, finance and library information systems) Hire and motivate qualified Information Systems professionals
Lack of customer survey data	Commission comprehensive surveys of the users annually and update indicators in this category

6.5 INSTITUTIONAL ICT POLICY AND STRATEGY CRITICAL ISSUES

The study found that institutional leadership does not yet consider ICT strategically important for teaching, learning, and research. For example, less than 0.5% of total expenditure is allocated to Internet access and on average there are only three PCs per 100 students. In some of the institutions, the telephone budget (fixed and mobile) for the administration is higher than for Internet access for the entire institution.

One critical issue is the low reporting level of head of ICT at most of the institutions. Research has shown that a higher reporting level for head of ICT can be positively associated with a higher success of the ICT function in an organization [Reference]. This study found that about 10% of institutions reported that ICT is championed by the head of the institution (CEO). Although this study did not conduct a detailed analysis of the relationship between e-readiness and ICT leadership, our results suggest that a high score in ICT strategy translates into higher stages in other indicators (see Figure 5.3). The study therefore recommends that a re-organization be carried out to enable the head of ICT report to the CEO and be a member of senior management. In this enhanced status, the ICT function will have broad view regarding systems priorities and be able to effectively link these priorities to key business needs across the institution.

The second and related critical issue is the low level of alignment of ICT strategy to corporate strategy. This would be partly achieved by elevating the head ICT to senior management. We further recommend that institutions adopt and make the strategic ICT sub-indicators identified in Chapter 2 an integral component of the corporate strategic plan and monitor these together with the other corporate performance indicators.

The final critical issue is infrequent ICT staff skills upgrade. Given the high rate of change of information and communication technology, we recommend that institutions should invest in frequent ICT professional training. This is also another way of increasing the retention rate of ICT staff.

The critical issues and recommendations for Institutional ICT Policy and Strategy are summarized in the Table 6.5.

Table 6.5: Critical issues and recommendations for institutional policy and strategy indicators

Critical issues	Recommendations
Reporting level of ICT head is low	Head of ICT to report to CEO and become a member of senior management
Average alignment of ICT strategy to corporate strategy	Adopt and make the strategic ICT indicators an integral component of the corporate strategic plan and monitor these together with the other corporate performance indicators
Infrequent ICT staff skills upgrade	Invest in frequent ICT professional training

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APPENDIX 1 – HARD FACTS QUESTIONNAIRE

Questionnaire and Directed Interview Outline

General

1. Date: _____ Interviewer:_____
2. Interviewee:_____ Position:_____
3. Name of institution: _____
4. College/Campus_____
5. Type of institution (Please tick ☑):

Technical College/ Polytechnic ☐	Tertiary College ☐	University ☐	Research Institution ☐

Specify Other ……..

6. Address:

P.O. Box	
District	
Telephone	
E-mail	
Location	
Province	
Fax	
Website	

7. Total number of full-time teaching and/or research staff (in-post)
   (a) Male:_____ (b) Female:_____
8. Total number of part-time teaching and/or research staff
   (a) Male:_____ (b) Female:_____
9. Total number of non-academic staff: (a) Male:_____ (b) Female:_____
10. Total number of students (including part-time/Module II) _____
11. Total number of undergraduate students (Module 1/ Full-time)
    (a) Male:_____ (b) Female:_____
12. Total number of undergraduate students (Module II for public university or part-time for private universities)
    (a) Male:_____ (b) Female:_____

13. Total number of diploma students (a) Male:_____ (b) Female:_____

14. Total number of certificate/short-course/continuing/executive students per year _____

15. Total Number of graduate students: (a) Male:_____ (b) Female:_____

16. Total number of non-degree students (diploma, certificate):

(a) Male:_____ (b) Female:_____

Network Access Indicators

Institutional Information infrastructure

17. What is the total number of employees in your campus? _____

18. What is the number of active telephone extensions on your Private Branch Exchange (PBX)? _____

19. How many external fixed (Telkom) direct exchange lines are connected to your PBX? _____

20. How many mobile telephone lines are connected to your PBX? _____

21. What is the number of institutional mobile phones not connected to PBX_____

22. Do you have structured cabling in ALL staff offices, library, and computer labs?

Yes ☐	No ☐

Internet availability

23. How does your campus access the global Internet (i.e., connection to KENET or other ISP)? (Please tick ☑ all that apply)

Copper ISDN leased line ☐	ADSL leased line ☐	Wireless leased line ☐	VSAT leased line ☐	Optical fiber leased line ☐	Other ☐

24. What is the capacity of your leased line (in kb/s)? _____

25. Does your campus have an external optical fibre connection to the public telephone exchanges, KENET or nearest Internet point of presence?

Yes ☐	No ☐

26. What is the distance between your campus and the nearest Internet point of presence? (KENET or ISP)

Within 40Km ☐	>40Km radius ☐

27. Does your campus use a wireless local loop?

Yes ☐	No ☐

28. Do you have a download VSAT connection?

Yes ☐	No ☐

29. If Yes, what is the capacity of your download VSAT connection in kb/s?
_____

30. Does your organization have an Intranet?

Yes ☐	No ☐

31. Does your campus network have any wireless LAN segments?

Yes ☐	No ☐

32. What is the size of your Intranet or corporate LAN in terms of total number of network access points? _____

33. What is the size of your Intranet or corporate LAN in terms of total number of networked PCs? _____

34. Where is your campus websites hosted? (Please tick ☑)

Not applicable ☐	Within Intranet ☐	By Local ISP or KENET ☐	Outside the country ☐	Inside & outside the country ☐

Internet and telephone communications affordability

35. What is the total cost of your leased line Internet access to your campus per year (leased line only for FY 2005/06) in Ksh? _____

36. What is the total local KENET/ISP charge per year of the Internet connection to your office location? (Ksh) _____

37. What is the total cost of your campus fixed line telephone bills (include lines not terminated on PBX) per year in Ksh? _____

38. What is the total cost of your campus mobile telephone bills (include lines not terminated on PBX) per year in Ksh? _____

39. What is the total expenditure of your campus per year (FY 2005/06) in Ksh
_____

Network speed and quality

40. What is the maximum Internet access network speed available to your organization? (if you could afford)

< 128 kbps ☐	128 – 2048 kb/s ☐	2 Mb/s – 8 Mb/s ☐	> 8 Mb/s ☐

41. Does your organization monitor the packet loss for Internet traffic?

Yes ☐	No ☐

ICT hardware and software products

42. What was the total network hardware (hubs, routers, switches, cables etc.) cost of purchases (in Ksh dollars), of your organization last fiscal year (FY 2005/6)? _____

43. What was the total computer hardware cost of purchases (in Ksh), of your organization last fiscal year (FY 2005/6)? _____

44. What was the total cost of software purchases by your organization last year (FY 2005/6)? _____

45. What was the volume (in Ksh) of the ICT hardware (network and computers) purchases were from local suppliers? _____

46. What was the volume (in Ksh) of the ICT software purchases were from local suppliers? _____

47. What is the total number of ICT applications (e.g., payroll application or human resource application) does your organization use? _____

48. How many of the ICT applications used in your organization have been developed locally developed (in-house or by local Kenyan software developers)? _____

49. Do you have in-house software developers who customize or develop your business applications?

Yes ☐	No ☐

50. What is the value (in Ksh) of your ICT hardware inventory? _____

51. Do you purchase ONLY branded (HP, Dell, IBM) PCs?

Yes ☐	No ☐

52. Do you purchase ONLY branded (HP, Dell, IBM) server machines?

Yes ☐	No ☐

53. What is the value (in Ksh) of your ICT hardware that is locally assembled or manufactured? _____

54. What is price range of the entry level of networked PCs or workstations used in your organization?

< $500 ☐	$500-1000 ☐	$1000-2000 ☐	>$2000 ☐

55. What is the price range the entry-level application servers used in your organization?

< $5000 ☐	$5000-10000 ☐	$10000-20000 ☐	>$20000 ☐

56. What is the total number of PCs in your institution? _____

57. Total number of application servers? _____

58. What is the total number of printers? _____

59. How many PCs or notebook computers are connected to the Intranet? _____

60. How many printers are connected directly to the LAN? _____

61. How many computers of different types are available at your office location?

    a. Number of mail servers:

None ☐	1-2 ☐	3-5 ☐	5-10 ☐	> 10 ☐

    b. Number of web servers:

None ☐	1-2 ☐	3-5 ☐	5-10 ☐	> 10 ☐

    c. Number of application servers:

None ☐	1-2 ☐	3-5 ☐	5-10 ☐	> 10 ☐

    d. Number of personal computers, including notebook computers (Pentium III & above):

None ☐	<5 ☐	5-10 ☐	20-50 ☐	50-100 ☐	100-500 ☐	500-1000 ☐	> 1000 ☐

Service and support

62. How many ICT personnel do you have? _____

63. How many system or network administrators do you have? _____

64. How many system analysts and developers do you have? _____

65. How many software technicians do you have? _____

66. How many hardware technicians do you have? _____

67. How many telecommunications technicians do you have? _____

68. How long does it take to install an external telephone line (from application for telephone to installation)?

< 1 week ☐	2-4 weeks ☐	1-6 months ☐	>6 months ☐

69. How long does it take to clear an external telephone line fault once it is reported?

< 2 days ☐	2-7 days ☐	7-14 days ☐	> 14 days ☐

70. How long does it take to clear a digital leased line fault?

< 1 days ☐	1-2 days ☐	2-7 days ☐	> 7 days ☐

71. What is the response time for software applications support?

< 12 hrs ☐	12-24 hrs ☐	24-48 hrs ☐	> 48 days ☐

72. What is the response time for PC and Server support?

< 12 hrs ☐	12-24 hrs ☐	24-48 hrs ☐	> 48 days ☐

73. Is Internet-based support for your hardware and/or applications available in your institution?

Yes ☐	No ☐

74. What is the response time of your ISP in case of Internet failure?

< 6 hrs ☐	6-12 hrs ☐	12-24 hrs ☐	> 24 days ☐

75. Is it possible to hire and retain key ICT personnel (IT Managers, Network engineers, systems developers etc.) locally?

Yes ☐	No ☐

76. Do you have a strong ICT support team for both software and hardware in your organization?

Yes ☐	No ☐

Networked learning E-Readiness of Higher Education Institutions

Access to ICT

77. How many computers of different types are available in the institution?

    e. Number of mail servers _____

    f. Number of Web servers: _____

    g. Number of application servers: _____

    h. Number networked personal computers (Pentium IV or later) _____

    i. Number of laptops/ notebooks for use by academic staff _____

78. How many general purpose computer laboratories do you have? _____

    How many specialized (networked or software development) computer laboratories do you have? _____

79. How many networked computers are in the specialized computer laboratories? _____

80. How many computers are in classrooms? _____

81. How many students share one computer in laboratory lessons or class group work? _____

82. Are computers available to students at the following times?

a. Mon – Fri 8 a.m.–5 p.m	Yes ☐	No ☐
b. Mon – Fri after official lessons	Yes ☐	No ☐
c. Weekends	Yes ☐	No ☐
d. Always	Yes ☐	No ☐

83. Are networked computers available to academic staff at the following times?

a. Mon – Fri 8 a.m.–5 p.m	Yes ☐	No ☐
b. Mon – Fri after official lessons	Yes ☐	No ☐
c. Weekends	Yes ☐	No ☐
d. Always	Yes ☐	No ☐

84. Are computers available to outsiders after 5 p.m. or over the week-ends e.g. for commercial training or for local community ICT training?

Yes ☐	No ☐

85. Do all academic staff have campus or institutional networked computers in their offices?

Yes ☐	No ☐

86. How many networked computers available to permanent academic staff?

_____

87. How many networked computers available to part-time or adjunct academic staff?

_____

88. Do students have access to the campus or institutional automated library resources from the computer labs or over the Internet?

Yes ☐	No ☐

89. Do all students have an institutional e-mail address?

Yes ☐	No ☐

90. Do all students have access to the Internet from the computer labs?

Yes ☐	No ☐

91. Do students have access to the student information system on campus or off campus?

Yes ☐	No ☐

92. Do students have access to the e-learning platform on or off-campus? YES/NO

Yes ☐	No ☐

93. What is the total number of hours per week can a student use computers in the lab

_____

94. Are the computers in laboratories & offices connected through an institutional network?

Yes ☐	No ☐

95. Is the institutional LAN connected to other education institution networks?

Yes ☐	No ☐

96. Type of access to the Internet.

Non-existent ☐	Dial-up ☐	Dedicated 64 Kbps ☐	Dedicated >128 Kbps ☐

Enhancing Education with ICT

97. Percentage of academic staff with basic ICT literacy skills:

<20% ☐	20-40% ☐	40 – 60% ☐	60 – 80% ☐	80-100% ☐

98. Are the following software resources available in the institution?

a. Productivity tools	Yes ☐	No ☐
b. E-learning and Educational software	Yes ☐	No ☐
c. Management Information Systems	Yes ☐	No ☐
d. Other (Specify)	Yes ☐	No ☐

Other _____

99. How do teachers/lecturers use computers?

a. Word Processing	Yes ☐	No ☐
b. Spreadsheets and DBMS	Yes ☐	No ☐
c. Communicating to students $ others by email	Yes ☐	No ☐
d. Accessing resources in the internet	Yes ☐	No ☐
e. Incorporating ICTs in their instruction and curricula	Yes ☐	No ☐

100. Level of integration of ICT into the educational and learning processes:

a. ICT is fully integrated into curriculum	Yes ☐	No ☐
b. ICT is used in classrooms for learning	Yes ☐	No ☐
c. ICT is used in project-based learning activities	Yes ☐	No ☐

101. How many courses are supplemented by the Web or E-learning content
_____

102. What is the total number of courses (e.g., Marketing) are offered by your institution
_____

Developing the ICT workforce

103. What training opportunities are available to your junior ICT workforce?

None ☐	Local ICT colleges ☐	In-house programs ☐	External consultants ☐	Local vendor training ☐

104. What training opportunities are available to your senior ICT professionals?

None ☐	Local colleges /universities ☐	Training abroad ☐	External consultants ☐

105. Does your organization use e-learning or ICT-based distance learning resources to train ICT workforce?

Yes ☐	No ☐

106. How many of the ICT personnel are graduates of local institutions?_____

107. How many of the senior ICT personnel have received all their academic education from local Universities?_____

108. How many of your ICT employees have professional certification (e.g., Cisco, MCSE, Linux, SAP)? _____

109. Does your organization have internal ICT training program for ICT users and professionals?

Yes ☐	No ☐

110. What was the total ICT training budget last year _____

111. How many employees received training in the past 2 years on the use of organizational networked applications? _____

112. What was the total cost for of training the employees on the use of organization networked applications? _____

113. How many employees received training on the use of office application software (e.g., word, excel, databases)? _____

114. What was the total cost of training employees on how to use a computer and office applications? _____

115. How many employees received training on the strategic role of organizational information systems? _____

116. What was the total cost of training employees on the role of organizational information systems? _____-

117. How many ICT professionals received systems and network administration training last year? _____

118. What was the cost of training the ICT professionals? _____

119. How many ICT professionals received specialized training on system development or development platforms? _____

120. What was the total cost of the specialized ICT professional training? _____

ICT in the Libraries

121. Is the library on your campus automated?

Yes ☐	No ☐

122. If Yes, which of the following functions are automated?

j. OPAC ☐
k. Issue Desk ☐
l. All library operations ☐

123. Does your campus library have budget for automation and ICT operations?

Yes ☐	No ☐

124. If Yes, what is the total annual library ICT budget in Ksh? _____

125. Does your campus library have a senior librarian in charge of the library information systems?

Yes ☐	No ☐	N/A ☐

126. If Yes, what is the highest academic qualification of the librarian in charge of the library information systems?

Diploma in library sciences ☐	Post-graduate diploma in ICT ☐	Bachelors degree in information sciences ☐	MS in information sciences ☐	PhD in information sciences ☐

127. Is OPAC available off-campus by students and academic staff?

Yes ☐	No ☐

128. Has library staff received regular training on ICT systems for libraries?

Yes ☐	No ☐

129. Does you library have a multimedia center for viewing or access to multimedia resources such CD, DVDs, or Internet databases?

Yes ☐	No ☐

130. If Yes, how many networked PCs are available for student use in the multimedia center and in the library? _____

Yes ☐	No ☐

131. Do students or academic staff have access to any Internet databases from the library or on the campus network

Yes ☐	No ☐

132. Does library staff offer any information literacy services and training?

Yes ☐	No ☐

133. Are there any digital library services (e.g., abstracts of thesis or projects, on-line local journals, e-books) available in the campus library?

Yes ☐	No ☐

134. Does library staff offer information literacy courses on-line?

Yes ☐	No ☐

135. Does library send out regular updates and information on library to students and faculty via e-mail?

Yes ☐	No ☐

136. Does library make e-requisitions?

Yes ☐	No ☐

137. Does library pay for goods and services electronically using e-transfers?

Yes ☐	No ☐

138. Does library process (cataloguing and classifying) all book, journals, and non-book materials electronically?

Yes ☐	No ☐

139. Does library send e-bibliographic lists to suppliers?

Yes ☐	No ☐

140. Does library receive e-invoices from the suppliers?

Yes ☐	No ☐

Enhancing Research with ICTs

141. Are students required to use the Internet for their assignments or projects?

Yes ☐	No ☐

142. Do lecturers some lecturers in your institution belong to any research discussion groups or network?

Yes ☐	No ☐

143. If Yes, what is the name of the research network or discussion group _____

144. How many users from your institution access EBSCOHost database per month? _____

145. How many lecturers have setup personal websites _____

146. Do some lecturers subscribe to on-line journals _____

147. Do you subscribe to any e-journals?

Yes ☐	No ☐

148. How many hours do you spend on the Internet per week

< 1 hour ☐	1–2 hours ☐	2–3 hours ☐	>3 hours ☐

149. Have faculty in your institution established any research databases hosted on your Website?

Yes ☐	No ☐

150. Do you collaborate with researchers in other institutions in Kenya or abroad?

Yes ☐	No ☐

151. Do you use your computer to prepare your own research papers?

Yes ☐	No ☐

ICT Research and Innovations

152. Does your institution offer an undergraduate degree program in ICT (information systems, computer science, electrical engineering etc.)?

Yes ☐	No ☐

153. Does your institution offer any Master's level ICT degree program?

Yes ☐	No ☐

154. Does your institution offer any doctoral ICT degree programs?

Yes ☐	No ☐

155. Do ICT undergraduate students participate in local or international ICT project exhibitions or competitions?

Yes ☐	No ☐

156. If Yes, name one exhibition or competition _____

157. Are Master's students required to undertake a research project as part of their program?

Yes ☐	No ☐

158. How many ICT Master's research projects were completed in the last academic year? _____

159. How many ICT PhD degrees were awarded in the last 3 years? _____

160. How many ICT patents has your institution filed in the last 5 years? _____

161. How many ICT research papers have been published by faculty or students in your institution in the last 5 years? _____

162. Has your institution established an ICT incubator or business park?

Yes ☐	No ☐

163. How many of ICT faculty members are recognized as national ICT experts? ____

164. How many of the ICT faculty members have a PhD? _____

165. How many ICT faculty members have published a textbook in ICT? _____

166. How many externally funded research projects have been undertaken by faculty and researchers in your institution? _____

167. Does the university receive any income from royalties or licenses arising from it research work?

Yes ☐	No ☐

168. Does your institution collaborate with other ICT research laboratories in other parts of the world? _____

Networked Society Indicators

People and organizations online

169. For what purpose mainly does your organization use Intranet and Internet

E-mail/Basic Communication	☐
Teaching and Learning	☐
Internal Administrative systems	☐
All of the above (transformation)	☐

170. How many employees use the Internet (e-mail, Web, etc.) for their work? _____

171. Has your organization registered a Kenyan domain name (i.e., .ke)?

Yes ☐	No ☐

172. Does your organization have a corporate e-mail system (e.g., Microsoft Exchange or Linux E-mail server)?

Yes ☐	No ☐

173. If yes, how many employees have individual corporate or ministry e-mail addresses? _____

Locally relevant content

174. What type of website does your organization maintain?

None ☐	Information website ☐	Interactive or Transaction website ☐

175. Do you monitor the number of visitors to your website per month?

Yes ☐	No ☐

176. If yes, how many people on average visit your organizational website per month?
_____

177. What local websites does your organization need to access regularly?

The Institutional website	☐
Local Newspaper websites	☐
Other local educational websites	☐
Search engines or Web e-mail sites	☐
Local company websites	☐
Do not know	☐

178. What percentage of the Web traffic from your organization is to other local websites (i.e., in Kenya)?

< 5% ☐	< 20% ☐	<50% ☐	> 50% ☐	Do not know ☐

179. Where is your website hosted?

In Kenya ☐	Abroad ☐	Both in Kenya & Abroad ☐

180. Does your organization advertise its website in other media (e.g., radio, TV, print etc.)

Yes ☐	No ☐

181. Do employees in your organization subscribe to any local mailing lists?

Yes ☐	No ☐

182. Do employees in your organization have access to an Intranet-based (i.e., in-house) Web-based training?

Yes ☐	No ☐

183. Do employees have access to other local Web-based training programs?

Yes ☐	No ☐

184. Are there any local Web portals (i.e., Kenyan) visited by students, faculty, and staff in your institution?

Yes ☐	No ☐

185. What is the total number of local suppliers and customers does your organization have? _____

186. How many of the local suppliers and customers have websites (any type)? _____

ICTs in Workplace

187. How many employees have a PBX telephone extension? _____

188. How many employees are allowed to make external calls? _____

189. Are there any public telephones installed in your campus or premises?

Yes ☐	No ☐

190. Are there any cyber cafés installed in your campus or premises?

Yes ☐	No ☐

191. How many employees have access to a networked PC or workstation at work (i.e., PC connected to organization's LAN)? _____

192. Does your organization have networked applications installed on its Intranet or LAN (e.g., ERP, Accounting Information System etc)?

Yes ☐	No ☐

193. If yes, how many employees are users of the networked applications?
_____

194. Do you have any transaction processing system in use in your organization (e.g., order processing, purchasing systems, accounting information system)?

Yes ☐	No ☐

195. Do you have an ERP installed in your organization?

Yes ☐	No ☐

196. If yes, how many employees use the transaction processing systems? _____

197. How many employees use office computer applications at work (e.g. word-processing, spreadsheets, PowerPoint, project management)? _____

198. Does your organization use a corporate messaging system (e.g., Open source or Microsoft Exchange)

Yes ☐	No ☐

199. How many employees need to access Websites (local or outside country) as part of their work? _____

200. Does your institution have a call center or Help desk for customer support?

Yes ☐	No ☐

End of networked society questionnaires

Networked Campus Indicators

ICT Power Supply and Air-Conditioning

201. Does your campus have access to commercial power supply from the electrical utility company (i.e., KPLC)? _____

202. If yes, what is the annual cost of commercial power supply in Ksh (use latest FY)

_____

203. How frequently do you experience commercial electrical supply outages in a month?

Never ☐	Once ☐	2 times ☐	More than 2 times ☐

204. Do you have a backup diesel generator for all ICT equipment for your office location?

Yes ☐	No ☐

205. If yes, what is the monthly cost of maintaining the diesel generator (in KSh) per month _____

206. If yes, what is the capacity (in KW) of the diesel generator at your location? ___

207. Do you have Uninterruptible Power Supply (UPS) equipment for your PBX at your location?

Yes ☐	No ☐

208. Do you have UPS equipment for your server equipment?

Yes ☐	No ☐

209. Do you have UPS equipment (distributed or centralized) for all your PCs in offices?

Yes ☐	No ☐

210. Do you have UPS equipment (distributed or centralized) for all PCs in your student computer labs?

Yes ☐	No ☐

211. If No, what fraction of PCs are connected to a UPS in your organization? _____

212. What is the total UPS inventory in Ksh? _____

213. Do you have air-conditioning equipment for your server room? _____

214. Do you have air-conditioning equipment for your computer labs? _____

215. What is the inventory cost of the air-conditioning plant in Ksh? _____

216. What is the inventory cost of the generator plant? _____

Security for ICT equipment and software

217. Are all networked computers protected using a licensed anti-virus software?

Yes ☐	No ☐

218. If Yes, How often is the anti-virus software updated (days)? _____

219. Does you institution have a firewall? _____

220. Is your Intranet protected against Spam mail and Internet spy ware

Yes ☐	No ☐

221. Are all the computer labs physically secured? _____

222. Are all computer labs secured by a security guard?

Yes ☐	No ☐

223. Have you had a security breach into your network in the last two years?

Yes ☐	No ☐

224. How often do you back-up data on the servers? _____

225. Have you installed electronic or radio alarm security equipment in your server room? _____

226. Have you installed electronic or radio alarm equipment in each of your computer labs?

Yes ☐	No ☐

227. Do you maintain off-site data backup? _____

228. Do you have an ICT disaster management policy?

Yes ☐	No ☐

229. What is the total cost of physical security (guards, electronic)) _____

ICT Employment opportunities

230. What is the total number of employees (faculty and staff) in your organization? _____

231. How many telecommunications professionals (managers, engineers, technicians) are employed in your organization? _____

232. How many IT professionals (IT managers, programmers, analysts, computer support etc.) are employed in your organization? _____

233. How many ICT professionals were hired in last two years by your organization? ____

234. How many expatriates are employed in your ICT departments? _____

235. How many of the ICT employees are Kenyan? _____

236. How many employees use a computer application at work? _____

237. How many of the employees in your organization would be considered knowledge workers? _____

238. How many ICT professionals resigned or left your organization in the last 3 years_____

239. How many senior ICT professionals (e.g., IT Managers, Director of IT) are Kenyans? _____

240. How long does it take to fill a senior ICT professional position (e.g., analyst, network engineers, IT managers etc.)? _____

241. Is the IT Manager or Chief Information Officer in your organization part of the senior management team?

Yes ☐	No ☐

242. Is the telecommunications system in your organization considered strategic by your senior managers?

Yes ☐	No ☐

243. Does your organization have any IT systems that would be considered to be of strategic value?

Yes ☐	No ☐

ICT strategy

244. What is the status of ICT in your institution?

A section in a department ☐	A section in a department ☐	A Division ☐	Other (Specify) ☐

Other _____

245. What is the title of the head of ICT?

Head of IT/ICT ☐	Head of Dept ☐	IT/ICT Manager ☐	IT/ICT Director ☐	Other (Specify) ☐

Other _____

246. To whom does the head of ICT report?

CEO ☐	Principal ☐	ICT Director ☐	Dean/Director ☐	Head of Dept ☐

Other (Specify) _____

247. Who is the champion for ICT (exerts the greatest influence in the strategic direction for ICT, in the prioritization of ICT projects, etc.) in your institution?

CEO ☐	Principal ☐	ICT Director ☐	Dean/Director ☐	Head of Dept ☐

Other (Specify) _____

248. Does your institution have an ICT policy?

Yes ☐	No ☐

249. If YES, to what extent is it known/understood by students and staff?

75%-100% ☐	50%-75% ☐	25%-50% ☐	5%-25% ☐	Not Known/ Understood ☐

250. If YES, what is the extent of implementation?

75%-100%	50%-75%	25%-50%	5%-25%	Not Implemented
☐	☐	☐	☐	☐

251. If NO, are there efforts to develop one?

Yes ☐	No ☐

252. Does your institution have an ICT strategic plan, whether separate or an integral part of the corporate plan?

Yes ☐	No ☐

253. To what extent is it aligned to the corporate strategic plan?

75%-100%	50%-75%	25%-50%	5%-25%	Not Aligned
☐	☐	☐	☐	☐

254. What is the main focus of the ICT strategic plans?

- ✓ Support administrative processes (e.g. student management, financial management, etc.) ☐
- ✓ Support teaching & learning (e.g. e-learning ☐
- ✓ Support research ☐

Other (specify) _____

255. What transformation has ICT brought into your organization?

- ✓ Efficiency and effectiveness ☐
- ✓ Openness and transparency ☐
- ✓ Increased productivity of staff ☐
- ✓ Organizational change ☐

Other (specify) _____

A2. ICT financing

256. What proportion of the total ICT capital budget comes from the following sources?

1. Donors & well-wishers _____ 2. Internal _____
3. Grants from partners _____ 4. Loans _____
5. Others (specify) _____

257. What is the major source of funding ICT recurrent expenditure, e.g. Internet and maintenance of equipment?

Donors & well-wishers ☐	Internal resources ☐	Grants from partners ☐

Other (specify) _____

ICT human capacity

258. How many ICT professional staff does your institution have? _____

259. How many ICT support staff does your institution have? _____

260. What is the highest academic qualification of the person in charge of ICT?

- ✓ Dip./IT or related area ☐
- ✓ Dip./Other area ☐
- ✓ Degree/IT or related area ☐
- ✓ Degree/Other area ☐
- ✓ Masters/IT or related area ☐
- ✓ Masters/Other area ☐
- ✓ Ph.D. ☐

Other (specify) _____

261. On average, how many hours in a week does the person in charge of ICT spend personally addressing technical problems? _____

262. How many years of academic administration experience (e.g. as Chairman of Department, Dean/Director of Faculty/Institute/School) does the person in charge of ICT have?

None	<1 year	1-2 years	2-3 years	4-5 years	>5 years
☐	☐	☐	☐	☐	☐

263. What proportion of the professional ICT staff have worked with users for more than three (3) years?

Zero	<10%	10%-25%	25%-50%	50%-75%	>75%
☐	☐	☐	☐	☐	☐

264. What proportion of the ICT staff has Certificate and Diploma as their highest academic qualifications? _____

265. What proportion of the ICT staff has Bachelors degree as their highest academic qualifications? _____

266. What proportion of the ICT staff has Masters degree as their highest academic qualifications? _____

267. How many new professional ICT staff were hired in the last three (3) years? _____

268. How many professional ICT staff left the institution in the last three (3) years? _____

269. How often on average do the ICT staff upgrade their technical skills?

Never	Every Year	Every 2 years	Every 3 years	Every 4-5 years	>5 years
☐	☐	☐	☐	☐	☐

270. How do most ICT staff upgrade their technical skills?

Intranet-based web resources ☐
Other local web-based training programs ☐
Local face-to-face training programs ☐
External face-to-face training programs ☐
External on-line resources ☐

Other (specify) _____

E-Campus

271. Does your campus have a corporate website?

Yes ☐	No ☐

272. What proportion of the departments or faculties has their individual websites?

75%-100%	50%-75%	25%-50%	5%-25%	None
☐	☐	☐	☐	☐

273. Does the campus offer any information on products, services and procedures to both internal and external customers, suppliers, contractors and other stakeholders through the Web?

Yes ☐	No ☐

274. If YES, which of the following information is available through the Web?

Directory of services offered ☐
Downloadable forms ☐
Policies plans and procedures ☐
Contacts ☐

Others (specify) _____

275. Is YES, how often is this information updated?

Daily	Weekly	Monthly	Quarterly	Annually
☐	☐	☐	☐	☐

Other (specify) _____

276. If YES, to what extent does your campus relate with its customers, suppliers, contractors and other stakeholders online?

Mainly ☐	Sometimes ☐	Rarely ☐

Other (specify) _____

277. If NO, how do the internal and external customers, suppliers, contractors and other stakeholders get information on products, services and procedures?

Phone ☐	Fax ☐	Personal Visit ☐

Other (specify) _____

278. Does your campus have an operational course management system (e.g. Moodle, Blackboard, in-house developed software, etc.)?

Yes ☐	No ☐

279. Which of the following business applications are computerized?

Student management ☐
Library management ☐
Financial management ☐
Facilities management ☐

Others (specify) _____

280. What is the level of integration of the computerized business systems?

75%-100% ☐	50%-75% ☐	25%-50% ☐	5%-25% ☐	None ☐

APPENDIX 2 – PERCEPTIONS QUESTIONNAIRE

General Demographic Data

1. Date:_____ Enumerator: _____

2. Name of Institution/Campus/College _____

3. Campus/College Address:

Campus location/building	
P.O. Box	
Telephone	
E-mail	
Fax	
Website	

4. What your Sex? Male ( ) Female ( )

5. What is your Academic Department (**for Faculty and Students**)

Human and Social Sciences	☐
Languages, Communication, Journalism	☐
Computing(IT, IS, Computer Science, Computer Engineering)	☐
Engineering (Electrical, Mechanical, Civil)	☐
Biological Sciences, Physical Sciences	☐
Education	☐
Medical Sciences	☐
Other **(Specify)**	☐

6. What is your Administrative Department (**for Admin Staff only**)

Admissions, Registrar	☐
Student Services (Residential, Co-curriculum)	☐
Accounting, Finance, Administration	☐
Academic Services	☐
Maintenance, Security, Transport	☐
IT Services	☐
Other **(Specify)**	☐

7. What is your age?

16-25 ☐	26-35 ☐	36-45 ☐	46-55 ☐	>56 ☐

8. Highest level of formal education attained **(*indicate actual level*)**

PhD ☐	Masters ☐	Bachelors ☐	Diploma College ☐	Student ☐

Other, specify_____

9. Main occupation? (**Please choose only one**)

Professor/Associate	☐
Senior Lecturer / Lecturer/Assistant Professor	☐
Assistant Lecturer/Tutorial fellow/graduate assistant	☐
Administrative Staff	☐
Student	☐

Other, specify_____

10. If student, Year of Diploma or Degree Study **(Please choose one)**

First ☐	Second ☐	Third ☐	Fourth ☐	Fifth ☐	Masters ☐	Doctoral ☐

Other, specify_____

11. What is your *main* source of general information in order of importance? **(1 – Most Important, …, 7 – Least Important)**

Colleagues	
Newspapers	
Radio	
Television	
Internet	
Lecturer	
Books/Journals	

12. What type of information do you need in order of importance? **(1 – Most Important, …, 6 – Least Important)**

Academic	
Research	
Administration	
News/Entertainment/Shopping	
Emergency/Help/Rescue	
Banking/Investments	

Network speed and quality (User perceptions)

13. **Are most of your local telephone calls from** your campus **successful on first attempt?**

Yes ☐	No ☐	N/A ☐

14. **Are most of your long distance calls from** your campus **successful on first attempt?**

Yes☐	No☐	N/A ☐

15. **Are most of your international calls from** your campus **successful on first attempt?**

Yes☐	No☐	N/A ☐

16. **Do you have** off-campus **access to your institutional E-mail?**

Yes☐	No☐

17. **If you have** off-campus **access to your institutional e-mail, are you always successful on first attempt?**

Yes☐	No☐

18. **If you have** on-campus **access to e-mail and Internet, how would you classify the failures (i.e,no access) per week of your campus network and/or E-mail?**

Always works☐	1-5 times☐	> 5 times☐

19. **Do you find the Internet speeds from your institution better than that from Cyber Café's in nearest town or other local ISPs? Yes ( ) No ( )**

20. **Do the Internet speeds from your institution frustrate or slow down your work?**

Yes ( ) No ( )

21. **How long does it take to restore a campus network failure?**

< 1 hour☐	1-5 hrs ☐	6-12 hrs☐	1-2 days☐	> 2 days☐

Service and Support (perceptions)

22. What is the frequency of failure of the computer you use in the lab or offices?

Daily ☐	Once per week ☐	2 Times per week ☐	Once per month ☐	hardly ☐

23. When there is a failure, how long does it take to fix the fault

< 1 hour☐	1-6 hrs ☐	1 day☐	>1 day☐

24. Which is the most common type of computer failure? (***Please tick only one***)

unable to log in	☐
No e-mail access or internet	☐
unable to load applications	☐
Computer is dead	☐

25. Do you call or e-mail the help desk in your institution when you encounter problems?
Yes ( ) No ( )

26. Is your campus computer network stable? Yes ( ) No ( )

27. On average, how often do you experience power failure and you are unable to use your computer?

Once a day☐	Once a week ☐	Once a month ☐	Never(if on ups)☐

People and organizations online

28. Have you *ever* used internet services? Yes ( ) No ( )

29. If yes, how do you use the Internet in order of importance? **(1 – Most important, …, 6 – Least important)**

E–Mail	
News /Entertainment	
Business Transactions/ Banking	
General Search for information	
Academic (learning, teaching, research)	
N/A	

30. How regularly do use the internet?

Daily ☐	Less than 3 days a week ☐	Monthly ☐

Other, specify_____

31. Do you know someone who has (also) used the internet?
Yes ( ) No ( )

32. If you have never used the internet, are you interested in accessing the internet?
Yes ( ) No ( )

33. Do you *have* an email address?
Yes ( ) No ( )

34. If yes, with *whom* is your main address?

Institutional ☐	International Web-based e-mail (e.g., Yahoo or Hotmail) ☐	Local ISP ☐

35. What is the purpose of your having an email address in order of importance? (***1 = most important, 5 = least important***)

Academic	
Administration	
Banking/Investments	
Entertainment/Shopping/News	

Emergency/Help/Rescue	

Other, specify_____

36. How would you classify your Institutions or department website?

Informational website ☐	Interactive website ☐	Do not know ☐

37. Do you use your institution's in-house Web-based training application on the Intranet?

Yes☐	No☐	N/a☐

38. Do you use other local or international Web-based training websites?

Yes ( ) No ( )

39. Are there any local Web portals (e.g., Newspapers) that you regularly visit?

Yes ( ) No ( )

40. Have you seen your Institution's website advertised in other media (e.g. radio, TV, print etc.)

Yes ( ) No ( )

41. Do you subscribe to any local mailing lists? Yes ( ) No ( )

42. What local websites (.ke or local organizations) do you visit regularly? **(***Please tick only one***)**

Government websites ☐	Newspapers ☐	Other educational /research websites ☐	Local ISP/ Company websites☐	None ☐

Locally Relevant Content

43. On average how many local websites do you visit that contain local topics/information?

None ☐	1 - 2 ☐	3 - 4 ☐	> 4☐

44. Please name one of the local websites you find most useful _____

45. How frequently is your most useful local website updated?

Daily ☐	Weekly ☐	Monthly ☐

Other, specify_____

46. In what language(s) are the websites that you visit?

English ☐	Kiswahili ☐	Both English and Kiswahili ☐	Other Local Languages ☐

Other, specify_____

47. What type of information do you seek through these local websites? **(*Rank in order of importance 1-most important 5-Least important*)**

Academic	
Administration	
Banking/Investments	
Entertainment/Shopping/News	
Emergency/Help/Rescue	

Other, specify_____

48. How dissimilar are the web-sites that you visit with regard to type of information?

Just the Same ☐	Slightly Different ☐	Very Different ☐

Other, specify_____

49. Do the web-sites that you visit carry different types of information relevant to different groups within the community? Yes( ) No ( )

50. If not, to whom is the web-site information most relevant?

All Youth ☐	Students ☐	The Employed ☐	All Kenyans ☐

Other, specify_____

51. Which of the following do you use or participate in most frequently? **(*Rank in order of frequency 1 – most frequently, …, 3 – Least frequently)***

User Discussion Groups ☐	E-mail Newsletters ☐	List-serves ☐

Other, specify_____

52. Do you have opportunities for web-related training? Yes( ) No ( )

53. If yes, who pays for it?

Self ☐	Institution ☐	Other, Specify _____

54. Are there web-related skills that you feel you require but are not available locally?

Yes ☐	No ☐	Other, Specify _____

55. What proportion of your campus website content is on local issues?

< 5% ☐	5%-10% ☐	11%-20% ☐	21%-30% ☐	> 30% ☐

56. Is your campus website content also available in Kiswahili? Yes( ) No ( )

57. How regularly is the content of your Institution's website updated? ***(tick one)***

Daily ☐	Weekly ☐	Monthly ☐	Yearly ☐	Do not know ☐

58. Which of the following media have been used to promote your Institution's website? **(*Chose more than one if necessary*)**

Radio and Television ☐	Newspaper ☐	Internal bulletins ☐	Notice boards ☐	None ☐

ICT IN EVERYDAY LIFE

59. Do you have *access* to a fixed telephone line? Yes( ) No ( )

60. If yes, where *mainly* do you obtain fixed telephone services? **(*Chose one*)**

Home ☐	Workplace ☐	Home & Workplace ☐	Public Booth ☐	Cyber Cafés or Tele-centers ☐

Other, specify_____

61. For what purpose do you mainly use your office fixed telephone? (***Rank in order of importance 1= most important, 5= least important***)

Academic ☐	Administration ☐	Banking/ Investments ☐	Entertainment/ Shopping ☐	Emergency/ Help/ Rescue ☐

Other, specify_____

62. Do you have *access* to a mobile phone? Yes( ) No ( )

63. If yes, where *mainly* do you obtain mobile phone services? (***Chose only one***)

Own Line ☐	Workplace ☐	Own & Workplace ☐	Public Booth ☐	Tele-Centre or Cyber Café ☐

Other, specify_____

64. Do you send SMS messages? Yes( ) No ( )

65. On average, how many SMS messages do you send or receive per day?

None ☐	1 - 3 ☐	3 - 5 ☐	> 5 ☐

66. What is the nature of these messages? (***Rank in order of importance 1= most important, 6 = least important)***

Academic	
Administration	
Banking/Investments/E-bills	
Entertainment/Shopping/News	
Personal/Greetings/Social	
Emergency/Help/Rescue	

67. Have you *ever* used a computer? Yes( ) No ( )

68. If yes, where *mainly* do you obtain access to a computer?

Home ☐	Workplace ☐	Home & Workplace ☐	Cyber Café ☐

Other, specify_____

69. For what purpose did/do you use the computer? (***Chose more than one if necessary***)

Word Processing ☐	Data Analysis ☐	Email/Internet ☐	Entertainment ☐

Other, specify_____

70. Are you able to listen to radio on a daily basis? Yes( ) No ( )

71. If you listen to radio, where mainly do you obtain access to radio services? (**Chose only one**)

Home ☐	On Campus ☐	Home & Campus ☐	Public ☐

Other, specify_____

72. Are you able to *watch* television on a daily basis? Yes( ) No ( )

73. If you watch television, where mainly do you obtain access? **(*Chose one*)**

Home ☐	On campus ☐	Home & On campus ☐	Public Place ☐

Other, specify_____

ICT in Workplace (To be completed by staff only)

74. How do you transact your official business? (In order of importance 1-most common 2-least common)

Person-to-Person ☐	Fixed Telephone☐	On Mobile/ SMS ☐	Through Fax ☐	On Email ☐	Memos/ Letters☐	Web ☐

75. How often do you use the internet for academic work (research, teaching or learning)?
Always ( ) Rarely ( )

76. Do you have unlimited access to telephone services?
Yes ( ) No ( )

77. Do you have access to a personal computer?

Yes ( ) No ( )

78. If yes, who provided this to you?

Self ☐	Employer☐	Research Project ☐	Other, Specify _____

79. How often do you use email for internal communication?

Regularly ☐	Occasionally ☐	Rarely ☐	Never ☐

Other, specify_____

80. Do you have internet access from your office computer? Yes ( ) No ( )

81. Do you use a mobile for your work? Yes ( ) No ( )

82. Do you use mobile-based internet services (e.g., EDGE, PDA, Laptop access)?

Yes ( ) No ( )

83. Do you have an official business card complete with an email and web-site addresses?

Yes ( ) No ( )

84. Do you subscribe to any mailing list (local or international) Yes ( ) No ( )

85. What local web-sites do you visit regularly when in your office? (**Chose more than 1 if applicable**)

None ☐	Universities (Local or international) ☐	Government (.go.ke Websites) ☐	Newspapers ☐	Supplier/ Customer ☐

Other, specify_____

86. How long do you stay on-line on the internet for email or web-sites while in your office?

Hardly ☐	Less than 30 Minutes ☐	Up to One Hour ☐	More than an Hour ☐

Other, specify_____

87. How frequently do you access the internet for email or web-sites from your office?

Hardly ☐	Daily☐	Weekly☐	Bi-Monthly ☐	Monthly ☐	Occasionally ☐

Other, specify_____

88. Do you have access to a telephone extension in your office or campus?

Yes ( ) No ( )

89. Do you have a PC in your office? Yes ( ) No ( )

90. Do you use a mobile phone for your work? Yes ( ) No ( )

91. Do you use mobile internet from your office (access the Internet using your mobile phone)?

Yes ( ) No ( )

92. Do you have Internet access from your office computer? Yes ( ) No ( )

93. How often do use ICT facilities (telephone, faxes, pagers and computers) for your work in the Institution?

Highly used ☐	Moderately used ☐	Fairly ☐	Hardly used ☐

94. How do you use computers at work? (***Chose more than 1 where applicable***)

Private access to Internet	☐
Work-related Internet access	☐
Access organizational application	☐
Microsoft Office applications (word, excel)	☐
Do not use	☐

ICT Employment Opportunities (Staff only)

95. Do you think the IT department is important in your organization?

Yes ( ) No ( )

96. Is the Head of IT department in your institution a senior officer?

Yes ( ) No ( )

97. Does the head of IT department in your institution provide effective leadership of the IT function?

Yes ( ) No ( )

98. Are the ICT professionals in your institution motivated?

Not Motivated ☐	Moderately ☐	Highly motivated ☐

99. Are the ICT professional in your institution qualified and experienced?

Inexperienced ☐	Qualified and experienced ☐	Qualified but inexperienced ☐

100. Does your organization retain experienced and qualified IT professionals?

Yes ( ) No ( )

101. Does your institution have enough IT professionals to support you in your workplace?

Yes ( ) No ( )

102. Does the head of your institution (e.g., VC or Principal) consider the head of ICT department in your institution important?

Yes ( ) No ( )

103. Do most of your colleagues need to use computers and the Internet for their work?

Yes ( ) No ( )

104. Do you type your own letters, reports, notes or presentations?
Yes ( ) No ( )

105. Is ICT literacy important for your career progression?
Yes ( ) No ( )

106. Do computers increase your productivity? Yes ( ) No ( )

107. Is access to Internet essential for your work? Yes ( ) No ( )

108. Is a mobile phone necessary for your work? Yes ( ) No ( )

KENET Vision statement

To be a national world-class research and education network in Africa by 2010

KENET Mission statement

To drive the integration of ICT in research and learning through quality, cost effective and efficient provision of ICT services and to be a key partner in the development of the ICT society