

The E-Readiness Survey 13 of Kenyan Universities



E-READINESS 2013 SURVEY OF KENYAN UNIVERSITIES

A STUDY FUNDED BY THE KENYA EDUCATION NETWORK

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May 2014

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Citation

Kashorda, M., & Waema, T. (2014). E-Readiness Survey of Kenyan Universities (2013) Report. Nairobi: Kenya Education Network.

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ACRONYMS AND ABBREVIATIONS

BYOD	Bring Your Own Device
CFO	Chief Finance Officer
CUEA	Catholic University of East Africa
DVC AA	Deputy Vice Chancellor for academic affairs
EA	East Africa
ERP	Enterprise resource planning systems
Gb/s	Gigabits per second
GER	Gross enrolment ratios
ICT	Information and Communication Technology
IDI	ICT Development Index
IEEE	Institution of Electrical and Electronics Engineering
IP	Internet Protocol
IRU	Indefeasible rights of usage
ISP	Internet service providers
ITU	International Telecommunications Union
JKUAT	Jomo Kenyatta University of Agriculture & Technology
Kb/s	Kilobits per second transmission speeds
KCA	Kenya College of Accountancy
KENET	Kenya Education Network
KTCIP	Kenya Transparency and Communications Infrastructure Project
LMS	Learning management system
M&E	Monitoring and evaluation
Mb/s	Megabits per second
MIS	Management information systems
NOFBI	National Optical Fiber Backbone Infrastructure
NREN	National Research and Education Network
NRI	Networked Readiness Index
ODL	Open and Distance Learning
OPAC	Online Public Access Catalogue
OSS	Open Source Software
PBX	Private Branch Exchange
PC	Personal computer (desktop, laptop or notebook)
PDAs	Personal Digital Assistants
SPSS	Statistical Package for Social Science
UoN	University of Nairobi
UPS	Uninterruptible Power Supply
USD	US Dollars
USIU	United States International University
VCs	Vice Chancellors
VSAT	Very Small Aperture Terminal

ACKNOWLEDGENTS

This is the third comprehensive E-readiness 2013 survey of Kenyan Universities and unlike in the past was funded by a Kenya Education Network (KENET) research grant. We therefore thank KENET Board of Trustees for the research grant.

The 2013 E-readiness survey required detailed and confidential data from the 30 participating universities and it could not have been completed without the support of the Vice Chancellors and the senior leadership of the universities. We therefore thank the Vice Chancellor who approved the data collection exercise. We also thank the senior leadership of the universities who include the Deputy Vice Chancellors in charge of Academic Affairs, university registrars, directors of e-learning, university librarians, chief finance officers, deans of ICT and engineering, and ICT directors who completed the hard facts questionnaires and facilitated data collection from the faculty, students, and staff in their respective universities. We also thank the over 14,000 students and over 1,400 faculty and staff who participated in the survey and others who attended stakeholder workshops to discuss the findings.

The researchers were supported by a research team consisting of 42 research assistants from each of the participating campuses coordinated by Dr. Margaret Nyambura Ndungú, the research coordinator. It would have not been possible to collect the data without the support of the research team and we sincerely thank them for their commitments and for the hard work of training and supervising the data collection exercise. Since all the research assistants were employees of the universities, most junior faculty members, we thank the universities for allowing them to provide the research services.

We thank Caleb Ouma, our competent and hard-working statistical analyst who has served as the lead statistician since 2006, Robert Kimiti, a very able database designer who also designed the web-based data entry forms, Dancun Onyango Oguta the assistant statistician who was involved in supervising data entry and data clean-up exercises. We thank KENETs' administration officer, Bernadette Mwandau and the finance team for supporting the project implementation. Last but not least, we thank Mrs. Josephine Mwasi Mutungi who edited the final report.

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May 2014

EXECUTIVE SUMMARY

The e-readiness 2013 survey of Kenyan universities is the third in a series of studies that were started in 2006 (Kashorda et. al., 2006). It is also the first comprehensive survey conducted after the universities were connected to the undersea Internet bandwidth in 2010 that was nearly 10 times cheaper than the satellite bandwidth available during the 2008 survey. The 2013 survey has therefore provided an opportunity to explore the impact of broadband connectivity on the overall e-readiness of universities.

E-readiness is a measure of the preparedness of a university or institution to use ICT to enhance the quality of learning, teaching, and research. A high degree of e-readiness also contributes significantly towards the realizations of a university's academic and administrative goals. As with previous studies, the key objective of the 2013 e-readiness survey was to conduct a *diagnostic* assessment of a representative group of Kenyan universities to provide the research data required to develop, review or monitor institutional and ICT strategic plans. The purpose therefore was not to rank universities but to provide them with information that would assist them to use ICT to realize their mission and goals.

The 2013 survey, supported by an internal KENET research grant for Kenyan universities, covered 30 universities with a student enrolment of 423,664. It included the 17 universities surveyed in 2006 and 2008, making it possible to conduct a trend analysis of e-readiness for these selected universities. The second survey in 2008 was supported by a Rockefeller Foundation grant through KENET, the National Research and Education Network (NREN) of Kenya (see http://www.kenet.or.ke) and covered 50 East African universities in Burundi, Kenya, Rwanda, Tanzania and Uganda.

The e-readiness assessment framework developed by the KENET research team contained 17 e-readiness indicators grouped into five categories: network access; networked campus; networked learning; networked society; and institutional ICT strategies (UC, 2011). Each indicators was staged on a scale of 1 to 4, where 1 represented unprepared and 4 represented the highest level of preparedness.

The KENET e-readiness research team included Professor Meoli Kashorda (USIU, Kenya), the lead researcher, and Professor Timothy Waema (University of Nairobi, Kenya). They were assisted by Dr. Margaret Nyambura Ndung'u, the 2013 research coordinator and a team of data analysts led by Mr. Caleb Ouma Ongong'a, the research statistician since 2006.

Methodology

The e-readiness survey collected data from 30 universities consisting of 20 public universities and 10 private universities. All the 17 universities that participated in the 2006 and 2008 surveys were included. The total student enrolment for the 30 universities was 423,664 and was estimated to be about 80% of total enrolment in Kenyan universities.

The main factors considered in selecting the 30 universities were:

- 1. The 17 universities that participated in the 2006 and 2008 surveys in order to provide data for longitudinal studies
- 2. University campuses with a student enrolment of 2,000 and above

- 3. Universities that participated in the preliminary hard facts demographic data collection exercise in 2012 and 2013
- 4. Universities that were fully chartered by the Commission for University Education. University colleges or private universities in initial stages of formation were therefore not included.

The e-readiness survey assessment was campus-based and covered 42 campuses of the 30 universities. Data was collected over a one-month, from mid-October to mid-November 2013, using hard facts and perception questionnaires originally developed for the 2006 survey but modified in 2008 and 2013 to collect additional data (e.g., laptop ownership by students). The modified hard facts questionnaire that had six sections was completed by chief academic officers; chief finance officers; registrars; deans of ICT; university librarians; and directors of ICT.

The perception questionnaires were completed by students, faculty and non-teaching staff in all 42 campuses. Unlike in the past, the 2013 modified perception questionnaire included questions on laptop and smartphone ownership as well as the learning and university environment. Similar questions were used in the annual EDUCAUSE survey of undergraduate students and information technology (IT) in the United States of America (USA). The 2013 survey questionnaires were posted on the e-readiness survey 2013 website <u>http://ereadiness.kenet.or.ke</u>.

The perception questionnaires were administered to a statistically significant sample for each of the 42 campuses. The total sample comprised 1,497 teaching and non-teaching staff, and 14,974 students. The sample size for the perceptions questionnaires took into account the student population, different categories of students (undergraduates, post-graduates), faculty and staff. The sample sizes were statistically significant for each university. The resulting confidence interval was about 1% with 95% confidence level.

Staging analysis and key findings

The study analyzed the aggregate staging for each of the five categories of e-readiness indicators as well as data for each university. Detailed results for each of the 30 universities that participated in the survey were posted in the e-readiness survey results database and are available to authorized users of in universities (see http://ereadiness.kenet.or.ke). The universities could use the results as part of monitoring and evaluation of their ICT or corporate strategic plans, or for regular review of their strategic plans. The results could also be used for benchmarking among participating universities (i.e., University of Nairobi could compare their results with Kenyatta University with permission).

Figure 8-1 summarizes the overall results of the 2008 and 2013 surveys. It is evident that in the five years between the surveys, there has been limited accession to higher stages for most of the 17 indicators. In fact, only two indicators, namely, ICT in the workplace and network environment had moved to stage 3.0 and above by 2013 while the other 15 indicators remained below stage 3.0. However, the Internet availability indicator moved from stage 1.6 to stage 2.9 in 2013 mainly due to the increase by a factor of 10 in the Internet bandwidth per 1,000 students sub-indicator.



Figure 8-1: Average staging for 17 indicators for 2008 and 2013

Source: KENET e-readiness data 2008 and 2013

In general, the results suggest that accession to higher stages has been slow since the universities were not able to achieve stage 3 for 15 out of the 17 indicators. A similar conclusion was reached by the 2008 survey which demonstrated that accession required the commitment of the academic, administrative and ICT strategic leadership.

Network access

The Internet availability indicator moved from stage 1.6 in 2008 to stage 2.9 in 2013. This was mainly because the average Internet Bandwidth per 1,000 students increased from 0.43 Mb/s to 4.1 Mb/s. This was a tenfold increase, attributed to the drop in the average unit cost of Internet bandwidth from \$2,300 per Mb/s in 2008 to about \$160 per Mb/s per month in 2013 for the 30 universities. Despite the over 90% price reduction, \$160 per Mb/s was still a high price in comparison to developed countries. However, anecdotal evidence suggests that this was one of the lowest unit prices in Kenya for no-contention international Internet bandwidth.

The networked PCs available per 100 students ratio, another sub-indicator of Internet availability, dropped from stage 5.8 in 2008 to stage 3.8 in 2013. This drop was somewhat compensated by the large number of students who owned laptop computers at 53%, as students owned over 200,000 laptop computers compared to 16,174 student lab computers available at the 30 universities. Universities therefore need to invest in enhanced campus backbone and wireless network infrastructures in order to support this large number of student-owned laptop computers.

However, lack of adequate student computer lab facilities for about 50% of the students who did not own laptops was driving students to cyber cafés for computer and Internet access as described in Chapter 3. The results showed that about 25% of the students

accessed computers and Internet from cyber cafés while only 17% accessed computers from their campuses. Universities therefore need to invest in student computer labs to serve the students who are unable to purchase laptop computers or those who may not wish to carry their laptop computers to university campuses.

The Internet affordability indicator dropped from stage 1.9 to stage 1.4 which seemed counter-intuitive with the drastic drop in prices of undersea bandwidth. The key reason was the over 100% increase in student enrolment that reduced the ratio of Internet bandwidth expenditure per 1,000 students ratio that was used to stage the affordability indicator. Table 3-1 summarizes the changes in student enrolment and Internet availability sub-indicators.

Table 3-1: Demographic data and Internet availability sub-indicators for 17 universities-2008 and 2013

Year of survey	Total students	Total PCs owned by students	Total bandwidth (Mb/s)	Internet bandwidth per 1,000 students	PCs per 100 students	% of students with PC access at home
2008	162,319	8,907	70.8	0.436	5.5	27
2013	339,418	13,815	1,431.5	4.22	4.07	30.4

Source: KENET e-readiness data 2008 and 2013

Universities therefore need to increase their Internet bandwidth budgets due to the increased student enrolment as well the large number of student-owned laptops in university campuses. On average, the universities were spending only 0.5% of their total recurrent expenditures on Internet bandwidth. The researchers propose that this should be increased to at least 1% of the total recurrent expenditure in order to achieve stage 3 and above.

Apart from the low PC ratio, the students considered the campus networks slow and unstable as described in Chapter 3. For example, about 56% of the students considered the campus networks unstable while 52.2% considered their Internet speed to be slower than cyber cafés or 3G mobile internet. This suggests that campus networks were poorly designed and managed and hence the high degree of dissatisfaction. This clearly points to inadequate investments in campus infrastructure as well as ICT human capacity. This is a critical issue that is analyzed in Chapter 8.

ICT financing

The universities moved from stage 1.7 in ICT financing to stage 2.0 and were spending only 0.5% of their total expenditure. This should be increased about 1% to achieve stage 3 and 2% to achieve stage 4.

The data showed that most of the 30 universities were charging *student lab fees* that could be used to finance all recurrent ICT expenditures, including ICT staff salaries and Internet bandwidth. However, it was not clear from the data if the lab fees were being used exclusively for ICT recurrent expenditures. This is a potential subject for future research. In addition, ICT departments need to start charging for ICT services provided to other universities departments (e.g., finance and academic affairs departments) in order to increase the revenue available for ICT infrastructure investments.

Networked learning indicators

The networked learning indicators include enhancing education with ICT; ICT in libraries; ICT research and innovation; and developing the ICT workforce that were all below stage 3. The networked learning indicators measure the preparedness of institutions to support new and innovative ways of teaching, learning and research in universities. Low stages means that universities were not ready to transform teaching, learning and research using ICT. For example, 77% of the students stated that they preferred blended learning that combined face to face and online learning, rather than the traditional face to face teaching. To better serve students, the faculty should adjust their teaching approaches and develop the necessary e-learning content.

The ICT research and innovation indicator was low at stage 1.8 having dropped slightly from stage 2.2 in the 2008 survey. This was measured only using availability of PhD and master's ICT degree programs as well ICT innovations incubators and not the throughput. Additional data that was not used for staging included throughput of master's and PhD programs and the percentage of faculty with doctoral degrees. The supplementary results showed that only 13.5% of the 535 ICT faculty members in the 30 universities had a PhD while the rest had a master's degree. This could be addressed in the next five years by increasing the throughput of doctoral programs in ICT. The low staging indicates that availability of broadband Internet does not necessarily lead to an increase in research and innovation output without the leadership of academic heads of department.

The enhancing education with ICT indicator at stage 2.8 had not changed significantly since 2008. Universities were still not tracking the percentage of online or e-learning courses developed. The survey results indicate that on average about 73% of university students preferred blended courses compared to only 14.9% who preferred online courses only. This preference, along with results of similar studies conducted in USA universities (Dahltrom, 2013), should inform the e-learning strategies of the universities. However, only 11% of the students reported that nearly all or all courses they took were blended while about 78% reported that only a few or none of the courses were blended in 2013. There was therefore a big disconnect as the majority of students preferred blended courses yet such courses were not widely available. Interestingly, a high percentage of students wanted their instructors to use more learning management systems (LMS) (42%), e-books (51%), and open content available on YouTube or Khan Academy (45%). These findings should also inform university e-learning strategies.

While about 53% of the students reported owning smartphones, only 24.1% of them had very good or excellent experience in using them to access electronic library resources, including the university open public access catalogue (OPAC) system. In addition, only 24.6% of the students had good or excellent experience using their mobile handsets to access the university learning management system that hosted e-learning courses. This suggests that the universities' electronic resources were not yet fully adopted for access using mobile handsets despite the high penetration of mobile handsets among students.

Internal vs. external factors of e-readiness of universities

Only six of the 17 indicators, namely, Internet availability; Internet affordability; network environment (reliability of commercial power supply); ICT in everyday life; locally relevant content, and people and organizations, partly depend on the external national ICT environment. The staging for all the other 11 indicators were directly influenced by senior leadership of the universities and their Vice Chancellors. They also had significant influence on the level of staging achieved for the six indicators that were partly influenced by external factors.

The Government of Kenya has over the years improved the regulatory environment to promote growth of the ICT sector and increase availability of broadband Internet in the country. Most of the universities surveyed were located in areas where commercial power was available but required backup generators and uninterrupted power supply (UPS). The government also supported the universities through the bandwidth expansion project funded by the World Bank through the Kenya Transparency and Communications Infrastructure Project (KTCIP) that led to the drop in the cost of Internet bandwidth to \$160 per Mb/s in 2013. Thus, it was the institutional strategies that would influence accession to higher stages as described in Chapter 8.

Summary results and conclusions

The main conclusion from the 2013 survey is that the university community in Kenya is ready to use ICT for learning, teaching, research and management. Table 7-2 shows that senior leadership of the universities appreciated the full value of ICT in achieving their institutions' mission, however, it unclear why this has not translated into higher levels of e-readiness with only two out of 17 indicators achieving stage 3 and above.

The results also show that universities are not investing sufficiently in campus backbone and wireless network infrastructure that will make it easier for students to use their own laptops and smartphones on campus to access learning materials and other student services. They are also not preparing or encouraging faculty to develop e-learning materials or adopt blended teaching techniques.

	DVC AA	Dean ICT	FO	Registrar	Librarian	Director ICT
Enhanced quality of teaching	\checkmark	\checkmark				\checkmark
Enhanced quality of learning	\checkmark	\checkmark				\checkmark
Improved research productivity		\checkmark				
Expanded research opportunities	\checkmark	\checkmark				
Enhanced competitiveness	\checkmark				\checkmark	
Reduced op. costs	\checkmark		\checkmark	\checkmark	\checkmark	
Enhanced revenue						
Enhanced opportunities for revenue generation	\checkmark					
Increased efficiency	\checkmark		\checkmark	\checkmark	\checkmark	\checkmark
Improved quality of service delivery	\checkmark	\checkmark	\checkmark	✓	\checkmark	\checkmark
Increased transparency & accountability	\checkmark		\checkmark	\checkmark	\checkmark	

<i>Table 7-2:</i>	Summary results of	of perceptions th	at stakeholders	agreed or s	strongly agreed	on impacts of ICT
	~			0	0,0	

Source: KENET e-readiness data , 2013

Over the past five years, Internet availability has improved significantly because of the focus on only one sub-indicator–Internet bandwidth per 1,000 students. The target set by KENET researchers had been revised to 10 Mb/s per 1,000 students which is a modest 200 kb/s per online student assuming only 5% were concurrently, which is rather low. The universities in 2013 achieved 4.0 Mb/s per 1,000 students compared to only 0.431 Mb/s per 1,000 students in 2008.

The researchers recommend that universities should start tracking the sub-indicators shown in Table 9-1 in their institutional strategic plans. Though the sub-indicator targets depend on a particular university they have been found to be achievable by some of the 30 universities that participated in the study.

Sub	-indicator	Sub-indicator value (2013)	Target for 2015 survey
a.	Annual Internet bandwidth expenditure	\$7,330	\$15,000
	per 1,000 students		
b.	Internet bandwidth per 1,000 students	4.0 Mb/s	10 Mb/s
с.	PCs per 100 students	3.8	10
d.	Estimated % number of students who	53%	75%
	own laptops		
e.	Percentage of students who took all or	11%	50%
	nearly all blended courses		

Table 9-1: Recommended critical sub-indicators and targets

All the data collected and analyzed shall be available in the e-readiness survey research database to authorized users. It could be used for benchmarking among the participating universities.

In conclusion, it is the senior leadership who will have to measure and monitor the strategic e-readiness indicators in order to achieve significant accession in all 17 indicators in the next two years before the 2015 e-readiness survey is conducted.





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