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INFLUENCE OF COMPUTING COMPETENCE ON LECTURERS' PREPAREDNESS FOR E-LEARNING AT THE UNIVERSITYOF NAIROBI, KENYA

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ABSTRACT

The objective of this study was to determine the influence of lecturers' computing competence and preparedness for electronic learning (eLearning), focusing on word processing, spreadsheets, presentation, statistical analysis, internet browsing and e-mailing software packages. We applied a cross-sectional survey design with both quantitative and qualitative approaches to source data from 212 lecturers and 108 administrative staff in May 2011. The results show that participants whose competence in applying word processing packages was above average had about 5.7 the odds of being prepared for eLearning as those whose competence was below average. Those whose competence in applying spreadsheets was above average were about 2.2 times as likely to be prepared for eLearning as those whose competence was below average. Participants whose competence in presentation packages was above average had about 5.1 times the odds of being prepared for eLearning as those whose competence was below average. Structuring the training program and harmonizing its schedules with academic semesters, making the University training program continuous, initiating a program for change management are some of the measures that the University should consider to improve lecturers' preparedness to function in an eLearning setting.

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KEYWORDS: Computing Competence, E-Learning, Preparedness, Software Packages, Training, Change Management

INTRODUCTION

The unprecedented improvement of Information and Communication Technology (ICT) and the Internet after the Second World War has significantly influenced the delivery of university education, both in developing and developed countries (Naidu, 2006; Datuk & Ali, 2008). Over the past two decades, many institutions of higher learning have increasingly integrated ICT to support course delivery. The need to expand access to university education, particularly for corporate sector workers by creating a flexible mode that results to minimal inconveniences to their work schedule necessitated the interest in ICT (Naidu, 2006). Electronic Learning (eLearning) is the application of ICT and internet to support course delivery (Farahani, 2003; Omwenga, 2004). Industry practitioners often use various terminologies in place of eLearning, for instance, *online learning*, *virtual learning*, *distributed learning*, *network,* or *web-based learning*. Whatever the terminology used, the primary connotation is the application of ICT packages, including the Internet, Intranet, satellite broadcast, audio or video tapes, interactive television or CD-ROMs (Trombley & Lee, 2002; Tavangarian, Leypold, Nölting & Röser, 2004). Over the past two decades, eLearning has been gaining momentum in developed and developing countries alike, especially in response to technological revolution, including the advancement of internet as a medium of communication (Farahani, 2003; Omwenga, 2004; Selim, 2007). As such, eLearning has

attracted the interest of academic institutions, lecturers, learners and the corporate sector. Statistical projections indicate that enrolment for university education through eLearning was expected to grow consistently from about 900,000 in 2003 to about 15.2 million learners by the end of 2012 (MENON Network, 2007). As universities infuse eLearning in their systems, the roles of lecturers are bound to change significantly, particularly in terms of course development, facilitation, moderation and evaluation of learners (Bangkok, 2004; Omwenga, 2004). This makes it necessary for lecturers to learn new skills to facilitate their operation within an eLearning setting (Farahani, 2003; Lu, Liu & Liao, 2005). However, inadequate computing competence among lecturers remains a key factor undermining institutional preparedness for eLearning in most institutions of higher learning as noted by various studies, including Farahani (2003), Sime and Priestley (2005) and Koo (2008), among others. The key message contained in the findings of these studies is that the level of computing competence among lecturers significantly correlates with institutional preparedness for eLearning.

The relationship between infrastructural facilities, lecturers' computing competence, and institutional preparedness for eLearning has been a subject of empirical investigation in many countries. However, very little documentation of the subject has occurred in African countries, especially in Kenya; thus, leading to a dearth of academic literature to inform policy processes and programming. Gakuu (2006) reported that although the application of ICT-based instructional modes was limited at the University of Nairobi, lecturers were positive about integration of eLearning. However, the study did not establish the linkage between infrastructural facilities, lecturers' ICT competence, and preparedness for eLearning. By documenting information on skill gaps and training needs, this study provides useful baseline information that should stimulate investment in skill development among lecturers at the University of Nairobi. The article comprises of four sections, including literature review, data and methodology, results as well as discussions and conclusions.

LITERATURE REVIEW

The relationship between computing competence among lecturers or teachers and preparedness for eLearning has been a subject of empirical investigation in many countries. A review of empirical literature reveals two sets. The first set comprises of literature that details lecturers' competence in general while the second set focuses on lecturers' competence in specific software packages including word processing, spreadsheets, database, presentations, statistical analysis, Internet and e-mailing packages. Highlighted in the subsequent paragraphs are key findings of selected studies. In Malaysia, for instance, Luan, Aziz, Yunus, Sidek, and Bakar (2005) investigated gender differences in ICT competencies among the academic staff at the Universiti Putra Malaysia in terms of eight software packages, including word processing, spreadsheets, databases, presentations, electronic mail, World Wide Web, multimedia and virtual class applications. The study found that female lecturers were more competent in the application of most packages than were their male counterparts. For instance, in the application of word processing packages, up to 85% of the female lecturers against 64% of their male colleagues rated themselves as 'excellent' in the insertions and editing of texts in word processing. Again, a higher proportion of women than men (96% and 87%, respectively) rated their competence in the application of e-mailing packages as 'excellent'. Overall, 64% of the lecturers were above average in terms of computing competence (Luan, Aziz, Yunus, Sidek & Bakar, 2005).

In the United States, Marcinkiewicz (1994) found that the level of computing competence significantly associated with computer use among public university lecturers. Berner (2003) also found that self-perceived ICT competence was the key determinant of computer use by lecturers, especially to support teaching activities. The studies concluded that developing ICT competence among lecturers remains crucial for enhancing institutional preparedness for eLearning. In another study, Sime and Priestley (2005), found a positive correlation between computing competence and computer use frequency among Argentine middle-level college instructors. The study further reported that computing competence

accounted for up to 7.2% of variance in the preparedness for eLearning and was the third most important factor after access to computers at the workplace and internet reliability.

Again, in Malaysia, Koo (2008) reported that up to 85% of lecturers in public universities were limited in terms of computing skills, which in turn, affected their application of computers in their teaching. The functionality of such lecturers was significantly constrained by skill limitations in computing, which delayed the adoption of eLearning by more than half of public Malay universities. Still in Malaysia, a study conducted by Selim (2007) noted that due to inadequacy of computing skills, more than 80% of Malay lecturers in public universities lacked confidence in computer use. In Bahrain, Al-Ammari and Hamad (2007) found that the perceived usefulness of computers and the perceived ease of use were significantly associated with lecturers' intention to integrate ICT in their teaching activities. The study also found that computer self-efficacy positively influenced lecturers' intention to use computers in their work. The perceived usefulness, perceived ease of use and self-efficacy regarding computer use among lecturers are critical elements of institutional preparedness for eLearning.

Still in Asia, Lu, Liu, and Liao (2005) found that the intention to use eLearning websites among university lecturers in Taiwan significantly associated with lecturers' competence in using computers. The study further noted that competent lecturers were more regular in visiting eLearning websites than those lacking computing skills. The study emphasised the role of universal training for academic staff to facilitate transition to an era of technology-aided university education. Nanayakkara and Whiddett (2008) noted that the decision of lecturers to embrace eLearning significantly correlated with the level of computing skills in online content design. In relation to this finding, the study revealed that about two-thirds of lecturers at the Bay of Plenty Polytechnic in New Zealand reported a low level of computing skills. Yet again, participants identified ICT training as the most crucial avenue through which institutions of higher learning could improve computing skills among their academic staff.

In the United Kingdom, Thomas and Stratton (2006) revealed a strong positive relationship between ICT training, computing competence and computer use. Lecturers who had had some training in ICT applications were more competent than were those lacking training. Besides, up to 70% of trained lecturers were of the opinion that the manipulation of ICT packages was easy. In this regard, the frequency of computer use was higher among those who perceived the manipulation of ICT packages to be easy. The study also found that trained lecturers were consistently using computers to support course delivery than those who were yet to undergo such training. In relation to institutional preparedness for eLearning, the study reported a strong relationship between the proportion of ICT competent lecturers and the number of departments that had integrated eLearning.

In Africa, studies relating computing competence and institutional preparedness for eLearning remain scarce. The few existing documentations are concentrated in the south and western parts of the continent. For instance, Thurab-Nkhosi, Lee and Gachago (2005) found that inadequate computing competence among lecturers was one of the key constraints to eLearning at the University of Botswana (UBeL initiative). In this regard, the study revealed that only 20% of the surveyed participants rated their computing proficiency as excellent, the majority expressed discomfort with computers.

In Namibia, Mpofu (2004) reported that more than two-thirds of lecturers were not using computers to facilitate course delivery, despite the motivational support provided by the universities, which included ICT training, universal access to computers at the workplace and higher allowances for trained lecturers. Low computing competence significantly associated with negative attitudes towards ICT, which affected the level of computer use. In Nigeria, Tella (2007) found that low level of computing skills was the key factor influencing the confidence to utilize ICT equipment and software packages to support course delivery. The study found a significant relationship between computing skills and fear regarding computer use. In this regard, teachers lacking computing skills expressed a low level of confidence in

computer use. Kenya is one of the countries experiencing a dearth of academic literature on lecturers' computing competence and preparedness for eLearning. However, a study conducted by Gakuu (2006) revealed that the use of ICT-based instructional modes was limited at the University of Nairobi; however, lecturers expressed a positive attitude towards computer use and eLearning. Moreover, lecturers' attitude towards computers and eLearning was not significantly different across University colleges. Key deficiencies noted in Gakuu's study included inadequate linkage between infrastructural facilities, lecturers' computing competence, and preparedness for eLearning. Besides, the study did not bring out the extent of ICT training needs among lecturers at the University.

DATA AND METHODOLOGY

This study builds on the positivist philosophy of social research, holding that in social sciences, information that humans derive from sensory experience is the exclusive source of all authoritative knowledge. Besides, the world is external and objective; and that the observer is independent of phenomena under observation. The positivist thought assumes that valid knowledge can arise from scientific knowledge (Ashley & Orenstein, 2005). Based on the positivistic thinking, the study applied a cross-sectional survey design with both quantitative and qualitative approaches to guide the research process (Babbie, 1973; Fowler, 1993). Whereas, the quantitative approach elicited information for descriptive and inferential purposes using self-administered questionnaires, the qualitative approach obtained in-depth information through key informant interviews. We collected primary data in May 2011 from lecturers and administrative staff at the University of Nairobi. Although the study focused on lecturers' preparedness for eLearning, the inclusion of administrative staff was due to their crucial role in policy formulation, implementation and enforcement, which influence the work environment in which lecturers operate. Their inclusion in the study enabled the study to identify policy gaps regarding ICT strategies, plans, budgetary allocations and ICT development, which are likely to influence lecturers' preparedness to function in an eLearning environment.

With a finite population of lecturers, we applied one of Fisher's formulae for sample size determination to obtain a sample size of 213 participants. We sampled lecturers using a stratified random sampling process based on colleges, gender and cadre. This ensured proportionate representation of all colleges; male and female lecturers; as well as assistant lecturers, lecturers, senior lecturers, associate professors and professors. We obtained proportionate samples from each stratum by first, calculating the sampling fraction, as a quotient of the sample size (n_i) and the population (N_i). Table 1 shows the proportionate sample sizes of lecturers from each college and for various cadres of administrative staff. From each stratum, we applied simple random sampling to select respondents. In addition, we applied purposive sampling procedure to select administrative staff, based on their availability and accessibility at the time of the study. The sample included 6 principals, 6 deputy principals, 6 registrars, 21 assistant registrars, 20 deans and directors, 13 associate deans and deputy directors, as well as 36 administrative assistants. We used three sets of instruments, including a self-administered survey questionnaire for lecturers, a key informant interview schedule for administrators and an observation schedule to source the data. We pre-tested the instruments on 20 lecturers and 10 administrators. We obtained data by issuing questionnaires to lecturers, which we collected after two weeks; and interviewed administrators at their places of work. The response rate was 99.5% for lecturers and 84.4% for administrators.

Table 1: Proportionate Samples of Lecturers and Administrators

Respondent Type	College/Cadre	Population	Sample Size	Actual	Percent
Lecturers	Humanities and Social Sciences	412	92	92	100.0
	Biological and Physical Sciences	170	38	38	100.0
	Health Sciences	52	12	11	91.7
	Education and External Studies	125	28	28	100.0
	Agriculture and Veterinary Sciences	94	21	20	95.2
	Architecture and Engineering	105	23	23	100.0
	Total	958	213	212	99.5
Administrators	Principals	6	6	6	100.0
	Deputy principals	6	6	6	100.0
	Registrars	6	6	6	100.0
	Assistant registrars	21	21	16	76.2
	Deans and directors	20	20	16	80.0
	Associate deans & Deputy directors	13	13	9	69.2
	Departmental chairpersons	20	20	15	75.0
	Administrative assistants	36	36	34	94.4
	Total	128	128	108	84.4

This Table shows that the study targeted samples of 213 lecturers and 128 administrative staff. However, 212 lecturers successfully completed and returned questionnaires, which represents a response rate of 99.5%. Besides, of the 128 administrative staff, we successfully engaged 108 in key informant interviews, which show a coverage rate of 84.4%.

In addition, we applied both quantitative and qualitative techniques to process and analyze. We analyzed quantitative data at three levels, namely univariate, bivariate and multivariate. Univariate analysis yielded frequency distributions and percentages; bivariate analysis obtained cross tabulations with Chi-square (χ^2) tests; while multivariate applied binary logistic regression to obtain beta co-efficients and odds ratios. We performed all the quantitative analyses using the Statistical Package for Social Sciences (SPSS) and Ms-Excel packages. In addition, we processed and analyzed qualitative data by organizing and summarizing transcripts in line with thematic areas; followed by thematic analysis. Details about the methods that we applied in this study are in various publications, including Babbie (1973), Fowler (1993), Aldrich and Nelson (1984), Nachmias and Nachmias (1996), Mugenda and Mugenda (1999), Wuensch (2006), as well as Best and Khan (2004).

RESULTS

The study covered 212 lecturers from all colleges of the University of Nairobi, including 92 (43.4%) from the College of Humanities and Social Sciences; 38 (17.9%) from the College of Biological and Physical Sciences; 11 (5.2%) from the College of Health Sciences and 28 (13.2%) from the College of Education and External Studies. Those from the College of Agriculture and Veterinary Sciences were 20 (9.4%), while 23 (10.8%) lecturers were in the College of Architecture and Engineering. In addition, the study involved 108 administrative staff, including 6 (5.6%) principals, 6 (5.6%) deputy principals, 6 (5.6%) registrars, and 16 (14.8%) assistant registrars. Other participants included 16 (14.8%) deans and directors, 9 (8.3%) associate deans and deputy directors, 15 (13.9%) departmental chairpersons and 34 (31.5%) administrative assistants. We measured lecturers' preparedness for eLearning in terms of self-perceived computing competence, referring to the ability to execute commands and manipulate a range of software applications for various purposes. In this regard, we requested participants to rate their competence on each of the following computing software packages on a scale of 0 to 10: word processing, spreadsheets, presentation, statistical analysis, internet browsing and e-mailing. We summed up participants' ratings for each software tool and determined mean scores. We then rated resultant quotients on a scale of 0-49% and 50-100%. We considered participants whose mean scores were less than 50% to be below average; thus, were unprepared to function in an eLearning environment. Conversely, we considered those whose mean scores were above 50% to above average, and prepared for eLearning. Based on the principle, out of 212 participants, 103 (48.6%) had a mean score of 50% or higher; while 109 (51.4%) scored less than 50%; suggesting that slightly more than one-half of the lecturers were below average in terms of computing competence.

Table 2 presents cross-tabulation results between lecturers' preparedness for eLearning and various background attributes including age, gender, education level and average monthly income. Regarding age, the results show that of the 212 participants, 97 (45.8%) were in the 40 to 49 years age bracket; 4 (25.5%) were aged between 50 and 59 years, while 22 (10.8%) were in the 30 to 39 years bracket. Besides, another 22 (10.8%) reported to be 60 years or higher, while 8 (3.9%) were aged below 30 years. Table 2 further shows that the proportion of participants unprepared for eLearning in the 50 and above age category was more than the proportion of those prepared in the same age category. Conversely, among those aged below 40 years, the proportion that was prepared for eLearning was higher than the proportion of those unprepared. The pattern suggests that younger lecturers were likely to be more competent in working with software packages; hence, were likely to be better prepared for eLearning than their relatively older colleagues.

Based on this, bivariate analysis obtained a computed χ^2 value of 18.026, with 4 degrees of freedom and a ρ-value of 0.001, which is significant at 1% level; suggesting up to 99% chance that lecturers' preparedness for eLearning significantly associated with age. Similar findings regarding the relationship between lecturers' computing competence and age emerged in the study of Venkatesh and Morris (2000), who assessed the role of gender and social influence on technology acceptance behaviour among academic staff of Indian public universities. The study found that younger lecturers were more receptive to new technologies than were their older counterparts. In Jordan, Abbad, Morris and Nahlik (2009) found a negative correlation between lecturers' age and eLearning delivery methods.

Table 2: Background Profile and Preparedness for E-Learning

Background Attributes	Prepared Frequency	Percent	Unprepared Frequency	Percent	Total Frequency	Percent
Age						
<30 yrs	8	8.3	0	0.0	8	3.9
30-39 yrs	12	12.5	10	9.3	22	10.8
40-49 yrs	45	46.9	52	48.6	97	47.8
50-59 yrs	23	24.0	31	29.0	54	26.7
60+ yrs	8	8.3	14	13.1	22	10.8
Total	96	100.0	107	100.0	203	100.0
Gender						
Male	69	67.0	77	70.6	146	68.9
Female	34	33.0	32	29.4	66	31.1
Total	103	100.0	109	100.0	212	100.0
Education level						
Bachelors	1	1.0	4	3.7	5	2.4
Masters	36	35.0	20	18.3	56	26.4
Doctorate	66	64.0	85	78.0	151	71.2
Total	103	100.0	109	100.0	212	100.0
Average monthly income						
<KES 50,000	4	3.9	0	0.0	4	1.8
KES 50,000-59,000	0	0.0	3	2.8	3	1.4
KES 60,000-69,000	7	6.8	4	3.7	11	5.2
KES 70,000-79,000	10	9.7	7	6.5	17	8.1
KES 80,000-89,000	9	8.7	12	11.1	21	10.0
KES 90,000+	73	70.9	82	75.9	155	73.5
Total	103	100.0	108	100.0	211	100.0

This Table shows cross-tabulation results between lecturers' preparedness for eLearning and background attributes including age, gender, education level and average monthly income. The results suggests the lecturer's preparedness for eLearning significantly associated with age (ρ-value = 0.001), education level (ρ-value = 0.004) and average income (ρ-value = 0.039).

Regarding gender, the results in Table 2 further show that 146 (68.9%) participants were men and 66 (31.1%) were women. Besides, the proportion of women lecturers prepared for eLearning 34 (33.0%) was marginally higher than the proportion of those unprepared 32 (29.4%). However, the proportion of men prepared for eLearning 69 (67.0%) was lower than the proportion of those unprepared 77 (70.6%). However, the analysis did not find a significant relationship between lecturers' preparedness for

eLearning and gender (χ^2 = 1.039, df = 1 & ρ-value = 0.243). This suggests that no gender was more competent in computing than was the other; hence, none was likely to be more prepared for eLearning than was the other. This is however, inconsistent with the findings of Luan, Aziz, Yunus, Sidek and Bakar (2005), who investigated gender differences in ICT competence among academicians at the Universiti Putra Malaysia. The study reported that female and male academicians were significantly different in the application of software packages such as word processing, spreadsheets and presentation packages. However, in Egypt, Houtz and Gupta (2001) found that male lecturers were more confident and had a greater usage of computers compared to their female counterparts, while Venkatesh and Morris (2000) noted that male lecturers were more likely to accept new technological innovation than were their female colleagues. Concerning education level, up to 151 (71.2%) participants reported holding doctorate degrees, 56 (26.4%) held masters certificates, while 5 (2.4%) had bachelor's degree qualifications. Besides, the results summarized in Table 2 show that the proportion of doctorate degree holders unprepared for eLearning was higher than the proportion of those prepared.

Conversely, the proportion of masters' degree holders prepared for eLearning was higher than the proportion of those unprepared. Based on this pattern, the analysis obtained a χ^2 value of 11.031, with 2 degrees of freedom and ρ-value of 0.004, which is significant at 1% level; suggesting up to 99% chance that lecturers' preparedness for eLearning significantly associated with educational attainment. Thus, masters' degree holders, being relatively younger people, were likely to be more competent in computing; hence, better prepared for eLearning than doctorate degree holders. These findings are consistent with those that Roberts, Hutchinson and Little (2003) reported in their study, which assessed barriers to the use of technology for teaching in Dutch universities. The study noted that professors and associate professors were less likely to use ICT packages in their teaching than were junior lecturers.

The results in Table 2 further indicate that most participants, 155 (73.1%), were earning Kenya Shillings (KES) 90,000 or more; 21 (9.9%) were in the KES 80,000 to 89,000 bracket; 17 (8.0%) averaged at between KES 70,000 and 79,000, while 11 (5.2%) reported an income of KES 60,000 to 69,000. In addition, the proportion of lecturers unprepared for eLearning in the top income bracket was higher than the proportion of those prepared. Contrastingly, the proportion prepared for eLearning in the category of less than KES 60,000 was higher than were those unprepared. The analysis yielded a computed χ^2 value of 11.707, with 5 degrees of freedom and ρ-value of 0.039, which is significant at 5% level; suggesting up to 95% chance that preparedness for eLearning varied significantly across the income categories. More specifically, top earners were relatively less competent in computing than low earners. Similarly, Venkatesh and Morris (2000) found a positive correlation between the frequency of computer use and lecturers' average income. The study noted that although lecturers in higher income brackets had a greater access to personal computers than those in lower income scales, more than one-half did not use computers consistently to support their work due to limited ICT skills.

Computing competence is the ability to handle a wide range of computer software packages for word processing, spreadsheets, presentation, statistical analysis, as well as internet browsing and e-mailing to perform various tasks (van Braak, 2004). This study focused on lecturers' training in software packages, training duration, funding sources for training, competence in using software packages and challenges associated with computing competence. Table 3 shows the cross-tabulation results between lecturers' preparedness for eLearning and training in various software packages. In this regard, the results show that out of 212 participants, 156 (73.6%) had accessed training in word processing packages; 119 (56.1%) had trained in spreadsheets; while 135 (63.7%) reported training in presentation packages. The results further show that 102 (48.1%) had trained in statistical analysis packages; 127 (59.9%) had trained in internet browsing packages; while 107 (50.5%) indicated training on the use of e-mailing packages. In addition, Table 3 shows that among participants who had accessed training in all the software packages, the proportion that was prepared for eLearning was higher than the proportion of those unprepared. The study found that most participants, 156 (73.6%) were trained in word processing packages, followed by

presentation packages, 135 (63.7%), internet browsing, 127 (59.9%) and spreadsheets, 119 (56.1%). In addition, 107 (50.5%) and 102 (48.1%) participants had accessed training in e-mailing and statistical analysis packages, respectively.

The results summarized in Table 3 show that lecturers' preparedness for eLearning significantly associated with training in various packages including word processing (ρ-value = 0.000), presentation (ρ-value = 0.011), internet browsing (ρ-value = 0.014), spreadsheets (ρ-value = 0.033) and statistical analysis (ρ-value = 0.056). The results suggest that training in all the software packages, except e-mailing was likely to have a significant influence on lecturers' preparedness for eLearning. Notably, e-mailing packages served as important means of communication for personal and academic purposes, which had become more important than paper mail. This explains why there was no significant relationship between lecturers' preparedness for eLearning and competence in working with e-mailing packages. The results amplify the importance of training in software packages. In this regard, participants who reported having some training were more ready for eLearning than those who had not trained. Son, Robb and Sangyo (2007) obtained similar findings, where teachers who had some prior training in software packages were using computers in classrooms more often than were their colleagues who had not undergone such training. The study further noted that among factors influencing teachers' computing skills, previous training was the most important, accounting for up to 80% of variance in computing competence.

Table 3: Proportion of Participants Trained on Software Packages

Software Packages	**Prepared**		**Unprepared**		**Total**		**Chi Square (X^2) Results**		
	Frequency	**Percent**	**Frequency**	**Percent**	**Frequency**	**Percent**	**χ^2**	**df**	**p-value**
Word processing									
Yes	88	85.4	68	62.4	156	73.6	13.316	1	0.000***
No	15	14.6	41	37.6	56	26.4			
Total	103	100.0	109	100.0	212	100.0			
Spread sheets									
Yes	66	64.1	53	48.6	119	56.1	4.528	1	0.033**
No	37	35.9	56	51.4	93	43.9			
Total	103	100.0	109	100.0	212	100.0			
Presentation									
Yes	75	72.8	60	55.0	135	63.7	6.482	1	0.011**
No	28	27.2	49	45.0	77	36.3			
Total	103	100.0	109	100.0	212	100.0			
Statistical analysis									
Yes	57	55.3	45	41.3	102	48.1	3.647	1	0.056*
No	46	44.7	64	58.7	110	51.9			
Total	103	100.0	109	100.0	212	100.0			
Internet									
Yes	71	68.9	56	51.4	127	59.9	6.084	1	0.014**
No	32	31.1	53	48.6	85	40.1			
Total	103	100.0	109	100.0	212	100.0			
E-mailing									
Yes	58	56.3	49	45.0	107	50.5	2.297	1	0.130
No	45	43.7	60	55.0	105	49.5			
Total	103	100.0	109	100.0	212	100.0			

*This Table presents cross-tabulation results between lecturers' preparedness for eLearning and training in various software packages, including word processing, spreadsheets, presentations, statistical analyses, internet browsing and e-mailing. Notably, lecturers' preparedness for eLearning significantly associated with training in word processing (ρ-value = 0.000), presentation (ρ-value = 0.011), internet browsing (ρ-value = 0.014), spreadsheets (ρ-value = 0.033) and statistical analysis (ρ-value = 0.056). ***, ** and * show significance at 1%, 5% and 10% levels, respectively.*

The duration of training is also a critical factor likely to influence computing competence and preparedness for eLearning, the longer the duration, the better the competence and vice versa. For this matter, we requested those who had trained in various software packages to indicate the duration for which training, which they received. The results show that the duration of training for word processing packages averaged at 3.3 weeks (95% CI 2.3-4.4); presentation packages averaged at 2.0 weeks (95% CI 1.1-2.9); while the training for internet browsing averaged at 1.7 weeks (95% CI 0.9-2.5). More still,

mean duration of training for spreadsheets packages was 2.4 weeks (95% CI 1.2-3.6); statistical analysis packages was 2.2 weeks (95% CI 0.5-4.0); and e-mailing, 2.04 weeks (95% CI 0.9-3.2). The results show that mean duration of training in word processing packages was the longest at 3.3 weeks, while the shortest training duration was in internet browsing at 1.7 weeks. Although there was no significant variation in the duration of training across the software packages, the outstanding fact is that the training durations were too short for beginners; and barely matched the scope of software programs such as Microsoft Word, Microsoft Excel and statistical analysis packages such as *SPSS*, *Epi info*, *SAS* or *CSpro*.

Compared to the guidelines provided by the Computer Society of Kenya (CSK), the reported durations of training are way below the recommended standards. For instance, training in word processing packages should take between 4-6 weeks; suggesting that participants who had accessed training in word processing packages will require further training to cover the curriculum effectively. We performed one-way Analysis of Variance to determine the significance of variation in the duration of training between participants that were prepared for eLearning and those that were unprepared. The results revealed lack of significant variation in the training duration for all the software packages, suggesting that training duration was standard for all participants, regardless of the level of prepared for eLearning. Key informant interviews revealed that participants obtained training for most software packages from commercial colleges, whose curricula suited commercial interests.

However, reduction of course contents to 2 rather than 6 weeks, means that trainees with little or no prior computing experience were disadvantaged. Table 4 shows cross-tabulation results between lecturers' preparedness for eLearning and sponsorship for training in various software packages. The results show that 108 (69.2%) participants sponsored themselves for training in word processing packages; only 40 (25.6%) were sponsored by the employer (University of Nairobi). Among those who sponsored themselves, the proportion that was unprepared for eLearning (76.5%) was relatively higher than the proportion that was prepared (63.6). however, among those who were sponsored by the employer, the proportion that was prepared for eLearning (29.5%) was relatively higher than that which was unprepared (20.6%). For spreadsheet packages, 84 (70.6%) participants sponsored themselves, while 29 (24.4%) were sponsored by the employer. Among those who indicated self-sponsorship, the proportion that was unprepared for eLearning (79.2%) was relatively higher than the proportion that was prepared (63.6%). However, among those sponsored by the employer, the proportion that was prepared (27.3%) was relatively higher than that which was unprepared (20.8%).

In the case of presentation packages, 102 (75.6%) participants sponsored themselves, while 28 (20.7%) were facilitated by the employer. Among the participants who indicated self-sponsorship, the proportion that was unprepared for eLearning (83.3%) was relatively higher than the proportion that was prepared (69.3%). Contrastingly, among those who indicated sponsorship from the employer, the proportion that was prepared for eLearning (25.3%) was relatively higher than that which was unprepared (15.0%). For statistical analysis packages, 63 (61.8%) sponsored themselves in training, while 33 (32.4%) were facilitated by the employer. Among those who sponsored their own training, the proportion that was prepared for eLearning (57.9%) was relatively lower than that which was unprepared (66.7%). Among those whose training was sponsored by the employer, the proportion that was prepared for eLearning 33.3%) was relatively higher than that which was unprepared (31.1%). The situation was similar for training in internet and e-mailing packages. The results suggest that training facilitated by the employer was more likely to influence preparedness for eLearning than training acquired through self-sponsorship. However, given that only about one-third of the participants had benefited from employer-sponsored training, key informant interviews revealed that the University training program for academic staff was underperforming, particularly due to financing constraints.

Table 4: Sponsorship for Training in Software Packages

Software Packages	Prepared		Unprepared		Total	
	Frequency	Percent	Frequency	Percent	Frequency	Percent
Word processing						
Self	56	63.6	52	76.5	108	69.2
Employer	26	29.5	14	20.6	40	25.6
Others	6	6.8	2	2.9	8	5.1
Total	88	100.0	68	100.0	156	100.0
Spread sheets						
Self	42	63.6	42	79.2	84	70.6
Employer	18	27.3	11	20.8	29	24.4
Others	6	9.1	0	0.0	6	5.0
Total	66	100.0	53	100.0	119	100.0
Presentation						
Self	52	69.3	50	83.3	102	75.6
Employer	19	25.3	9	15.0	28	20.7
Others	4	5.3	1	1.7	5	3.7
Total	75	100.0	60	100.0	135	100.0
Statistical analysis						
Self	33	57.9	30	66.7	63	61.8
Employer	19	33.3	14	31.1	33	32.4
Others	5	8.8	1	2.2	6	5.9
Total	57	100.0	45	100.0	102	100.0

This Table indicates cross-tabulation results between lecturers' preparedness for eLearning and sponsorship for training in various software packages. For each package, the results show that the proportion of participants prepared for eLearning was relatively lower among those who indicated self-sponsorship; but relatively higher among those whose training was sponsored by the employer (University of Nairobi).

Based on the level of training and experience, participants were requested to rate their competence in applying each of the software packages on a scale of 0 to 10, which was them transformed into a scale of <50% and 50% or more. We considered those whose scores for all the packages averaged below 50% to be incompetent and unprepared for eLearning, while those whose scores averaged at 50% or more were competent and prepared for eLearning. Table 5 presents cross-tabulation results between lecturers' preparedness for eLearning and competence in applying various software packages. More specifically, up to 139 (65.6%) participants were below average in applying word processing packages, while 73 (34.4%) were above average. Among those who were above average in working with word processing packages, the proportion that was prepared for eLearning, (84.5%) was higher than the proportion that was unprepared (47.7%). Based on this, bivariate analysis obtained a χ^2 value of 30.089 with 1 degree of freedom and a ρ-value of 0.000, which was significant at 1% level. The results suggest up to 99% chance that lecturers' preparedness for eLearning significantly associated with their competence in working with word processing packages. In view of this, participants whose competence in working with word processing packages was above average were likely to be more ready for eLearning than those whose competence was below average. This led to rejection of the null hypothesis *($H_0$1),* stating that *lecturers' competence in word processing has no significant relationship with their preparedness for eLearning,* for not holding true to empirical evidence.

In the case of spreadsheets, 121 (57.1%) participants were below average, while 91 (42.9%) indicated scores that were above average. Among those who were below average, up to 50 (48.5%) participants were prepared for eLearning, while 71 (65.1%) were unprepared. The analysis obtained a computed χ^2 value of 5.294, with 1 degree of freedom and a ρ-value of 0.021. The result was significant at 5% level, which suggested up to 95% chance that lecturer's preparedness for eLearning significantly related to competence in applying spreadsheet packages. Consequently, we rejected that null hypothesis *($H_0$2),* stating that *there is no significant relationship between lecturers' competence in spreadsheet packages and their preparedness for eLearning*.

Table 5: Competence in Software Packages

Software Packages	Prepared		Unprepared		Total	
	Frequency	Percent	Frequency	Percent	Frequency	Percent
Word processing						
Below average	16	15.5	57	52.3	73	34.4
Above average	87	84.5	52	47.7	139	65.6
Total	103	100.0	109	100.0	212	100.0
Spread sheets						
Below average	50	48.5	71	65.1	121	57.1
Above average	53	51.5	38	34.9	91	42.9
Total	103	100.0	109	100.0	212	100.0
Presentation						
Below average	48	46.6	74	67.9	122	57.5
Above average	55	53.4	35	32.1	90	42.5
Total	103	100.0	109	100.0	212	100.0
Statistical analysis						
Below average	67	65.0	92	84.4	159	75.0
Above average	36	35.0	17	15.6	53	25.0
Total	103	100.0	109	100.0	212	100.0
Internet						
Below average	17	16.5	27	24.8	44	20.8
Above average	86	83.5	82	75.2	168	79.2
Total	103	100.0	109	100.0	212	100.0
E-mailing						
Below average	19	18.4	26	23.9	45	21.2
Above average	84	81.6	83	76.1	167	78.8
Total	103	100.0	109	100.0	212	100.0

This Table presents cross-tabulation results between lecturers' preparedness for eLearning and competence in applying various software packages. The results suggest that lecturers' preparedness for eLearning significantly associated with their competence in working with word processing, spreadsheet, presentation, statistical analysis packages. However, there was no significance between preparedness for eLearning and competence in internet and e-mailing packages.

For presentation packages, those below average were 122 (57.5%), while 90 (42.5%) were above average. The results further show that those who below average included 48 (46.6%) participants who were prepared for eLearning and 74 (67.9%) who were unprepared. The analysis obtained a computed χ^2 value of 8.971, with 1 degree of freedom and a ρ-value of 0.003, which was significant at 1% level; suggesting up to 99% chance that lecturers' preparedness for eLearning significantly related to their competence in applying packages. This led to rejection of the null hypothesis *($H_0$3)* stating that *lecturer's competence in using presentation packages has no significant relationship with their preparedness for eLearning*.

In statistical analysis packages, those above average were 53 (25.0%), while the majority, 159 (75.0%) were below average. Those who were below average in applying statistical analysis packages consisted of 67 (65.0%) participants who were prepared for eLearning and 92 (84.4%) who were unprepared. Here, bivariate analysis obtained a χ^2 value of 9.574, with 1 degree of freedom and a ρ-value of 0.002, which was significant at 1% level. This suggests up to 99% chance that competence in working with statistical analysis packages was one of the factors likely to influence lecturer's preparedness to function in an eLearning environment. This led to rejection of the null hypothesis *($H_0$4),* which stated that *there is no significant relationship between lecturers' competence in using statistical analysis packages and their preparedness for eLearning.* In addition, the results in Table 5 show that 168 (79.2%) were above average in working with internet browsing packages, while 44 (20.8%) were below average. Software packages most applied by participants included *Mozilla Firefox* and *Google Chrome,* as well as e-mailing packages such as *Yahoo mail, Gmail, Eudora* and *Microsoft Outlook*. More specifically, of the 168 (79.2%) participants who were above average in applying internet browsing packages, included 86 (83.5%) who were prepared for eLearning and 82 (75.2%) who were unprepared. Bivariate analysis yielded a χ^2 value of 1.726, with 1 degree of freedom and a ρ-value of 0.189, which was not significant. Consequently, we rejected the null hypothesis *($H_0$5)* stating that *the relationship between lecturers' competence in using*

internet packages and their preparedness to apply eLearning is not statistically significant, due to insufficiency of empirical evidence.

Regarding e-mailing, those above average were 167 (78.8%), while 45 (21.2%) were below average. Among those who were above average, 84 (81.6%) were prepared for eLearning, while 83 (76.1%) were unprepared. Based on this, bivariate analysis obtained a χ^2 value of 0.631, with 1 degree of freedom and a ρ-value of 0.427, which was also not significant. Consequently, those prepared and those unprepared for eLearning were not significantly different in terms of competence in using e-mailing packages. This implies that competence in using e-mailing packages was less likely to influence lecturer's preparedness for eLearning. Through key informant interviews, the study revealed that lack of formal training, as well as inadequacy of time and financial resources influenced computing competence and preparedness for eLearning. The ineffectiveness of ICT training program targeting academic staff at the University of Nairobi also influenced computing competence among lecturers, particularly due to underfunding and lack of clear selection criteria. Consequently, even those had benefitted from the training program were in need of refresher sessions to catch with technological changes. For instance, those who trained in *Microsoft DOS* could not affectively work with packages based on new operating systems such as *Windows 7*, *Windows 8,* or *Linux,* among others.

In addition, lecturers' involvement in administrative duties influenced computing competence by consuming time for improving ICT skills. Mass enrolment in regular and self-sponsored academic programs exacerbated the resultant workload. Participants argued that work-related pressure and desire to make extra income from teaching self-sponsored students were gradually skewing the lecturers' interest from developing ICT skills. The available time was utilised for teaching various groups of students, marking and performing administrative duties. Participants also linked lack of opportunity for enhancing computing competence to uncertainty, anxiety and fear of transition to an eLearning mode. Consequently, lecturers perceived some software packages to be too complicated, prompting some lecturers to stick to traditional modes of delivery, such as pen-paper or chalk-black wall. Similarly, some lecturers perceive transition to eLearning as threat to their careers, while some informants linked fear and anxiety to lack of consistent post-training technical support, particularly at departmental levels.

Shortage of modern and efficient computers at workplaces was also a key factor impeding lecturers' computing competence. Participants argued that obsolete machines were not only time wasting but also reinforcing fear and anxiety about their ability to cope with challenges that would come with eLearning. To cope with shortage of computers, some staff members used their personal computers to undertake University work. Still on infrastructure, unreliable internet connectivity impeded computing competence and preparedness for eLearning; and so was lack of ICT centres at departmental levels, where academic staff could go for quick consultation. The latter was particularly necessary due to shortage of technical staffing, which made it difficult for lecturers to access timely technical support. In addition, lack or inadequacy of eLearning resources affected lecturers' computing competence and preparedness for eLearning. Also critical was shortage of specialized eLearning facilities, particularly online learning management systems (LMS) such as Blackboard*, WebCT, FirstClass, Moodle* and *Lotus Learning Space*, among others. Notably, LMS had the potential to save costs, time and could help to improve the effectiveness of learning processes. Participants also noted that computing competence among lecturers was constrained by lack of specialized libraries as well as videoconferencing facilities.

CONCLUSIONS

The purpose of this study was to determine the influence of computing competence in various software packages on lecturers' preparedness for eLearning. The study found that participants whose competence in working with word processing packages was above average were better prepared for eLearning than those whose competence was below average (χ^2=30.089, df=1 & ρ-value=0.000). Multivariate analysis

indicated that participants whose competence in word processing packages was above average had about 5.7 the odds of being prepared for eLearning as those whose competence was below average. Preparedness for eLearning significantly related to competence in applying spreadsheet packages (χ^2=5.294, df=1 & ρ-value=0.02). Participants whose competence on spreadsheets was above average were about 2.2 times as likely to be ready for eLearning as those whose competence was below average.

Lecturers' preparedness for eLearning significantly associated with competence in working with presentation packages (χ^2=8.971, df=1 & ρ-value=0.003). In this regard, those whose competence was above average had about 5.1 times the odds of being prepared for eLearning as those whose competence was below average. Competence in working with statistical analysis packages was one of the factors influencing lecturer's preparedness for eLearning (χ^2=9.574, df=1 & ρ-value=0.002). In this regard, participants whose competence in statistical analysis packages was above average were about 1.7 times as likely to be ready for eLearning, as those whose competence was below average. Finally, lecturer's preparedness for eLearning and competence in Internet browsing packages was not significant (χ^2=1.726, df=1 & ρ-value=0.189). Training in computing skills is essential for lecturers' preparedness for eLearning. Although up to 73.5% of the participants had accessed training in various software packages, more than two-thirds had not benefitted from training provided by the University ICT training program for academic staff. Most participants financed their own training in commercial colleges, most of which barely met minimum threshold for curriculum delivery. Consequently, even those who had trained were still not competent enough to function in an eLearning setting. At the University of Nairobi, the School of Computing and Informatics provided training for enhancing computing competence. However, most lecturers were yet to benefit from the initiative, because of issues such as funding constraints, lack of awareness, as well as preoccupation with academic and administrative duties.

Lack of time to undergo training is a reality that requires administrative and planning considerations to make compulsory and possible for lecturers to access training as necessary. This is particularly critical for departments experiencing over-enrolment in self-sponsored programs, such as sociology, education, and business administration, among others. Structuring the training program and harmonizing its schedules with academic semesters is one of the critical measures that the University administration should consider to enable lecturers gain necessary skills for eLearning. Equally important considerations, include the need to make University training program continuous to take care of refresher needs as well as staff attrition. The effort to prepare academic staff to function in an eLearning setting should consider issues such as uncertainty and anxiety of going the transition process from traditional modes of delivery to the eLearning mode. The fear of trying out new ideas and technological changes often perpetuated anxiety, which in turn, precipitated reluctance and resistance towards eLearning. Anxiety is also likely to prevent lecturers from accepting training, as well as negatively influence perceptions regarding the ease of using technology in teaching and learning processes. This calls for effective methods to manage the change process to help lecturers adjust accordingly in favor eLearning.

Undoubtedly, change is a fearful process that also manifests through anxiety. People fear that change may bring new challenges or deprive them certain opportunities or privileges. To ensure that all lecturers share the vision of eLearning and walk along with the change process, sustained sensitization and education is an indispensable pre-requisite. Sustained sensitization is particularly necessary because changing mindset takes time. Besides academic staff, the change process should target top leaders of the University. In fact, change can be realized faster when leaders at all levels become good role models. They should undergo training in computing and eLearning processes to inspire their junior colleagues. Considering the requirements for an effective eLearning system, there is no doubt that it is a costly initiative, particularly in resource-poor countries. However, eLearning remains important for lecturers and learners to develop competencies necessary for tackling social and economic development challenges experienced in the 21st century. In other words, eLearning has the potential to enhance digital literacy

skills and create knowledge-based economies required for socio-economic development as envisaged in international and national development blueprints.

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