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Application of Information and Communication Technology in Institutions of Higher Learning in Kenya

By Edwin Andama Ombasa

Abstract

Technology in the 21st century has grown in leaps and bounds. Information and Communication Technology today is applied in nearly all spheres of human life. ICT has offered a window through which institutions of higher learning efficiently carry out their day to day activities of teaching, research and community service. It was against this background that the current study sought to investigate application of ICT in these institutions. The study applied a descriptive survey design. The study targeted the 70 public and private universities in the republic. Out of this population, 21 public and private universities were purposefully sampled to take part in the study. Respondents were sampled randomly. They comprised of 384 members of academic staff and 58 members from various departments of university administration. Quantitative data from the questionnaire was coded into categories based on the study objectives and fed into SPSS computer software version 20 which analyzed it using percentages and frequencies. Data was presented in frequency tables. The study established that ICT is applied in various domains such as: offering distance learning courses, delivering lessons, managing students' fees records, booking hostel rooms, and processing examinations.

Key Words: administration, ICT, teaching-learning

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Introduction

Information and Communication Technology (ICT) refers to a set of technological tools and resources used to communicate, create, disseminate, store and manage information. They include technologies such as radio, television sets, video, telephone, computer hardware and software, and so forth (UNESCO, 2002). On the other hand, Pernia (2008) defines ICT as technologies used to communicate in order to create, manage and distribute information. These include computers, internet, telephone, television, radio and audio-visual equipment. Pernia further argues that ICT devices and applications are used to access, manage, integrate, evaluate, create and communicate information and knowledge. Use of ICT in institutions of higher learning in the 21st century has experienced phenomenal growth. It was against this background that the current study sought to investigate how institutions of higher learning in Kenya apply ICT to run their day to day functions. The specific objectives of this study were to:

- i. Explore how ICT is applied to conduct administrative functions in Kenyan universities.
- ii. Investigate how ICT is applied to conduct teaching-learning activities in Kenyan universities.

Literature on ICT in Administration

Use of ICT to run administrative functions of institutions of higher learning can play a major role in the efficient utilization of existing resources and simplification of administrative tasks. It reduces paper work as it replaces manual maintenance of records to electronic maintenance which helps in easy retrieval of any information of students and staff (Alam, 2006). According to Ben-Zion et al. (1995) ICT can be applied in the following areas for effective educational administration in institutions of higher learning: general administration, payroll and financial accounting, administration of student data, inventory management, library system, and personnel records maintenance. Unlike the current study, Ben-Zion's study was not empirical.

Caroline and Salerno (2000) suggest the following ways of introducing technology in educational institutions' administration: sending email notices and agendas to staff instead of printing and distributing them manually, submitting lesson plans through email, asking parents to write email addresses on medical forms, insisting for all teachers to create a class web page, processing admissions through web enabled services and attending technology conferences to see what other institutions are doing. The current study provides empirical data to support Caroline and Salerno's arguments.

According to Hossein (2008), ICT provides many facilities and possibilities for education administrators to perform their tasks. They allow information to be transferred, stored, retrieved and processed by almost anybody who either works or studies in a given institution. Besides this, Hussein argues that use of ICT enhances managerial effectiveness and efficiency. The same is emphasized by Mugenda (2006) who argues that ICT fosters the dissemination of information knowledge by departing content from its physical location. This flow of information crosses geographical boundaries allowing remote communities to become integrated into global networks and making information, knowledge and culture accessible.

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Areas in which ICT can be applied include timetabling, student admission tracking, financial management, medical services, procurement and store management, data distribution and management. However, Mugenda doesn't provide empirical data to support her argument.

Krishnaveni and Meennakumari (2010) did a study in institutions of higher education in India. The study divided information administration into three categories: student administration, staff administration and general administration. Student administration dealt with student information such as use of electronic media by students to apply for admissions, use of computers for student registration, availing teaching timetable to students in electronic format, using computers to maintain attendance registers, communicating academic information of students to their parents via e-media, use of e-media for notification regarding transportation and use of e-media for notifications regarding hostel accommodation. Staff administration focused on using computers to recruit and allot work to staff, automation of attendance and leave management, use of e-media for performance appraisal, communication with staff using e-media, e-circulars from the institution. On the other hand, general administration involved using e-media to schedule examination halls, use of e-media by students to apply for examinations, using e-media to process and display examination results, use of e-media by students to pay/activate fee payment and use of e-media by staff to submit claims. In general, the study established that 66% of respondents utilized technology for student administration, 46% for staff administration, and 37.6% for general administration. It was also established that 58.5% of respondents made use of technology for overall information administration. Unlike Krishnaveni and Meennakumari's study, the current study was based in Kenya.

Literature on ICT in Teaching and Learning

Information and Communication Technology being one of the building blocks of contemporary society has substantially changed the practices and procedures of nearly all forms of endeavor within academia and governance (Alam, 2016). The revolutionary transformation which is taking place in ICT has dramatic effects on the way institutions of higher learning carry out their functions of teaching-learning and research. This requires a shift in the delivery and pedagogy used in the current education system. Research evidence shows that use of ICT in instruction enables students to take a more active role in their learning rather than their more traditional role of being a passive observer and listener. Therefore, it's important to pay attention to the ICT implementation in education systems for imparting easily accessible, affordable and quality higher education.

Use of ICT in institutions of higher learning is a good strategy to bridge the gap of staff shortage. This is possible by creating networking laboratories, creation of databases, access to expert lecture and technological developments in industries and research institutions (Alam, 2016). Teaching and learning can further be improved by replacing traditional methods with innovative instructional methods such as *PowerPoint* presentations, animations, simulations, video clips and overhead projectors. This enhances the quality of learning and also helps instructors to elaborate difficult concepts in an effective and time conscious way (Ali et al., 2013). Unlike theoretical arguments by Alam and Ali et al., the current study emerged to provide empirical evidence on application of ICT in teaching-learning activities.

Guma, Faruque and Kushi (2013) studied factors influencing use of ICT in institutions of higher learning in Uganda to make teaching and learning effective. The descriptive survey sampled 165 respondents from five institutions of higher learning who included administrators and lecturers. The study established that access to ICT resources, pressure from peers, teachers' computer efficacy and gender were among the factors that had a big influence

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on staff's use of ICT to teach. However, since the study didn't focus on application of ICT in teaching-learning, it left a gap that the current study exploited.

Grims (2000) argues that, "...teaching ICT skills in institutions of higher learning prepares students to face future developments based on a proper understanding..." (p. 363). In support of this, Branford & Cocking (2000) say that, "...use of ICT helps students and teachers to develop competencies needed for the 21st century." (p. 206). Besides this, Dede (1998) argues that use of ICT in education helps improve memory retention, increase motivation and enhances a student's comprehension of concepts. In spite of this, these studies are not empirical. This gap was filled by the current study.

According to Forcheri & Molfino (2000), use of ICT in teaching-learning promotes collaborative learning such as through role playing and group problem solving activities. This corroborates an argument by Guma, Faraque and Khushi (2013) that many people recognize ICTs as propellers of change in working conditions, handling and exchanging information, teaching methods, critical thinking and peer discussions. However, these arguments are not based on empirical data. The current study addressed this gap.

Miller, Martineau & Clark (2000) emphasize the role of ICT in the teaching and learning process by arguing that technology-based teaching is very facilitative since it provides relevant examples and demonstrations, changes the orientation of the classroom, increase flexibility of delivery, increases access and satisfies public demands for efficiency. Apart from this, Louw, Muller & Tredoux (2008) say that ICT is very central in curriculum delivery. It has the ability to improve teaching-learning abilities and consequently improve learners' performances. However, these arguments are not based on empirical data. The current study addressed this gap.

Castro (2003) and Cawthera (2000) posit that technology aided teaching and learning develops in the learner cognitive skills, critical thinking skills, evaluation, synthesis skills and also help them access information easily. Like in most studies, Castro and Cawthera do not provide empirical data — a gap addressed by the current study.

Research Design and Methodology

The study applied a descriptive survey design. According to Orodho (2009) a descriptive survey design is a method of gathering data from respondents under settings which have not been controlled or manipulated in any way. This design was suitable for the study since the researcher aimed at gathering respondents' opinions without manipulating any variables by way of experimentation.

The target population was all the 70 public and private universities in the republic. A target population refers to the number of real hypothetical set of people, objects or events to which the researcher wishes to generalize their findings (Borg & Gall, 1989). Out of this population, a total of 21 universities (14 private and 7 public) were purposefully sampled to take part in the study. The former were more because they are more in the population. This sample represented 30 % of universities in Kenya. On the other hand, respondents were sampled randomly. They comprised of 384 members of university academic staff and 58 members from various departments of university administration.

The researcher engaged the services of 21 research assistants who were responsible for administering instruments in the sampled institutions. The main research instrument that was used was a questionnaire. According to Bryman (2008) a questionnaire is the most suitable tool to use in circumstances where respondents are scattered in a population and also when there is need to safeguard their anonymity. Since the study involved many respondents from different universities, a questionnaire was found to be the most suitable tool to use. The tool

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had closed ended items which were intended to limit respondents to specific choices that were pre-determined by the researcher.

Before the actual study was conducted, the researcher tested the validity and reliability of the instruments by carrying out a pilot study in one university which was not included in the final study. Validity refers to the extent to which theory and practical evidence supports the interpretation of test scores (Nachmias, 1996). In this study, the researcher validated his research instruments in terms of content and face validity. Validation of questionnaire items was done by seeking expert opinion from one expert from Kenyatta University that is, Dr. Francis Kirimi. He advised on the appropriate length of the questions, suitability of language used and also the comprehensiveness of the content of the questions. The researcher adopted the expert's opinions to improve the validity of the instruments.

Reliability of the instruments was ascertained during piloting. According to Mugenda and Mugenda (2003), reliability is a measure of the degree to which an instrument used in research gives consistent results after a repeated trial. This exercise involved administering the questionnaires twice within a span of two weeks and doing a correlation of results. Responses given from the two sets of questionnaires were coded and fed into the SPSS version 20 computer software for correlation. Using Pearson's Product Moment formulae, a correlation coefficient was computed in order to establish the degree to which the content of the questionnaire was consistent in eliciting similar results. The instruments were found to be reliable because they yielded a correlation-coefficient of 0.86. According to Gay (2003), when a correlation coefficient of between 0.7 and 0.8 is established, the research instrument is usually considered to be reliable.

Data was grouped according to the study objectives for analysis. Quantitative data from the questionnaire was coded into categories based on the study objectives and fed into SPSS computer software version 20 which analyzed it using percentages and frequencies. Data was presented in frequency tables.

Findings

Findings of the study were based on the study objectives, namely: to explore how ICT is applied to conduct administrative functions in Kenyan universities; and to investigate how ICT is applied to conduct teaching-learning activities in Kenyan universities. The following section presents these findings, starting with demographic information of each category of respondents.

Demographic Information of Members of University Administration

Table 1: Gender of members of university administration

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Gender	Frequency (N = 58)	Percentage
Male	28	48.27 %
Female	30	51.72 %
Total	58	100

Table 2: Administrative departments of respondents

Administrative Department	Frequency (N = 58)	Percentage
Student finance	10	17.24 %
Vice Chancellor's office	6	10.34 %
Registry	19	32.75 %
Head of Academic Dept.	5	8.62 %
Salaries and Pensions	6	10.34 %
Total	58	100 %

Table 3: Years worked in department

Years Worked	Frequency (N = 58)	Percentage
Below 1 year	3	5.17 %
2 – 3 years	9	15.51 %
4 – 5 years	21	36.20 %
Above 6 years	25	43.10 %
Total	58	100 %

Discussion

The demographics of participants show that there were an almost equal number of male and female participants. This was necessary in order to guard against gender biases. The study findings also show that participants came from various administrative departments, with a majority coming from the university registry. The fact that over 40 % of respondents have worked in their current work stations for over six years means that the kind of information they gave was accurate because they have stayed in their work stations long enough and therefore were conversant with a number of issues revolving around administration.

Responses of Members of University Administration on Application of ICT in Administration

Table 4: Application of ICT in administration

Variables	FREQUENCY (N = 58)			PERCENTAGE (%)		
	Yes	No	Not sure	Yes	No	Not sure
1. In the past two months, has important information in line with your work been communicated to you via <i>e-mail</i> ?	32	16	10	55.17	27.58	17.24
2. Are student admission letters processed and sent to applicants via <i>e-mail</i> ?	18	30	10	30.03	51.72	17.24
3. Are teaching and examination timetables generated electronically?	52	4	2	89.65	6.89	3.44
4. Do students use computer based software to register for units?	56	Nil	2	96.55	Nil	3.44
5. Are student fee payment records managed electronically?	56	Nil	2	96.55	Nil	3.44
6. Does your institution keep an inventory of books and store supplies in computerized databases?	56	Nil	2	96.55	Nil	3.44
7. Are university examination results processed and posted on the university website?	9	48	1	15.51	82.75	1.72
8. Do students book hostels online via the university website?						
9. Do you periodically fill and send your performance appraisal reports electronically?						

Discussion

The study findings established that ICT is applied in universities to perform various administrative functions. In this study, 55.17 % affirmed that in the last two months they had received important communication in line with their duties via *e-mail*. However, almost thirty percent answered on the contrary whereas a smaller percentage gave a not sure response. More than three quarters said that teaching and examination timetables in their universities are usually generated electronically. This ensures efficiency and effectiveness. Negligible percentages either gave contrary opinions or were not sure. Registration of units by students in most universities is automated. In almost all the universities, students register for units

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online. The same case applies for management of fees payment records. These findings converge with arguments by Alam (2006) that use of ICT to run administrative functions in institutions of higher learning can play a major role in the efficient utilization of existing resources and simplification of administrative tasks. It reduces paper work as it replaces manual maintenance of records to electronic maintenance which helps in easy retrieval of any information of students and staff. However, unlike Alam's theoretical argument, the current study provides empirical evidence on this issue.

Close to three quarters of respondents said that there exist electronic inventories of books and store supplies.

On the other hand, almost all respondents said that examinations are usually processed electronically and posted online at the end of every semester. The same case applied to students' booking of hostels via universities websites. An area where ICT seems not to have taken root is electronic filling of staff performance appraisal reports. A majority said that this is usually done manually rather than electronically. These findings based in Kenya add new knowledge on this topic unlike those of Krishnaveni and Meennakumari (2010) which were based in India – a country whose social and economic environments are different.

Demographic Information of University Academic Staff

Table 5: Age of academic staff

Age	Frequency (N = 384)	Percentage
Below 30 years	28	7.29 %
31 – 35 years	62	16.14 %
36 – 40 years	206	53.64 %
Over 41 years	88	22.9 %
Total	384	100 %

Table 6: Years worked as academic staff

Years Worked	Frequency (N = 384)	Percentage
Below 1 year	2	0.52 %
2 – 3 years	16	4.16 %
4 – 5 years	90	23.43 %
Over 6 years	276	71.87 %
Total	384	100 %

Table 7: Gender of academic staff

Gender	Frequency (N = 384)	Percentage
Male	256	66.66 %
Female	128	33.33 %

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Total	384	100 %
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Table 8: Academic rank

Academic Rank	Frequency (N=384)	Percentage
Professor	18	4.68 %
Associate professor	24	6.25 %
Senior lecturer	89	23.17 %
Lecturer	146	38.02 %
Assistant lecturer/ Tutorial fellow	107	27.86 %
Total	384	100 %

Discussion

The demographics above show that the study sample did not have an equal number of male and female respondents. Perhaps this could be a suggestion that most members of university academic staff are male. A majority of respondents were aged between 36 and 40 years whereas a minority was aged below thirty years. This could be an indication that a number of university academicians join the university when they are a bit older. The fact that over 70 % of respondents had worked in the university for a period of over six years strengthens the study findings as it suggests that respondents were conversant with all the questions they responded to. Besides this, the study included different cadres of academic staff ranging from assistant lecturers to professors. This makes the study findings quite representative.

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Responses of university academic staff on application of ICT in teaching-learning

Table 9: Application of ICT in teaching-learning

Variables	Frequency (N = 384)			Percentage (%)		
	Yes	No	Not sure	Yes	No	Not sure
1. Currently, is the university offering distance learning courses that you are in charge of?	107	261	16	27.86	67.96	4.16
2. In the course of this semester, have you taught a lesson via <i>Power Point</i> presentation?	102	256	26	26.56	66.66	6.77
3. In the course of this semester, have you taught a lesson using videos clips?	102	256	26	26.56	66.66	6.77
4. In the course of this semester, have you taught a lesson using videos clips?	100	250	34	26.04	65.10	8.85
4. In the course of this semester, have students submitted assignments to you via <i>e-mail</i> ?	384	Nil	Nil	100	Nil	Nil
5. Do you often download lecture notes and other learning materials online?	104	269	11	27.08	70.05	2.86
6. Do students in your university assess the overall effectiveness of lecturers and submit feedback electronically?	13	40	5	22.41	68.90	8.62
7. Do you often submit your lesson plans to your superiors via <i>e-mail</i> or any other electronic means?						

Discussion

The study findings show that ICT is significantly applied in conducting various teaching-learning activities. Slightly over a quarter of respondents affirmed that their university offered distance learning courses that they were in charge of. However, over two thirds gave a contrary opinion whereas few gave a not sure response. In classroom teaching, over a quarter of respondents agreed that in the course of the current semester they have taught a lesson using *Power Point* presentations which is a computer aided technology. A third gave a contrary response whereas few gave no response. Similar responses were also elicited with regard to use of video clips in teaching. Submission of student assignments was also seen to be aided by technology by using emails. Slightly over a quarter of respondents agreed with this whereas almost two thirds disagreed. Interestingly, all respondents indicated that they often download learning materials from online platforms. These findings collate to those of Ali et al., (2003) who says that teaching and learning can be improved by replacing traditional methods with innovative instructional methods such as *Power Point* presentations, animations, simulations, video clips and overhead projectors. This enhances the quality of learning and also helps instructors to elaborate difficult concepts in an effective and time conscious way. They also corroborate Miller, Martineau and Clark (2000) who argue that technology-based teaching is very facilitative since it provides relevant examples and

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demonstrations, changes the orientation of the classroom, increases flexibility of delivery, increases access and satisfies public demands for efficiency.

Assessment of instructors' teaching effectiveness also seems to be aided with ICT. Slightly over a quarter of respondents said that students assess them at the end of the semester and post the feedback online to the internal quality assurance department. However, this was practiced in few universities.

Conclusion

On a grand scale, this study concludes that ICT has revolutionized the higher education sector. Virtually all universities in Kenya have integrated ICT in their routine activities though with varying degrees of success. In administration, areas that seem to have adopted ICT fully are student finance and registration of units. On the other hand, management of staff appraisal reports seems to lag behind. Comparatively, teaching and research also seem to have gone digital with students and staff having more access to an array of scholarly literature on the internet. In spite of this, teleconferencing and webinar as avenues of scholarly interaction seem to have made little headway in most of these institutions. In light of the various challenges facing application of ICT in institutions of higher learning, this study came up with some recommendations.

Recommendations

Based on the study findings, the researcher makes the following recommendations: The government should increase capitation to public universities to enable them meet the high cost of integrating ICT in their functions. Members of university staff should be sponsored to attend more ICT seminars/workshops to fine tune their ICT skills. More members of academic staff should be employed in universities in order to ensure that lecturers have adequate time to develop lessons that are tech-savvy. Universities should invest in new technology as this enhances efficiency and effectiveness in service delivery.

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