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**Impact of Mobile Technologies on e-learning at the University of Eastern Africa,
Baraton, Nandi County, Kenya**

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Abstract

Mobile technology in today's society plays a major role not only to enhance communication but also facilitate work, fun, entertainment as well as education. These devices improve the efficiency of transmitting information in organizations and passing knowledge in the teaching and learning process in institutions regardless of distance, time and place. They can be used in education process in several ways through internet connection. Technology in today's media enriched world is valued and of importance when it comes to e-learning. Although this has been supported by several studies, it comes with its impacts. This article explored the impacts of the mobile technology on e-learning in Universities in Kenya, a case study of University of Eastern Africa, Baraton. It adopted a case study method and a total of 85 respondents were randomly selected to participate in the study. This category of respondents comprised 70 undergraduate students and a total of 15 respondents who constituted lecturers. The findings revealed that mobile technologies had both positive and negative impacts on eLearning. One of the highest positive impact was efficiency while negative impact indicated was distraction. The study concluded that mobile technologies brought challenges to e-learning but if properly utilized, they would support teaching and learning effectively. The study recommended that both lecturers and students should continuously adapt to technological changes and make positive impact out of them.

Keywords: E-learning, Internet, Mobile technology, Wi-Fi, ICTs, Impacts

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By

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Introduction

Technology has dominated our world today where most people can access digital technology and mobile devices. Digital technologies and mobile devices are the tools which have been integrated into many learners and educators' daily lives. Education being one of the indicators in growth of the economy has adopted technology. The use of technology has made acquiring and delivering knowledge easy and fast. The image of mobile learning in education is slowly crystallizing into a picture of a learner not only to use new technologies, but also perform new activities with them; and of an educator who can not only put lots of learning content in a mobile gadget and hand it to their students, but also to plan new learning experiences for them (Lin, Y. 2007).

According to Patil et al. (2013), mobile technology is the technology used for cellular communication, which evolves every year and have internet capability that allows accessibility from anywhere the user is and anytime. These devices include smart phones, tablets, some iPods and laptops. Mobile technology also involves the use of mobile telephony, mobile computing and miscellaneous portable electronic devices, systems and networks, Wi-Fi (wireless Fidelity), GPS (global positioning service), WPS (wireless application protocol) and SMS (short message service). In the recent years, e-learning has grown into a widely accepted way of learning, and the usage of the global network is inevitable in every education process (Despotović-Zrakić et al., 2013) E-learning or distance learning is the training or education delivered via the Internet instead of the usual classroom, book, video or CD ROM. E-Learning is also referred to "Web Based Training" (WBT). Chuang, (2009) pointed out that, Web based training is delivered by a web browser via the Internet or a corporate intranet. The use of digital technology in the learning process and teaching practices in formal teaching is highly dependent on the ability of teachers to introduce it without jeopardizing the richness of the classroom environment, such as the attention needed to follow the flow of argumentation by the students and the need to guarantee quality of the inquiry (Pedro et al., 2018). However, not every learner enjoys using these devices in the process of learning. The support from the educator for the learner to acquire knowledge depends highly on the degree of learner's interest. Learners develop different perspectives and perceptions on these technologies in the learning process as per their experience.

Although mobile technologies seem to be beneficial, they have issues and they impact users in different ways. Malekzadeh et al., (2016) did a review on mobile learning in teacher education and the results indicated notable exceptions, challenges and issues associated with integration of mobile technology in education programs and curriculum. Also, adopting them fully in education sector is a challenge because for the technologies to be integrated, institutions will need to acquire infrastructure and install them. Maintaining them also comes with a price which may be an issue for many institutions as well as to students who may not be able to purchase them. However, recently, universities in Kenya and across the world have made significant investments in technology and systems to support various aspects of studies and learning in order to attract students into the online learning environment. Students have become increasingly equipped with newer mobile devices which enable quick and easy

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communication and information sharing. To a greater extent, some universities provide laptops to their students just to enhance online learning. There is need to exploit the limited education resources available in the country so that all universities can have their education beyond the lecture halls (A Nyerere et al., 2012)

Statement of the Problem

Education in Kenya and other countries is transforming to online thanks to the new technology and its immense benefits. However, e-learning has been accompanied with major challenges that if not addressed then online learning may not be fully adopted. One of the key issues driving e-learning is technology. Some of the technological constraints affecting e-learning include inadequate infrastructure. The success of e-learning depends on the availability of infrastructure such as computers, internet enabled mobile devices and other hand held devices. Absence of these tools has reduced full adoption of e-learning, making many students prefer physical learning. Absence of stable internet connection also affects e-learning. There must be internet connection for learning to take place. In Kenya, full adoption of e-learning may not be attained in the near future simply because most of the areas do not have electricity and hence having Wi-Fi and cable internet connectivity is still a challenge. The success of e-learning depends on development of a clear e-learning policy. This is a framework providing guidance on the program. However, there is no defined policy for e-learning as each institution is developing their own independent policy and this causes inconsistency.

Purpose of the study

To assess the impacts of mobile technology on e-learning in Universities in Kenya.

Research objectives

- i. To assess the accessibility of mobile technology to both students and lecturers.
- ii. To assess the level of skills of lecturers and students in the use of the mobile technologies.
- iii. To assess on the impact of the mobile technology on the teaching and learning processes and outcome.

Review of related Literature

The concept of e-learning

One of the key ways to avail online research and learning resources is through the Internet where both teachers and students can share and acquire information. E-learning based on technology integrates other vital technologies to teach, avail learning materials and regulate courses. As a concept, it revolves around major components such as the use of computers or even other devices and Internet. Valverde-Berrocoso et al.,(2020) in their study defined e-learning concept as a technology-mediated learning approach which uses technology to foster teaching and learning. The study also showed that e-learning concept was not the first term to be used in conceptualizing the use of computerized systems to facilitate learning process. Other technologies that preceded eLearning were teaching machines invented in 1954 and computer-based training programs that came into place in the 1960s. Later on with the advent of the internet, e-learning came into place. E-learning is characterized by the following aspects; technology driven, delivery system oriented, communication oriented and is educationally paradigm oriented.

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Defining e-learning is not easy as it might seem (Sander Tamm, 2019). It is difficult to come up with a single definition of e-learning that would be accepted by majority of the scientific community (Sangrà et al., 2012). It is hard to find a common definition of the term e-learning (Arkorful & Abaidoo, 2015). There are many terms used to describe learning delivered online via the internet. They range from distance learning, to computerized electronic learning, online learning, internet learning and many more. To get a better overview of the various academic definitions, is too good to look at some examples of different academic and educational researchers (Sander Tamm, 2019). According to Morais et al., (2014) certain myths revolves around the concept of eLearning. These myths are; that e-learning is a powerful tool and every institution should adopt it; e-learning saves on cost as it is believed to be cheaper than the traditional face to face learning; e-learning is likely to replace human; digital technologies should be the main learning tools in higher education; e-learning will make universities competitive and e-learning is likely to decrease absenteeism and drop outs of students in Universities.

Sangrà et al., (2012) have highlighted that the suspicion of different meanings or definitions of e-learning are conditioned by particular professional approaches. Further, individual or corporate interests underscores the need to analyze this field of knowledge technologies and other forms of educational materials whose primary goal is to provide students with a personalized, learner-centered, open, enjoyable, and interactive learning environment supporting and enhancing the learning processes. The Economic Times (2020) defines e-learning as a learning system based on formalized teaching with the help of electronic resources. Internet resources like eLearningNC.gov defines it as learning utilizing electronic technologies to access educational curriculum outside a traditional classroom i.e. a course, program or degree delivered completely online. (Arkorful & Abaidoo, 2015) define it as the use of information and communication technologies to enable the access to online learning and teaching resources. (Sander Tamm, 2019) defines e-learning as the acquisition of knowledge which takes place through electronic technologies and media. It can therefore be concluded that e-learning is the application of new technologies in teaching and learning. This study chose to understand e-learning as the process of facilitating teaching, learning and research with the help of technological tools over the internet.

Mobile Technologies and e-learning

The rapid growth of technology has made e-learning possible. Electronic systems and applications are used in e-learning. Basharat (2018) has pointed out that mobile learning allows us to extend the scope of education beyond the physical confines of a classroom. We can access quality content from home or office, communicate with a large community of learners and teachers, and work online. The development and adoption rate of mobile technologies are increasing rapidly all over the world with numerous mobile technologies in the teaching and learning environments (Brown, 2003). Currently, teaching in higher level of education is shifting as a result of technology impact. Numerous technological tools are replacing traditional methods and strategies of teaching and learning process. Thus, mobile devices have become a key tool for educational practices to consider new ways.

Mobile technologies ‘hold the key to turning today’s digital divide into digital dividends bringing equitable and quality education for all.’ Notably, the development of mobile technologies has opened up many possibilities in literacy and language learning. Research has demonstrated mobile technology’s effectiveness in improving literacy performance among learners. Because mobile technology can reach a wider audience, it holds

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the promise of transforming education for children and youth in isolated and other underserved conditions. According to data provided by World bank in 2018, 18% of citizens in developing countries don't have access to computers and other mobile technologies. This is an indication that online education sector will not be fully facilitated in developing countries like Kenya. It pointed out that challenges such as poor internet connection, lack of devices, the attitude towards e-learning and poor planning are some of the factors affecting successful implementation of e-learning programs in Universities. The future of e-learning must be built on the principle of openness and equality (Valverde-Berrocoso et al., 2020).

E-learning in developing countries and specifically in Africa is seen has one of the strategies that can bridge the gap between those who can access higher education and those you cannot (A Nyerere et al., 2012). If e-learning is implemented well, it can be a cost effective mode of teaching and learning where few infrastructures may be put in place and many students can acquire knowledge and skills in different areas of specialization. However, institutions of higher learning must put in place e-learning policies that will guide the entire process of uploading course content, assignments, tests, admission of exams and grading.

Impact of Mobile Technologies on e-learning

Mobile technologies have become more rampant and so it is important to study their use as well as their effect on the growth of distance education. Their integration in e-learning has brought both positive and negative impacts hence it is important to understand them and know how institutions can maximize their use for effective and efficient e-learning. Mobile technologies used on e-learning have led to greater changes in teaching methods and methodologies (Concannon et al., 2005). To optimize the opportunities offered by information and communication technologies (ICT), educators should be prepared to make their teaching practices up to date. This calls for a strong demand for both lecturers and students training in technological skills, to build their own (technological) resources and respond to students' needs, while also motivating them to develop autonomy and analytical thought skills for learning. The challenge to this practice involves changing teaching methodology and adopting new teaching-learning models in order to improve the training standards used by society in several fields of educational training.

Increasing mobile technologies virtual classrooms and the internet are having a major impact on e-learning. They have allowed lecturer - student and student –student interaction remotely (Finch et al., 2012). Most people who would not have attended college because of work schedule and other personal interests are now able to obtain their degree at their convenient places and time. The invention of online education platforms such as Moodle and Dashboard has made online learning, assignment and examination efficient. They have also made interaction very easy and real-time.

Educational trends are changing at an accelerated rate in the 21st century. In a society where everything is ready in an instant, tradition education is becoming less relevant for many students. Institutions are being forced to conform to students' needs by developing options for online and hybrid education. E-learning supports action learning by allowing students to engage in student centered case studies, activities, and collaborative problem solving assignments that create environments where participants develop learning competencies (Finch et al., 2012).

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Mobile technologies have enabled institutions to grow. Most of these institutions are now able to offer more programs at a lower cost. In the past, institutions were to develop satellite campus and invest in infrastructure and physical building, however, with mobile technologies; there is no need for physical infrastructure. The saved amount is then channeled to improving internet bandwidth, put in place better technologies and good learning platforms. Stanojevic & Rakic, (2019) point out that the integration of mobile technologies in learning have added enthusiasm to students and especially the born digital group of students who happen to be the majority in Universities.

All in all, the success of e-learning in this era depends on the commitment of online learning department and lecturers. Proper planning and quality modules should be developed. The department should also evaluate the content populated on the e-learning platform to ensure integrity otherwise students are likely to consume low quality content. With the barriers of time and place being removed by e-learning, non-credit classes are conducted posing the challenge of quality.

Methodology

This article adopted case study design. The cases study was suitable because it provided in-depth study of the research problem. The primary advantage of a case study research design is that it allows one to present data collected from multiple methods such as surveys, interviews, document interview and observation (Kothari, 2008)

Sampling procedure and Sample size

This article gathered data about impact of mobile technology on e-learning. A sample of the population was studied to get data and the findings obtained were used to make inferences. A sample is a smaller group drawn from a study population so as to draw conclusions about the targeted population. Kothari (2004) argues that the results from the sample can be used to make generalizations about the entire population as long as it is truly presented. Data was collected from lecturers and students. The study population was 2400 students and 120 lecturers. A sample of 85 respondents participated in the study. The study used Kothari 2004 formula to calculate the sample size as illustrated below;

The formula for the sample size: $n = \frac{Z^2 P(1-P)N}{P^2(N-1) + P^2(EP)}$

Where:

n = Sample size

N = Size of population

P = Population reliability where P is 0.05

E = Margin of error where e is 0.95

Z = Level of significance where Z is 1.96

Therefore: Sample size for lecturers = $\frac{1.96^2 \times 0.05(1-0.05)90}{0.05^2(90-1) + 1.96(0.05 \times 0.95)} = 15$

Sample size for students = $\frac{0.05^2(2400-1) + 1.96(0.05 \times 0.95)}{0.05^2(2400-1) + 1.96(0.05 \times 0.95)}$

Simple random sampling was then used to distribute questionnaires to the respondents. The questionnaires were distributed physically, and respondents were requested to fill them and were collected on the same day.

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Table 1 Population and sample

Respondents	Population	sample
Lectures	120	15
Students	2400	70
Total	2520	85

Source: Field data 2021

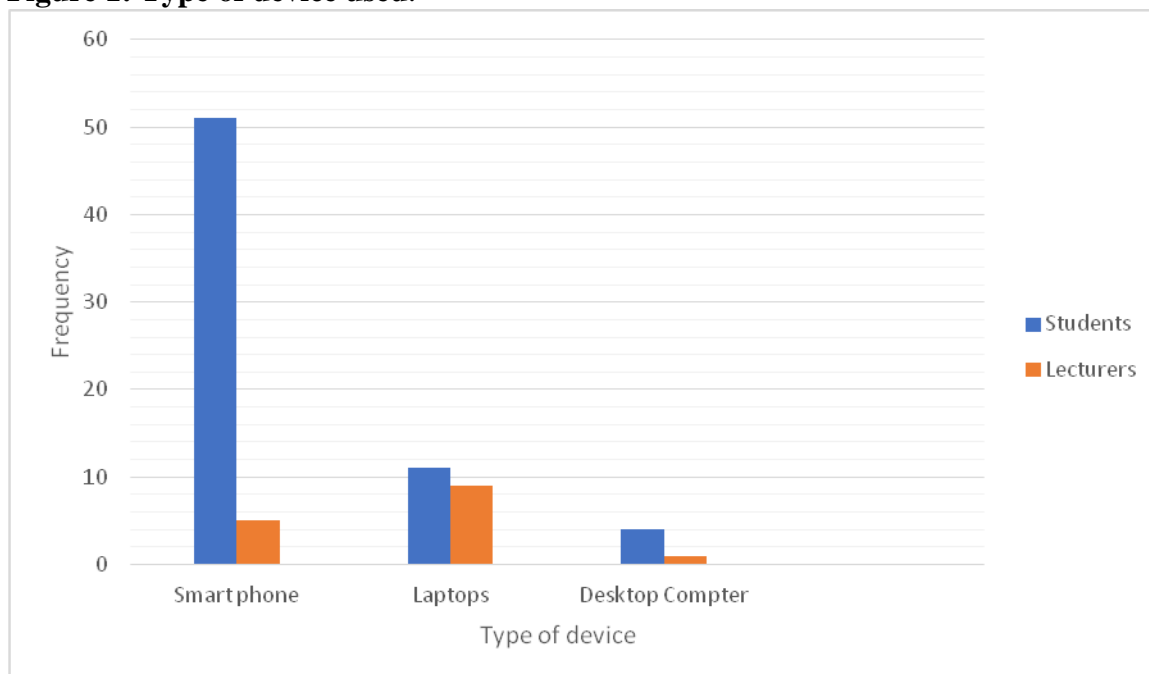
Data was collected from a sample of 85 respondents. Out of the 85 questionnaires administered, 81 were correctly filled and these were used for analysis. Four (4) of the questionnaires administered to students were not correctly filled hence would not be used for analysis. Therefore, a total of 66 questionnaires filled by students were used. On average the returned questionnaires were 95% representation of the total number of administered questionnaires. The data was analyzed using descriptive statistics and SPSS v.20.0. The findings were presented using tables and graphs hence generation of quantitative reports.

Results and discussions

From the analysis that was done, the findings indicated that many students used mobile phones on e-learning represented by a total of 51 respondents out of 66, while lecturers used laptops. Personal computer was the least used device from both respondents. This is an indication that devices that are carried from one point to another are commonly used even in e-learning. The findings are as illustrated in figure 1 below;

Device used

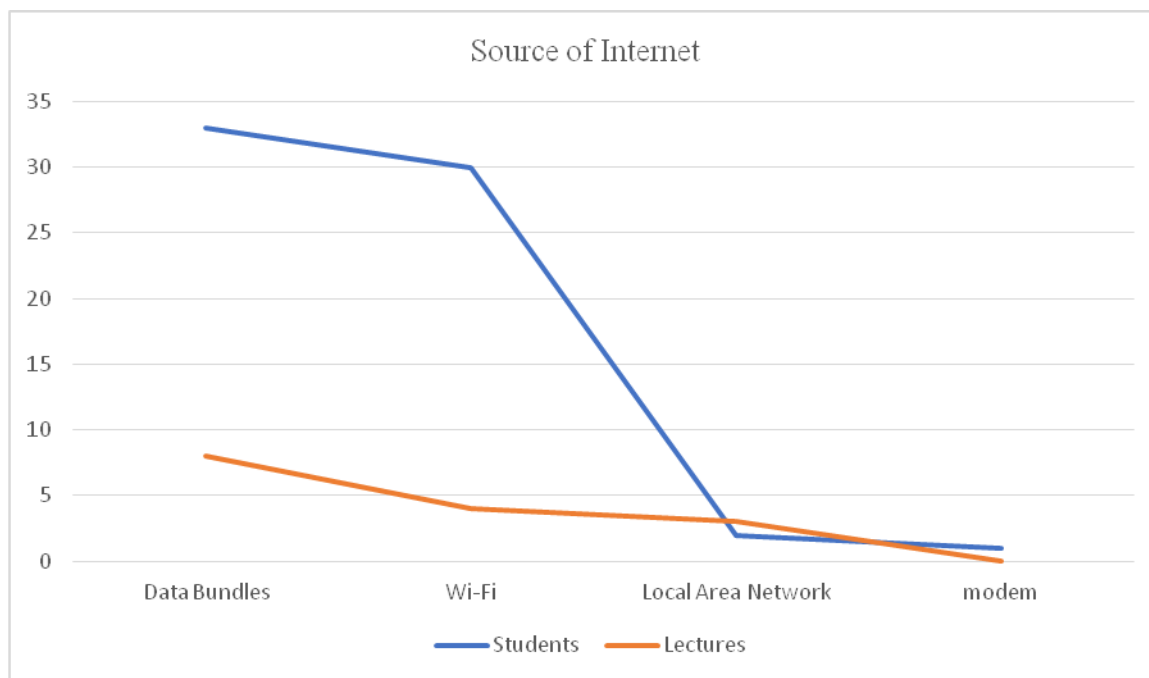
Figure 1: Type of device used.



Source: Field data 2021

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The findings indicated all respondents have access to internet but data bundles through mobile phone was ranked the highest mode of provision of internet. Modems were ranked the least in terms of internet access as illustrated in Figure 2 below.



Source of Internet

Figure 2: Source of internet

Source: Field data 2021

Skills of using Mobile Technologies

Table 2: Rating of students on Skills

	N	Mean	Std. Deviation
Operation	66	3.121	.7129
Access	66	2.864	.7419
Use	66	2.561	.8793

Source: Field data, 2021

To determine the ratings of the students on the skills of using mobile technologies on e-learning, various propositions were made for the respondents to respond to. Table 2 above shows some of the propositions made and how they were responded to by the students.

The item “operation and connectivity to mobile technology” was given the highest mean score of 3.1. Respondents agreed that they are able to operate and connect mobile technologies available to them for e-learning. The item “access to online resources” was given the second highest mean score of 2.9. Most respondents had average skills needed to access online resources in the process of e-learning.

The item “use of learning management software e.g., Moodle” was given the third highest mean score of 2.6. Students agreed that they were able to use several learning

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software's during learning process. This is because a series of training would have taken place before embarking on e-learning in the University.

Table 3: Ratings of Lecturers on Skills

	N	Mean	Std. Deviation
Operation	15	3.2667	.70373
Access	15	3.2000	.94112
Use	15	3.2667	1.0328
Presentation	15	2.9333	1.0328
Teaching	15	3.3333	.89974

Source: Field Data, 2021.

To determine the ratings of the lecturers on the skills of using mobile technologies on e-learning, various propositions were made for the respondents to respond to. Table 3 above shows some of the propositions made and how they were responded to by the lecturers.

The items “create audio and video presentation for teaching” were given the highest rating with a mean score of 3.333. This implies that lecturers agreed that averagely they are able to prepare class presentations for students by use of mobile technologies.

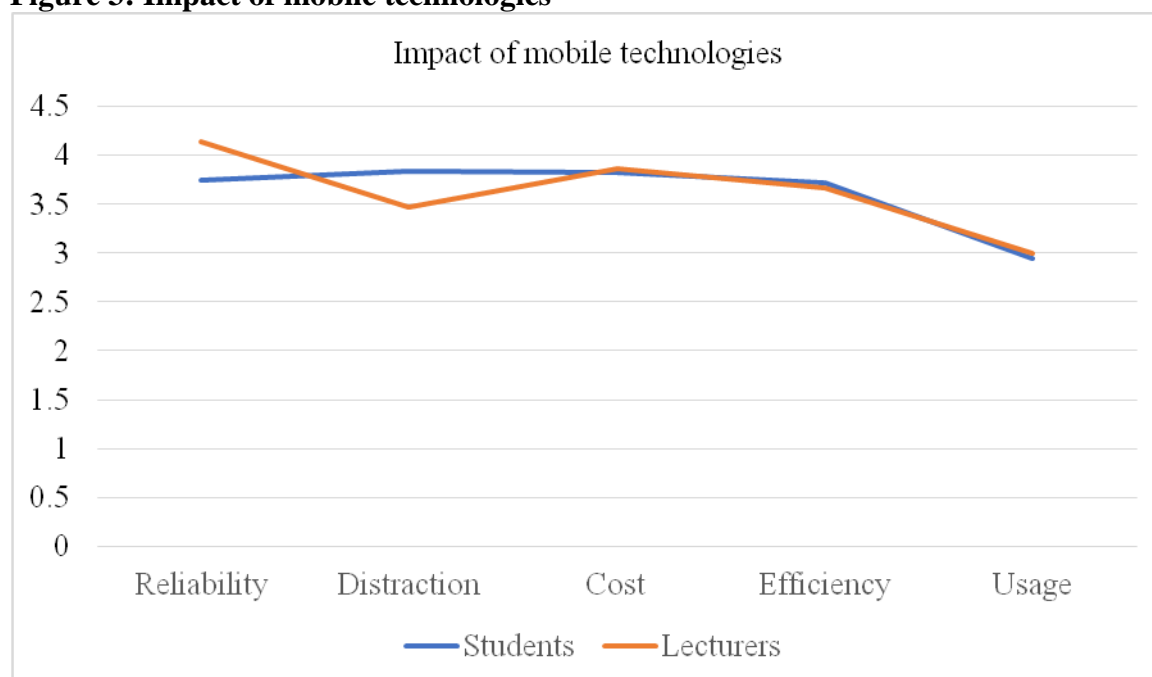
The item which stated “operation and connectivity to mobile technology and use of e-learning management e.g. Moodle” were given the second highest mean score of 3.267. This implies that the lecturers agreed that they have some skills on the use of mobile technology on e-learning. This is attributed to the fact that most lecturers have gone through e-learning training several times and have the required skills to operate various mobile tools.

The item “access to online resources and use of learning management software e.g. Moodle” was given the third highest rating with a mean score of 3.200. Lecturers indicated they are able to access online resources such as e-books and e-journals and upload them to the learning management system. The item” create audio and video presentation for teaching” was given the fourth highest mean of 2.933. This is a clear show that Lecturers were able to do presentations during teaching.

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Impact of mobile technologies

Figure 3: Impact of mobile technologies



Source: Field data 2021

To determine the ratings of the lecturers on the impact of mobile technologies on e-learning, various propositions were made for the respondents to respond to. Figure 3 above shows some of the propositions made and how they were responded to by the lecturers.

The item “reliability” was given the highest mean score of 4.133. This implies that the lecturers agreed that the use of mobile technology on e-learning is dependable and reliable. This feeling can be attributed to the fact that most lecturers use these mobile devices on e-learning and has helped on teaching aside their challenges.

The item “expensive” was given the second highest rating with a mean score of 3.867. This reveals that lecturers tended to agree that mobile devices are expensive to acquire and use as well. If one is using data bundles as their source of connectivity, it could be expensive if that is the only option they have.

The item “makes teaching easy” was given the third highest mean score of 3.667. Lecturers tended to agree that mobile technologies make the process of learning easy especially like these times of Covid-19 where learning is online due to unavoidable circumstances.

The items “prone to distractions” was given the fourth highest rating with a mean score of 3.467. This implies that lecturers tended to agree that mobile technologies are prone to cause distractions during the process of teaching through e-learning. This lecturer’s feeling can be associated to the fact that when using some devices like smart phones or tablets, one can receive an incoming call, write a message normally or through WhatsApp, go to YouTube to watch things of their interest.

The item “challenging to use” was given the least mean score of 3.000. Respondents tended to agree that mobile devices can be challenging to use sometimes. This feeling comes due to unstable network, lack of electricity, the devices are prone to hang and many more as

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most lecturers gave their opinions on the challenges they may have faced with the use of these technologies.

To the student category of respondents, the findings as presented in figure 3 above indicated that the item” prone to distraction” was given the highest mean score of 3.83. This implies that students agreed that mobile technologies cause distractions during the process of teaching through e-learning. This response is associated to the fact that when using some devices like smart phones or tablets, one is likely to be distracted by incoming notifications through social media sites such as WhatsApp, YouTube, Facebook and others.

The item” expensive” was given the second highest mean score of 3.81. This reveals that students agreed that mobile devices are expensive to acquire and use as well. Additional cost is incurred especially when using data bundles from the various service providers.

The item” reliability” was given the third highest mean score of 3.74. This implies that the students agreed that the use of mobile technology on e-learning is dependable and reliable. This is attributed to the fact adopted learning platforms are stable and less likely to fail due to enormous logins. The item” makes teaching easy” was given the fourth highest mean score of 3.71. Students agree that mobile technologies make the process of learning easy since one can join the class in any location and any time the class is arranged to take place.

The item” challenging to use” was given the lowest mean score of 2.94. Respondents agreed that mobile devices can be challenging to use sometimes although on very minimal times. This is attributed to unstable network, lack of electricity, lack of bundles, and the fact that the devices can hang from time to time.

Conclusion

E-learning has improved education as a result of adoption of mobile technologies. Students who were not able to attend classes physically are able to get their degree at their comfort. Greater opportunities are created for lecturers wanting to teach and also institutions that may need to increase their enrollment. This is because an institution may have both online and physical programs running parallel. However, the effectiveness of e-learning depends on the university administration, lecturers and students. The administration should ensure proper financial planning to provide the needed infrastructure such as internet connectivity and devices to be used. Lecturers on the other hand should ensure quality modules are populated into the learning management system and engage students in significant learning, while students too need to go an extra mile of ensuring access to devices and internet connection wherever they are so that they can join classrooms with ease. Finally, all parties must be open to the changes that mobile technologies bring in Higher education because if well embraced, mobile technologies have proven to add value to teaching and learning.

Recommendations

Lecturers must receive continuous training on E-learning so as to develop their academic skills according to the dynamic nature of technology for them to use IT effectively. Students should have access to the internet and e-learning facilities if they are to prove themselves and achieve their goals and should also be trained regularly on the use of the software used to incorporate e-learning. Lecturers and students should continuously adapt themselves to changing technological environments and have a positive attitude towards the adoption and implementation of e-learning within their institutions. Universities should work to ensure that there is stable internet access connectivity to ease e-learning.

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