STAFF FACTORS INFLUENCING THE ADOPTION AND UTILIZATION OF MOBILE LEARNING TECHNOLOGIES IN CHARTERED UNIVERSITIES IN KENYA

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ABSTRACT
The factors influencing the adoption and utilization of mobile technologies as tools for learning in Kenyan universities have received little attention in research. The purpose of this study was to investigate how factors related to staff and Institutions influence the adoption and utilization of mobile technologies as teaching and learning tools in Kenyan universities. The target population was1988 teaching staff drawn from chartered universities drawn from Nairobi and Nyeri Counties in Kenya. A total of 199 lecturers were selected through stratified sampling. The study was a descriptive survey, and involved collecting data using questionnaires and an interview schedule. A pilot study was conducted to validate research instruments. The split-half reliability test was applied on the staff questionnaires to obtain α=0.754 and 0.70 for each half. Data was analyzed using the Statistical Package for Social Sciences version 20. Descriptive statistics provided indices such as means, mode, range, percentages, frequencies, standard deviation and variance, while inferential statistics such as regression analysis, Independent Sample t-test for Equality of Means, Analysis of Variance and Pearson Correlation provided coefficients that helped to make generalizations about the population. The study demonstrated university teaching staff had sufficient technical proficiency to use mobile devices to access the internet, send, receive electronic mails and transfer data but lacked proficiency in using the devices for their teaching duties. Further, staff related factors such age, gender; proficiency and attitude had statistically significant influence on the adoption and utilization of mobile technologies. The study also demonstrated that factors within Kenyan universities had statistically significant influence on the adoption and utilization of mobile technologies. Besides recommending that Kenya builds a prototype for a mobile based learning management system for its universities, the researcher proposed that the technical capacity for university teaching staff be enhanced. The researcher calls upon educational researchers to carry out empirical studies on the academic potential for emerging applications such as Facebook, Tweeter and WhatsApp
Keywords: Staff, University, Mobile, Learning, Utilization, Adoption

INTRODUCTION

Background to the Study

In recent years, individuals and institutions have adopted Information Communication Technologies in operations. This is because, ICT have been proven to yield successes in human, social educational and economic development over the long term. The affordances of ICT are numerous making the technology a powerful catalyst that stimulates numerous human processes to global positioning (Hameed, 2013). By means of ICT, finance, transport, communication, engineering, education, health and agricultural sectors have openly accepted that ICT can leverage the tasks they do. The technologies are empowering people and institutions, allowing them to radically transform their processes and practices, enabling them perform their functions in a much improved way (Kandiri, 2014). West (2015) notes that besides their contribution to world's economic growth, the technologies are offering fascinating opportunities for individuals and communities to systemically redefine the way they contribute to society.

In teaching and learning, the convenience and flexibility offered by mobile technologies is freeing teachers and learners from tethered instructional technologies, transforming mobile devices from simple communication tools to significant tools for learning and information sharing. The increased ubiquity of mobile computing devices has created new options for students to obtain educational opportunities, access course content and interact with instructors and student colleagues wherever they are located (Gikas & Grant, 2013). On the other hand, university lecturers have also realized that mobile technologies can be a good opportunity for them to support learning in novel ways. Tomei (as cited in Issham, Azizan & Azman, 2011) corroborates this augment, positing that mobile technologies have achieved wide-ranging capabilities by which the technological gaps that exist in education can be bridged. Besides, these technologies are providing new and meaningful learning scenarios which have forced many institutions to restructure their curricula, instructional media, methods and pedagogical practices.

Even as Armatas, Holt and Rice (2005) augments that portable technology are rational for communication and course delivery, others studies have demonstrated that there are barriers that can impede the adoption and utilization of mobile technologies. Such barriers included factors such as limited technical skills in the operation of mobile technology, knowledge gaps among the teaching staff and curriculum designers, policy regulations by governments and university administrators and the mismatch between educational goals and institutional needs. Wright (2014) argues that teachers who are unwilling to try new methods and have a negative attitude towards technology can obstruct the use of the same technologies in the education place. The study by Wright further indicated that internet band-width and teacher proficiency can be key issues with any technology. On this note the author contends that teachers with limited proficiency in technology can find it extremely difficult to utilize these tools to support learning. The factors identified by these researchers allude to the major challenges affecting technological adoption at the different levels of education, including university education, across the entire globe.

In Kenya, the government advocates for universal access to ICTs as a major driver for national development. The government of Kenya, through the Ministries of Education and Information, Communication and Technology, supportive councils, departments and commissions, has been very keen on the provision of technologies that can transform pedagogy and modernize university learning. Through the Commission for University Education (CUE), the government has re-emphasized the critical role that emerging technologies can play in transforming the education process. A review of government policies on higher education demonstrates government's increasing realization that emerging technologies can form part of delivery modes for on-campus and distance approaches of university learning. The Kenya Policy Framework for Education and Training recognizes that education for disadvantaged communities can be supported using local radio stations and mobile telephony (Republic of Kenya, 2012). Consequently, Kenyan universities are encouraged to make provisions to ensure academic staff has access to such technologies (CUE, 2013).

Specifically, the Kenya National ICT masterplan has developed a strategic framework for integrating ICT at all levels of education and training. Key areas in the policy are proposals of mechanisms that can help in the achievement of ICT readiness in schools, colleges and universities. The document has defined mechanisms and structures within educational institutions that should make learners, instructors and institutions capable of utilizing multimedia technologies in learning, teaching and delivery of educational content (Republic of Kenya, 2014). However, despite the existence of relevant policies, there are barriers to learning and teaching at the university using mobile technologies. These barriers are specific to the students, the teaching staff, individual institutions and the technology itself. This study will interrogate barriers that influence the utilization of technology by the university academic staff, as well as the need to elaborate more on how mobile learning technologies has affected the quality of learning among the chartered universities in Kenya.

Staff Factors and their Influence on the Utilization of Technologies

An important expectation amongst the teaching staff is their ability to select and utilize existing instructional technologies. Andoh (2012) argues that the teaching staffs' selection of appropriate tools for instruction should be guided by the learning demands of the learner. This in itself exerts considerable pressure on the instructor to select the most contemporary instructional resources. Since mobile technologies can fit seamlessly into a teaching-learning scenario, then such technologies are emerging as the most preferred for modern-day instruction.

Once staff has selected a technology, the next concern is establishing a connection between selection and utilization in instruction. Researchers are concerned that huge investment on educational technologies has seemingly produced little evidence in adoption and utilization. Mugo (2007), Andoh (2012), Ahmadi, Kamba and Usman (2012), Accuosti (2014), Mac Callum, Jeffrey and Luk (2014) have documented staff-related factors and discussed their role in the success or failure of instructional technology programs. With specific reference to university education, these scholars concur that the following factors influence the adoption and utilization of mobile technologies by teaching staff: personal characteristics, teacher attitudes, ICT competency, computer self-efficacy, gender and teaching experience.

Regarding personal characteristics, Andoh (2012) postulated that the existence of a technology in the school does not necessarily translate into its use. The author adds that factors such as education level, age, gender, experience, preparedness and attitude are critical influencers of teachers' willingness to adopt and integrate technology into instruction. Specifically, he notes that lack of confidence and competence increases an instructor's anxiety which makes the teacher to ignore the technology and revert to the use

of conventional instructional mechanisms. Therefore, a deeper understanding of teachers' personal characteristics is an important step before rolling out any instructional technologies.

Ahmad, Kamba and Usman (2012) observed that although academic staffs have embraced modern instructional technologies, many have resisted opportunities to overcome barriers that these technologies can help overcome. As such, dons have not promoted universities as institutions with human capacity to handle cutting-edge technologies. The authors remark that this is an unfortunate scenario which requires redress. They propose that universities must be designed to shape the academic staff (particularly in matters of reaping the affordances of instructional technologies) just as they shape the university as an institution. In so doing, the authors propose that university management must conduct studies on preconditions for technology acceptance, particularly in the areas of attitude and self-efficacy.

MacCallum, Jeffrey and Luk (2014) have added another component on staffing factors, namely capacity building. They found that digital literacy had a major influence on staff intention to use technology, specifically, mobile technologies. They isolated general computer competency by staff in basic computing tasks, proficiency in Office packages, emailing and using the internet as basic but key skills for technology adoption. Although no university staff can possibly experience challenges using their mobile devices to text and make calls, the authors identified proficiency in the two basic skills as essential for conducting tasks using these devices. The authors established a link between the basic competency and teaching self-efficacy to use ICT; they confirmed that staff with basic ICT skills were more competent and more confident in the use of a wide range of ICT equipment. The finding reiterated the argument that a good foundation in digital literacy is necessary not only to academic staff, but also to office staff that will be mandated to drive institutional programmes on mobile-based services (Chen et al., 2015).

Making reference to studies conducted at the Boise State University and the University of Florida, Chen *et al.* (2015) observe that in situations where instructors made personal efforts to embrace the technology, their success for integration was getting obstructed by infrastructure and support challenges. Therefore, the researchers recommended that institutions formulate technology implementation strategies to make technology available and accessible to the teaching staff. Within the strategy, digital literacy, technical and pedagogical support to staff would be incorporated. This study investigated how issues of attitude, ICT competency, training and support among staff in Kenyan universities were being addressed.

Other researchers have placed emphasis on gender and age of the university staff as important variables in the way they respond to a technology. Barbarán (2014) is of the opinion that gender is not significantly correlated to technology adoption. Nevertheless, Andol (2012) postulates that female teachers register low levels of usage compared to their male counterparts. This can be attributed to limited access to technology, skill and interest. Almekhlafi and Almeqdadi (2010) also cite differences between male and female student teachers not only in technology use, but also in the confidence with which they handle the technology. The researchers also cite significant levels of technology anxiety, with male teachers showing lesser anxiety than their female counterparts. The authors document a number of barriers, both extrinsic and intrinsic to the teacher. Intrinsic barriers include attitudes, believes and general resistance while extrinsic barriers relate to training, time, access and resources (especially when resources are limited). The current study endeavoured to find out if the adoption of technology across gender assumes a similar pattern in the Kenyan system.

An important aspect in regard to technology adoption by teaching staff relates to attitude towards technology. Mac Callum, Jeffrey and Luk (2014) affirm that measurement of staff attitude, their self-efficacy and intention is a precondition before introducing a technology in the school. In their view, the results of such investigations help policy makers to predict the importance of attitude as an impediment to adoption of an instructional technology by the staff.

In contributing towards this argument, Barbarán (2014) has singled out academic staff as key players in the implementation of a technology. She argues that a teacher's decision to integrate an educational technology is influenced by their attitude towards and revolves around the instructor's knowledge, self-confidence, and the support that they gain while using that technology. In her study, Barbarán proposes that policy makers should creatively manage teacher attitude, while providing them the support necessary to facilitate learning with 21st century technologies. This study assessed the attitudes of university academic staff with a view to determining how they influenced adoption of mobile instructional technologies.

Mobile computing devices are the newest entrants into the world of instructional technologies, and have the potential of transforming the way academic staff perform their pedagogical duties. The devices are

argued to provide low cost yet exciting, flexible and convinienct means for the access of online course material, data sharing and communication. However, factors that influence the adoption and utilization of mobile learning technologies by university academic staff in chartered universities in Kenya have not been fully investigated. The study provided a true picture of the influences of age, gender, proficiency and attitude on the adoption and utilization of mobile technologies by university academic staff.

The purpose of this study was to investigate how staff related factors influenced the adoption and utilization of mobile technologies as instructional technologies in chartered universities in Kenya.

The objective of this study was to explore how staff related factors influence the adoption and utilization of mobile learning technologies in chartered universities in Kenya. Inferential statistics were used to test the following null hypotheses that staff-related factors do not have a statistically significant influence on the adoption and utilization of mobile technologies.

The outcomes of this study are appropriate for Kenya as it implements the technology-led vision 2030 blue print, and its findings can be a basis for gauging the preparedness of universities academic staff in the adoption and utilisation of mobile technologies for learning. The developers of educational learning management systems (LMS) will find the study useful, informing them appropriately as they design learning applications that can be supported on academic staff mobile technologies. Lastly, besides being a basis for further research, the study contributed to the limited body of knowledge on the use of mobile technologies to deliver and support learning in higher educational institutions in Kenya.

Conceptual Framework

The determinants, as discussed in the literature review, have been used in constructing the conceptual framework for this study (Kandiri, 2014). Figure 1 presents the conceptual framework for the study.

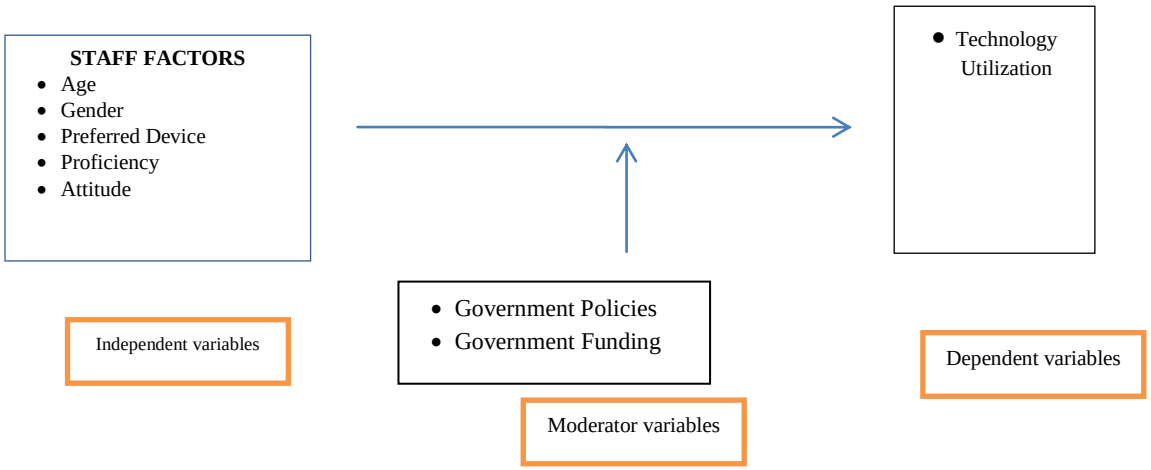

Figure 1: The *Conceptual Framework*

The framework assumed that the dependent variable, technology utilization, was a function of staff related factors, mainly age, gender, preferred device type, proficiency and attitudes. The academic staffs are normally at the centre of the instructional process. As such, it was necessary to collect data about staff and use that data to derive the link between them and the indicated dependent variable. Government policies and government capital have moderating influence on how staffs are expressed at the institutional level. Therefore, government policies and government funding were treated as moderator variables.

RESEARCH METHODOLOGY

Research Design

The research design was descriptive survey that sought to establish how different individuals react to a specific variable with a view to describing the nature of the existing condition (Orodho, 2004; Bryman, 2012). In a descriptive survey, the researcher describes a unit in detail, in context and holistically. This study, being a descriptive survey involved collecting information by administering questionnaires as well as interviewing a sample of individuals, who were representative of the population (Kombo and Tromp, 2006).

The Study Location

The study was conducted in chartered public and private universities in Kenya. Only universities located from the intersection of State House road with Uhuru Highway in Nairobi, branching off at Museum Hill interchange, extending into Forest Road, and then stretching along the Great North Road coded as road A2 were included. All chartered universities falling along or off this road but are within Nairobi and Nyeri counties, Kenya, were included in the study.

The Study Population

Population is made up of all subjects of a group that possesses characteristics that are useful for the study (Mikhail & Dylan, 2012). The target population of this study comprised all regular academic staff in Kenyan universities. Part-time academic staffs were excluded from the study population. Being irregular visitors to these institutions, these groups were deemed to lack sufficient familiarity with the facilities, operations and services that the universities offer. Subsequently, they would not provide sufficient and accurate data that the study was seeking to obtain.

Academic staffs from constituent colleges, universities campuses and non-chartered universities falling within the zone were also not included in the study. A total of three thousand one hundred and eighty-six (3186) members of the teaching staff constituted the target population. The accessible population was one thousand, nine hundred and eighty-eight (1988) regular teaching staff. Table 1 presents the institutions and the population of the teaching staff.

Table 1: Target population

Serial number	Institution	Academic staff
1	Dedan Kimathi University	132
2	Karatina University	137
3	KCA University	120
4	Kenyatta University	981
5	Pan African Christian University	80
6	United States International University	100
7	University of Nairobi	1,636
	TOTAL	**3186**

Source: CUE (2016) and KNBS (2007-2013)

Sampling

Since it would not be possible to examine every university, every member of academic staff the researcher selected a sample that was representative of the total population (Kothari, 2009). This section provides detailed outlines of how sampling of universities, schools, and the respondents was done.

In selecting the participating institutions for the study, universities in the selected zone were divided into two (2) strata: public universities and private universities. From each stratum, the universities were coded, and the codes fed into Sampling Utility for Windows. When run, the utility generated 50% samples of institutions from each stratum. In the first strata, University of Nairobi and Dedan Kimathi University of Technology were sampled. In the second strata, United States International University and KCA University were selected.

After sampling the universities and schools, the researcher proceeded to sample the respondents to be included in the study. The accessible population of academic staff was 1988. According to Kombo and Tromp (2006), a sample of 10-30% of the total population is considered sufficiently representative. The researcher therefore, guided by this principle, selected 10% of the accessible population of the academic staff to participate in the study. This translated to a figure of 199 respondents.

After determining the total sample size for the academic staff, it was necessary to determine the sample size for each university. The researcher used stratified random sampling to achieve this. In stratified random sampling, the population is divided into homogenous subgroups then, a simple random sample is taken for each subgroup. The sample for each sub-group is represented in proportion to their number in the population (Kombo & Trump, 2006). The following formula was used to determine the sample size for each university.

$$Institutional\ Sample\ size = \frac{Institutional\ Population \times Total\ Sample\ Size}{Total\ Population}$$

After the calculation, the following results were obtained: thirteen (13) from Dedan Kimathi University, one hundred and sixty-four (164) from University of Nairobi, twelve (12) from KCA University and ten (10) from the United States International University.

Pilot Study, Validity and Reliability

All research instruments were validated to make them reliable, consistent and dependable in measuring the variables accurately. The researcher, therefore, conducted a pilot study prior to the administration of the research instruments. In principle, reliability, validity and practicability of the research instruments were determined by the pilot study. The pilot study was conducted in Kabarak University. Ten (10) lecturers participated in the piloting study (Waititu, 2004). Feedback from the pilot study was used to refine the data collecting instruments. The method used for determining validy and reliability is indicated below

Validity

When constructing the research questions, a researcher needed to establish the face validity of the questions. This was achieved by asking experts to make a judgment if, on face value, the items in the instruments were a true reflection of the research concept with satisfaction. During data collection stage, validity was ensured in several ways. The first was by encouraging respondents to fill the questionnaire to completion. This was achieved by confirming that all sections of the instrument were filled to completion. Where sections had been left unfilled, the respondents were encouraged and given the necessary support to complete filling the questionnaire. Secondly, the researcher minimized incidences of non-return of questionnaires by waiting for respondents to fill, then collecting the questionnaire from the individual respondents. An audit of the returned questionnaires was done to confirm that numbers tarried with the number of questionnaires distributed.

Reliability

The spilt half method was used to determine the reliability. Normally, reliability is demonstrated when, after carrying out a study, the respondents score equally well or equally poorly on two randomly selected halves of the test (Cohen, 2011). Using this method, the test instruments were run once using the split-half method. The items in the instruments were divided into two, based on an odd-even number basis. Data from each half was analysed separately. When the treatment was applied to the questionnaire, alpha (α) values of 0.754 and 0.70 were obtained for the first and second halves, respectively. Bryman (2012) reported that a coefficient of 0.70 and above is sufficiently suitable. These values indicated a good internal consistency for the research instruments.

Data Collection Procedures

The researcher administered the questionnaires to the lecturers who were available in the lecturers' lounge on the day of data collection. Alharbi and Drew (2014) corroborate that this method is used to ensure a better response rate in a short amount of time. Lecturers represent a group of staff who report to their duty stations only when due for teaching or administration of examinations. For the purpose of this study, the technique proved to be an optimal method for collecting data from this category of respondents.

Data Analysis and Presentation

The researcher used Statistical Package for Social Sciences (SPSS) version 20.0 to code and analyse the collected data. Likert scales were used to manage ordinal data while descriptive statistics (measures of central tendencies) were used to manage quantitative data. Measures of dispersion (range, quartiles, variance and standard deviation) were used to compliment results obtained from statistical treatments (Zina, 2009). Inferential statistics such as regression analysis, Pearson Correlation, Analysis of Variance, and independent sample t-tests for equality of means were used to give deeper meaning to results obtained from descriptive statistics (Maina, 2015).

Ethical Considerations

The researcher obtained a research permit from NACOSTI, both for the pilot and actual study. Further, anonymity and the confidentiality of the information provided by the participants were respected. In the same vein, respondents were informed clearly that the data they provided would be used for research and not for any other purposes (Neuman, 2008; Zina, 2007).

DATA ANALSYIS AND INTERPRETATION

Return Rates

The instruments were administered and returned to the researcher. Before data collection, the researcher inspected the instruments to ensure they were filled adequately. The returned instruments for each university and for each category of respondents were counted and the response rates determined. Out of the 199 questionnaires distributed to the teaching staff, 158 were filled and returned. The response rate for the academic staff therefore stood at 79.4%. This section analyses the data in relation to the age, gender, devices, proficiency and attitude of the teaching staff.

Age of Teaching Staff

Table 2 presents a summary of the data regarding the age distribution for the teaching staff. The results on Table 2 indicate that 3.2% (n=5) respondents fell on the 25-29 age bracket while those that were aged 45 years and above were only 20.9% (n=33). Of the respondents, 76.1% (n=120) fell within the 30-45 age bracket. These findings are consistent with those of Ozge, Omer and Ilker (2006) who, in their investigation of the teaching staffs' attitudes towards

the use of technology at the Bahcesehir University in Istanbul, Turkey, obtained similar demographics. The results attest that the teaching staff in the selected universities were relatively young, and were, thus, versatile and resilient enough to handle emerging issues in the world of technology. Furthermore, the research sought to determine if there existed any correlation between the ages of staff and technology utilization. Table 3 provides the Pearson correlation results on this item.

Table 2: Distribution of teaching staff by their age

Age bracket	Frequency	Percent
25 - 29 years	5	3.2
30 - 35 years	16	10.1
35 - 40 years	34	21.5
40 - 45 years	70	44.3
45 and above years	32	20.3
Non-respondent	1	0.6
Total	**158**	**100.0**

Table 3: Correlation between the age of teaching staff and technology utilization

		Technology utilization	Age
Technology Utilization	Pearson Correlation	1	-0.138
	Sig. (2-tailed)		0.086
	N	157	156
Age of Staff	Pearson Correlation	-.138	1
	Sig. (2-tailed)	.086	
	N	156	157

The results indicated that a negative but limited statistically significant correlation existed between the ages of the teaching staffs and technology utilization at five percent level of significance (r=-0.138, N=157, p=0.05). The meaning of this observation is that older members of teaching staff are less likely to utilize technology than the younger members of staff. In this study, respondents included 158 regular teaching staff with 20.3% of them being the age of 45 and above. VarDeeKay and Young (2012) observed overall technology use among older faculty was slightly less than that of younger staff in a community college.

Fisk et al., (2004) observe that older adults tend to be slower than younger adults in the adoption and utilization of new technologies. However, Anderson and Perrin (2014) disagree slightly with the current findings, positing that some senior staff, especially when affluent and educated, demonstrate the same levels of use of technology as do the younger adults. However, the authors, at a later stage of their study, observed that a digital divide still exists between younger and older adults with the latter indicating a distance relationship with technologies. The findings of their study and those of the current study converge.

Gender of Teaching Staff

When the teaching staff were asked to indicate their gender, the results indicated that 62.0% (*n*=98) were males and 38.0% (*n*=60) were females. These proportions show consistencies with studies conducted at the University of Buea in Cameroon which gave an output of 76.4% for males against 23.6% for females. However, the current study shows higher female representation in university teaching positions, and can be attributed to the rise in gender empowerment policies across the globe.

Similar studies on gender issues in university academia in the United Kingdom for the year 2014 posted 60% for male against 40% female (European University Institute, 2016). Gender issues in the developed nations of Europe and North America have been addressed over time, but, regrettably, parity has not been achieved, not even in the academic circles. The study sought to determine if there existed any statistically significant relationship between the gender of the teaching staff and technology utilization. Table 4 presents the results obtained when data was analysed using the SPSS.

Table 4: Correlation between the gender of teaching staff and technology utilisation

		Technology utilization	Gender
Technology Utilization	Pearson Correlation	1	0.076
	Sig. (2-tailed)		0.345
	N	157	157
Gender	Pearson Correlation	0.076	1
	Sig. (2-tailed)	0.345	
	N	157	158

The test provided a low correlation coefficient at five percent level of significance (r=0.076, N=157, P=0.345). Since the r=0.076 value tended towards zero, it was concluded that the gender of teaching staffs did not have a statistically significant correlation with technology utilization. These observations were in line with the studies of Ngeru (2015) who report that when teachers' gender is correlated with the utilization of instructional technologies, no statistically significant correlation is observed.

Consequently, the utilization of instructional technology was equal for both male and female teachers. Likewise, Ochogo (2012) offers further support to the argument that there exists no statistically significant difference between male and female lecturers in the utilization of multimedia tools for delivery of virtual lessons. Similarly, competent use of technology for delivery of e-learning instruction does not show a statistically significant relationship based on gender.

Hardware Devices and Software preferred by the Teaching Staff

This study sought to establish if the teaching staffs had the necessary tools to facilitate m-learning scenarios. To achieve this objective, the researcher first inquired about the category of devices that they owned, followed by an interrogation of the device brands that the teaching owned. Ownership of a device brand was ties to its preference.

Category of Devices Owned by the Teaching Staff

The respondents were asked to indicate the category of mobile devices they possessed, with a view to establishing the relationship between the types of devices and utilization of mobile technologies for instruction. Figure 2 gives a graphical representation of the same information

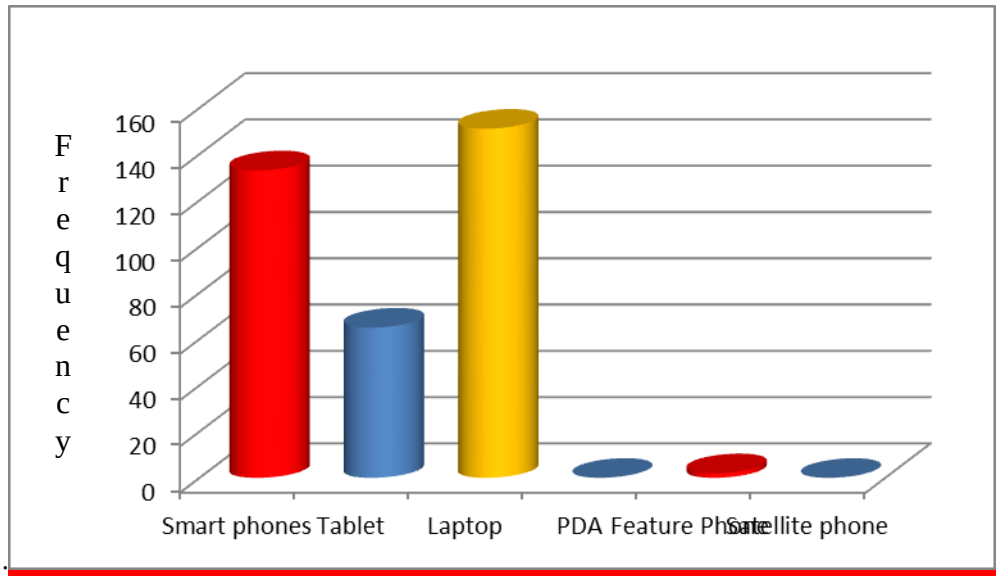

Figure 2: Frequency of category of mobile devices owned by teaching staff

When asked to indicate the mobile devices they possess, 78.6% (*n*=22) indicated they owned laptops, 95.5% (*n*=151) owned smartphones while 84.2% (*n*=151) owned tablets. Satellite phones, feature phones and PDAs were the most unpopular devices standing at ownership rates of 0.0% (*n*=0), 1.3% (*n*=2) and 0%

(*n*=0), respectively. Since the combined percentages exceeded the 100% rate, it was assumed that respondents owned more than one (1) mobile device.

The results indicated that the teaching staff possessed three types of important devices for facilitating m-learning, i.e. laptops, smartphones and tablets. These findings, however, show slight deviations in percentage ownership rates from those obtained from a similar study by Afendi, Mohammed and Hassan (2012). These authors reported that ownership of laptops by the teaching staff at the Kebangsaan University in Malaysia stood at 89.5%, smartphones at 52.1%, tablets at 12.2% and PDAs at 7.9%. However, it was supposed that their study was carried out at a time when laptops were the most popular mobile devices for learning and when smartphones were beginning to become affordable and popular among educators. The rapid developments in the world of communication technologies could have resulted in the percentage gains in ownership observed in the current study. A more recent study by Sánchez-Prieto, Olmos and García-Peñalvo (2014) indicates a faster growth in the ownership rates for the smartphones. This is because users find smartphones very versatile and usable in a broad set of mobile learning experiences, especially in the design and distribution of course materials.

Mobile Device Brands Owned by Teaching Staff

The study sought to establish the brand types of the mobile devices owned by the teaching staff. The research results indicated that Tecno was the most popular of all mobile device brands. The superiority is due to the user-friendly Android operating system, variety of Android based applications and an attractive design of the brand. Samsung and Alcatel were the best alternative after Tecno, but their ownership was considerably low, standing at 27.8% (*n*=44) and 10.1% (*n*=16), respectively. This information is presented on Table 5 below.

Table 5: Frequency and percentages of device brands owned by teaching staff

Mobile brand	Frequency	Percent
Alcatel	16	10.1
Motorola	10	6.3
Nokia	12	7.6
Samsung	44	27.8
Tecno	73	46.2
Non-respondents	3	1.9
Total	**158**	**100.0**

Existing literature has not provided statistics to corroborate or dispute the results obtained in this study. However, Karlsson, Penteriani and Croxson (2017) note that the Tecno brand has taken over the smartphone demand in Africa because it has focused on a marketing model that increases affordable access to such devices for the African consumers. Tecno has achieved this by removing costly features such as fingerprint readers and high quality displays, which customers are willing to forgo. Furthermore, the brand has partnered with hardware manufacturers to make loyalty free self-branded handsets. The savings achieved by the avoidance of loyalties are passed down to the consumer. On the other hand, Samsung is a brand associated with superior and quality mobile devices, desirable specifications; but is less attractive to people who are more conscious of costing rather than the brand. Motorola, Nokia and Alcatel are perceived to be European brands which are not only heavy and bulky but also crude and old-fashioned. Only the older and more conservative respondents may be in possession of the brands some of which are being phased out of the market across the world.

Preferred Telephone Service Provider

When asked to indicate their preferred service providers, 91.8% (*n*=145) of the university teaching staff indicated as having subscribed to Safaricom, 29.7% (*n*=47) to Airtel while 41.8% (*n*=66) preferred Telkom Orange. On this variable, the responses exceeded the expected frequencies to 163.3% (*n*=258), indicating that 63.3% (*n*=100) of the respondents owned and utilized services from more than one service provider. Nevertheless, the findings are consistent with those in exiting literature. For instance, Oteri (2015) and Republic of Kenya (2015) report that Safaricom holds the largest market share in provision of mobile services. Karlsson *et al* (2017) observe that Safaricom has maintained a dominant lead in the Kenyan mobile service provision using customer service and market driven strategies. Such strategies include developing a loyalty programme to encourage customers to generate points that can be used to subsidize products and services offered. Among these is a loyalty scheme called Bonga points, in which subscribers earn points for their increased usage of voice calls, SMS or data. The Bonga points can be redeemed for rewards, including data, purchase of

merchandise and for purchase of mobile devices for the customers themselves, family or friends.

Proficiency of Teaching Staff in the Utilization of Mobile Technologies

In this section, the researcher reports the findings on the proficiency of the respondents in the operation of mobile devices. Determination of proficiency levels was necessary because past approaches to technology provision in the educations sector have been done without sufficient involvement of the members of the teaching staff. Research has shown that it is important to determine the levels of user competency with a technology before supplying it to the education system. If this determination is not done, then the technology does not receive sufficient support by staff and risks being abandoned altogether. Tariq and Mumtaz (2016) propose that there is a need to reconcile the preference and needs of the teaching staff with the demands of technology if education managers are to achieve considerable success with policy decisions directed towards teaching-learning technologies. Therefore, besides examining the proficiency of staff with the technologies, this study also examined their perceptions in relation to duty performance. To this end, the respondents were asked to indicate if they possessed proficiency in the use of mobile devices to perform the indicated tasks. The results on this item were as shown in Table 6 below.

Table 6: Proficiency of teaching staff in the operation of mobile devices

Activities performed using mobile device	Frequency	Percent
Access and participate in social network forum	109	69.0
Access internet	157	99.4
Collaborating with researchers in your area of specialization	19	12.0
Compose a YouTube file	12	7.6
Download course materials	121	76.6
Download or contribute to a blog in your area of specialization	90	57.0
Locate remote sites using mobile phones	13	8.2
Navigate to unfamiliar destination using the mobile phone	13	8.2
Record a voice file for professional use	25	15.8
Send a memo or a sticky note on your mobile's desktop	10	6.3
Send and receive email	152	96.2
Take a photo for professional use	86	54.4
Transfer data to another mobile devise via Bluetooth, infrared	35	22.2
Upload course materials to students	126	79.7
Utilize YouTube for lecture delivery	30	19.0

From the table above, 99.4% (*n*=157) of the respondents indicated that they were proficient in accessing the internet, 96.2% (*n*=152) were proficient in sending and receiving email, 22.2% (*n*=35) were proficient in transferring data using wireless technology, and 69.0% (*n*=109) had proficiency in participating in social networking forums. On the other hand, few of the respondents lacked proficiency in performing the following tasks: composing YouTube files, delivering lectures on YouTube, recording voice files and collaborating with researchers in duty performance. Indeed, the results obtained for the tasks appear as follows: composing YouTube files (7.6%, *n*=12) for classroom use, utilizing the same for lecture delivery (19.0%, *n*=30), recording voice files for professional use (15.8%, *n*=25) and collaboration with researchers in the area of specialization (12.0%, *n*=19).

Except for use of internet and emailing, these observations are indicative of low usage rates of mobile devices for professional functions among the teaching staff. This is in consonance with the views of Omenyi, Agu and Odimegwu (as cited in Akpan, 2014) who tie low usage of ICT technologies to low competencies. In his argument, Akpan (2014) appreciates that the level of ICT competence influences how a teacher is willing to use the technology for professional duties. Those who lack the competence are themselves unwilling to engage in activities they are not sure about.

On the other hand, the competency of teaching staffs in the use of any ICT improves their effectiveness and efficiency thereby improving the overall quality of delivery of instruction at any level. Olumade (2015) reiterates that competent use of ICT can expend the digital workplace, enhance knowledge delivery and access, produces richer learning outcomes, and generally improve the quality of teaching and learning. In turn, this will expand the utilization of digital workspace, and raise quality of education.

In his study on perceptions on the use of ICT in higher education, Makura (2014) makes observations similar to those in this study. He notes that, although students indicated that their lecturers used a variety of ICT gadgets to achieve instructional objectives, the lecturers did not make use of emerging learning technologies (particularly the smart board and smartphones) in the teaching and learning scenarios. Just as was observed in this study, Mukura notes that teaching staff have pedagogical unfamiliarity with the technology itself and recommends that institutions must not only invest on technology, but also in the training staff on how the technology can be seamlessly embedded into pedagogy.

The research further sought to determine if staff proficiency had any statistically significant influence on the utilization of mobile technologies. Table 7 below provides the results for Pearson correlation test.

Table 7: Staff proficiency and technology utilization

		Technology Utilization	Proficiency
Technology Utilization	Pearson Correlation	1	0.478**
	Sig. (2-tailed)		0.000
	N	157	156
Proficiency	Pearson Correlation	0.478**	1
	Sig. (2-tailed)	0.000	
	N	156	156

**Correlation is significant at the 0.05 level (2-tailed).

The results indicated that there exists a statistically significant positive correlation between the staff proficiency and technology utilization at five percent level of significance (r=.478, N=157, p=0.001). A coefficient value of r=0.478 demonstrated that staff with higher proficiency in the use of mobile devices have the likelihood of utilizing the technology in the performance of their teaching duties. However, the relationship between the two variables was not very strong. The findings of this study are in tandem with those of John (2015) who observes that staff members can only utilize an instructional technology if they possess the skills, knowledge and attitude necessary to infuse it into the teaching curriculum.

Teaching Staffs' Attitudes towards Technology

The respondents were asked to indicate their attitude towards mobile technologies. A five-point Likert scale of strongly disagree, disagree, neutral, agree and strongly agree was used to collate their views. The teaching staffs were asked to indicate their opinions on the variables against this scale. Table 8 below indicates the results obtained from data analysis.

For the purpose of data analysis, agree and strongly agree were be treated as agree while neutral, disagree and strongly disagree were treated as disagree. Consequently, the study results indicated that 98.7% (*n*=156) of the respondents agreed that mobile devices could offer access to digital information readily. Likewise, 95.6% (*n*=151) of the respondents agreed that mobile learning should be included in professional development courses. Another 94.9% (*n*=150) of the respondents indicated that mobile technologies could assist them to deliver course material conveniently and effectively. Moreover, 94.9% (*n*=150) affirmed that the use of mobile technologies could contribute to quality teaching. Another 96.2% (*n*=152) attested that course objectives could be achieved by use of mobile technologies. However, only 4.4% (*n*=7) agreed that they had a good understanding of how mobile technologies fit within their job performance. Ninety-three percent (93.0%) (*n*=147) of respondents disagreed that they had received training on incorporating mobile technologies into pedagogy.

These findings are in line with the study of Olumade (2015) who argues that a major obstacle to technology diffusion depends to a large extent on the degree to which a large segment of the teaching staff has acquired the knowledge and skills required for the usage of the technology. Therefore, even though the respondents held positive attitudes, and despite their concurrence that mobile technology is necessary for pedagogy, the positive attitudes did not translate into utilization. It was deduced that lack of training of teaching staff had a negative impact on how the technology was employed to facilitate teaching and learning. The study sought to determine if there existed a statistically significant relationship between the attitudes of the teaching staff and the utilization of mobile technology. Table 9 provides the results of the statistical test.

Table 8: The attitudes of teaching staffs' towards technology

SN	Item	N	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Non response
1.	Course learning objectives can be achieved by use of mobile technologies	158	0 (0.0%)	2 (1.3%)	6 (3.8%)	82 (51.9%)	67 (42.4%)	1 (0.6%)
2.	I have good understanding of how mobile technologies fit my job performance	158	2 (0.0%)	65 (1.3%)	84 (3.2%)	3 (53.2%)	2 (41.1%)	2 (1.3%)
3.	I have received training on m-learning	158	37 (17.1%)	62 (26.6%)	48 (17.7%)	14 (27.8%)	15 (9.5%)	2 (1.3%)
4.	I require training to use mobile technologies more effectively	158	0 (0.0%)	6 (3.8%)	7 (4.4%)	77 (48.7%)	67 (42.4%)	1 (0.6%)
5.	I'll encourage my colleagues to use mobile technologies in performance of their professional duties	158	0 (0.0%)	2 (1.3%)	9 (5.7%)	65 (41.1%)	81 (51.3%)	1 (0.6%)
6.	Mobile devices are user friendly	158	1 (0.6%)	1 (0.6%)	2 (1.3%)	50 (31.6%)	103 (65.2%)	1 (0.6%)
7.	Mobile devise offer access to digital information, and hence is a boost to information technologies	158	0 (0.0%)	1 (0.6%)	1 (0.6%)	72 (45.6%)	83 (52.5%)	1 (0.6%)
8.	Mobile learning technologies should be included in the professional development courses	158	0 (0.0%)	1 (0.6%)	6 (3.8%)	68 (43.0%)	82 (51.9%)	1 (0.6%)
9.	Mobile technologies can assist me deliver course material conveniently and efficiently	158	0 (0.0%)	0 (0.0%)	8 (5.1%)	59 (37.3%)	90 (58.2%)	1 (0.6%)
10.	The use of mobile technologies can contribute to quality teaching	158	0 (0.0%)	0 (0.0%)	8 (5.1%)	48 (30.4%)	101 (63.9%)	1 (0.6%)

Table 9: Correlation between staff attitudes and technology utilization

		Technology Utilization	Attitude
Technology Utilization	Pearson Correlation	1	0.405**
	Sig. (2-tailed)		0.000
	N	157	157
Attitude	Pearson Correlation	0.405**	1
	Sig. (2-tailed)	0.000	
	N	157	157

**Correlation is significant at the 0.05 level (2-tailed).

The results above indicated that there existed statistically significant positive correlation between the staff attitude and technology utilization at five percent level of significance (r=.405, N=157, P=0.001). A coefficient value of r=.405 indicated that staff members who possessed positive attitudes towards the technology were more likely to utilize the technology for pedagogical duties. The results corresponded with those of Olafare, Lawrence and Fakorede (2017) who report that lecturers at the college of education in the University of Nigeria held positive attitudes towards ICT technologies. In their discussion, these researchers note that lecturers who hold positive attitudes towards a technology are more likely to utilize the technology in teaching and learning. UNESCO (as cited in Olafare *et al.,* 2017) makes similar observations, that lecturers who utilize a technology show positive attitudes towards that technology. Similarly, Reed (2014) attests that teaching staff with positive attitudes towards technology are more compliant with providing online submission of course materials than those that possess negative attitude.

Test for Hypothesis

The researcher sought to test the research hypothesis (Ho1) which stated thus: *Staff related factors such as age, gender, proficiency and attitude do not have*

statistically significant influence on the adoption and utilization of mobile technologies. To achieve this, a simple regression model was conducted. Table 10 below shows the model summary. The model indicates that there was a positive correlation between staff-related factors and adoption of mobile technology (technology utilization).

Table 10: Model summary for staff-related factors

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.391[a]	.153	.150	0.2026343	0.153	54.246	1	300	0.000

Predictors: (Constant), Staff Factors

The coefficient of determination was 0.153; therefore, about 15.3% of adoption of mobile technology is explained by the indicated staff-related-factors. Further, the data in Table 13 indicate that the regression model influenced statistically significantly the technology utilization $(F_{(1,300)}=54.246, p=0.001)$. The regression model was, therefore, a good fit for the data.

Table 11 shows the test results for the hypothesis which stated that staff-related factors do not have statistically significant difference in the utilization of mobile technologies for instructional delivery.

$H\_0: \beta=0$ (Staff-related factors do not have statistically significant influence on the utilization of mobile technologies)

Table 11: Analysis of variance for staff factors and technology utilization

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	2.227	1	2.227	54.246	0.000[b]
	Residual	12.318	300	0.041		
	Total	14.546	301			

a. Dependent Variable: Technology Utilization

b. Predictors: (Constant), Staff Factors

Table 12: Coefficient table for utilization of technology by teaching staff

Model		Unstandardized		Standardized	t	Sig.	95% Confidence Interval for B	
		B	Std. Error	Beta			Lower	Upper
1	(Constant)	.589	.030		19.407	.000	0.530	.649
	Staff Factors	314.752	42.735	.391	7.365	.000	230.653	398.851

Dependent Variable: Technology Utilization

The output on Table 12 indicated that probability value of (P=0.0005) is less than alpha value at 5% level of significance. The null hypothesis was, therefore, rejected. The slope of the regression line for staff-related factors was not zero; hence, staff-related factors statistically significantly predicted adoption and utilization of mobile technology $(t = 7.365, p = 0.001)$ at 5% level of significance.

The unstandardized coefficient was significantly large (314.75), revealing that staff factors of age, proficiency and attitude influenced the adoption and utilization of technology. The regression model produced was as follows:

$$\text{Technology Utilization} = 0.589 + 314.752\ \text{staff Factors}$$

CONCLUSION

There existed a negative but limited statistically significant correlation between age of staff and technology utilization at 5% level of significance. Older members of teaching staff were less likely to utilize technology than younger members of staff.

Regarding the gender of the teaching staff, Pearson correlation test provided a low correlation coefficient at five percent level of significance. It was concluded that the gender of teaching staff did not have a statistically significant correlation with technology utilization.

Regarding device preference by teaching staff, it was observed that Tecno was, again, the most popular brand standing at a popularity of 46.2%, followed by

Samsung at 27.8%. The teaching staff also indicated that Safaricom was the most frequently used service provider standing at 91.8%. Further it was concluded that 91.8% of the university teaching staff preferred Safaricom as their service provider, 29.7% (*n*=47) indicated Airtel while 41.8% preferred Orange communication. It was observed that respondents owned and utilized services from more than one service provider. The study established that 94.9% of the teaching staffs' mobile devices had Android operating systems

Regarding proficiency, the study concluded that there existed statistically significant positive correlation existed between the staff proficiency and technology utilization at 5% level of significance. A coefficient value demonstrated that staff with higher proficiency in the use of mobile devices had the likelihood of utilizing the technology in performance of their teaching duties.

Further the study concluded that there existed statistically significant relationship between the attitude of teaching staff and the utilization of mobile technology. The results of Pearson correlation test showed that a statistically significant positive correlation existed between the staff attitude and technology utilization at 5% level of significance. A coefficient value indicated that staff with positive attitudes towards a technology were more likely to utilize the technology more than staff who had a negative attitude.

In testing if there existed statistically significant relationship between staff-related factors and the utilization of mobile technologies it was concluded that staff-related factors did not have statistically significant influence on the adoption and utilization of mobile technologies. From the results of the test of hypothesis, it was observed that the probability value was less than the alpha value at 5% level of significance. The null hypothesis wasrejected.

RECOMMENDATIONS

For effective adoption and utilization of mobile technologies in the university place, academic staff, irrespective of age and gender needs to undergo capacity building programs, with a view to empowering them on the modalities of making meaningful interaction with a mobile based learning management system. Such training should be frequent, with a view to building the confidence of lecturers on how the technologies can increase their duty performance. The capacity building programs need to be developed so as to incorporate theories and models of technology acceptance.

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