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Mobile Devices for Learning in Universities: Challenges and Effects of Usage

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***Abstract*—** *Mobile devices are no longer playing the role of voice or short message communication but also in learning. These devices allow students to interact with educational content and learning can occur regardless of their location. It is therefore important to establish the factors hindering the use of Mobile devices for learning in Universities: A Case of Muni University. The study answered research questions such as; (a) what are the negative effects of using Mobile devices during lectures for other activities not related to the Lecture? (b) what are the reactions of lecturers towards the use of Mobile devices during lecture time? which factors are hindering the use of Mobile devices for learning? Quantitative design was employed using questionnaires containing a Five (5) Point Likert scale items ranging from strongly agree, agree, neutral, disagree, and strongly disagree and open-ended items were utilized in this study to obtain quantitative information to answer the research questions: A total population of 331 was considered and sample size of 181 was obtained using Krejcie and Morgan table. Stratified sampling was used to collect data from each stratum and data was analyzed using SPSS Version 20. The reliability of the data collected was tested using the Cronbach's reliability test coefficient were the overall value of all the options was on average 0.67 which was beyond recommended Cronbach's Alpha coefficient values 0.6 for an instrument to be declared reliable. In terms of ascertaining the negative effects of using Mobile devices during lectures for other activities to the related Lecture, students agreed that it distract students' attention, disturb other students, disturbs the instructors and the course of the lesson and reflects disrespect for the instructor. The findings also agreed that the following were ranked among top five (5) factors hindering the use of Mobile devices for learning: Lack of mobile devices, Slow Speed of the mobile devices, Power problems, Network Connections Issues and Battery problem but disagreed that the course is not suited for mobile devices, lack of interest and complicated to use. This study recommended that mobile devices should be encouraged, allow students to use Mobile devices according to lesson's topics since students disagreed that lack of interest is not hindering the use of mobile devices, discourage students from using Mobile devices in class for other activities not related to the topic and formulate the usability policy of mobile devices.*

***Keywords*—** *Challenges, usage, mobile devices, learning and Muni University.*

I. INTRODUCTION

The emerging Information and Communication Technologies (ICTs) such as Mobile technologies are paramount in teaching and learning. Mobile learning emerges as a new progression based on the use of mobile devices together with wireless communications for teaching and learning purposes [1]. According to [2], Mobile learning is any form of learning that happens when mediated through a mobile device, and a form of learning that has established the legitimacy of 'nomadic' learners. It encompasses all the initiatives that seek to take advantage of the integration of mobile technologies in the teaching-learning process. Mobile learning can take place anytime anywhere, including conventional learning environments such as university classrooms, lecture theatres, libraries, and even canteens as well as learners' homes, community locations, parks, and in public transport. Students can have access to lecture notes and assignments by using mobile technological devices [3]. Mobile technologies used in education include Mobile Phones, Smartphones, PDAs, MP3/MP4 players, E-Book Readers (e.g. Kindle), Netbooks, Tablets (e.g. iPad, Galaxy Tab), Hybrid Tablet/Smartphone Gadgets (e.g. Galaxy Note) and specialist portable technologies used in science laboratories [4].

[5] urged that university students cannot do without their mobile devices, including Smartphones, Laptops and more. In addition, modern mobile devices support a wide variety of other services which include text messaging, multimedia system, email, Internet access, short-range wireless communications (infrared, Bluetooth), business applications, gaming, and photography. The use of these mobile devices in learning motivate the students and engage their attention while focusing on solving problems improving their memory, their reading and writing skills [6]. Despite numerous opportunities offered by mobile learning in education, mobile devices affect students negatively in the following; disrupts driving performance by diverting attention away from the task of driving [7-9], Cheating can take place, students can make disruptive noises during the class, access to inappropriate content [10], [11]. Much as mobile devices have enhanced teaching and learning, it suffers from several challenges such as having small screens, limited processing power, and small keyboards [12], Network Infrastructure, Network Security, Costs, Cognitive Challenges [13-15], educators' attitude, lack of knowledge, lack of technical support [16]. However, the challenges of using mobile devices for learning in Universities have not been ascertained in Muni University. This paper seeks to provide a broad assessment of the challenges of using mobile devices for learning in Muni University. To discover viable solutions, the paper will describe different research questions and survey activities carried out and result obtained from the study.

This paper is organized as follows. Section one is the introduction and the second section is a review of related research on Mobile devices. It summarises existing studies on mobile devices benefits, negative effects, challenges, and evaluates the recommendations made in the literature. The third part discusses the methodology used. The brief overview of the analysis of the results of the research is presented in section four while section five gives a detailed discussion of

the results gathered and statistical tests. The last part of this paper discusses recommendations and direction for further study.

II. Related Works

Research on Mobile Devices usage in learning was carried out by other scholars according to the literature reviewed that was conducted for this research. The literature showed that the challenges of using Mobile Devices for learning vary from communities to communities.

A. Concepts of using Mobile Devices for Learning: Mobile Learning

There seems to be a misconception between the terms mobile learning and e-learning. While trying to address the issue of using Mobile Devices for e-learning, there is need to conceptualize mobile learning by first understanding its characteristics and operation. Other scholars like [17] define the term mobile learning as the personalization by connecting and interacting with handheld computers in classrooms. On the other hand, [18] defines Mobile learning as any activity that involves downloading or uploading educational content using a personal pocket device such as PDAs, smartphones, and mobile phones. [19] describes the characterizes of these devices as: Spontaneous, Private, Portable, Situated, Informal, Bite-sized, Light-weight, and Context-aware. [18] asserts that some scholars view mobile learning as the subset of e-learning. [18], [20] defines e-learning as the process that takes place on electronic digital and media tools and analogous to mobile learning that is supported by Mobile Devices and wireless transmission. [18], [21] further defines mobile learning as the learning that is conducted on mobile computing and at times can be an intersection of mobile computing and e-learning. However, [18] explains that e-learning aims at delivering education content over the internet and incorporates different learning activities that include mobile learning.

The study carried out by Pearson Students Mobile Device Survey in partnership with [22] to gain more understanding of how college students use technology for learning revealed that the immense increase in the market for smartphones, tablets, and other Mobile Devices has increased greatly in the past few years. [22] assert that of the commonly used Mobile Devices for accessing classwork were Laptops compared to other mobile devices.

B. Use of Mobile Devices (MDs) to Support Pedagogy in Higher Education Institutions(HEIs)

In this study, Mobile Devices learning was used to describe computing devices that are portable, can be used to extend e-learning such as tablets, smartphones, laptops, and palmtops. The primary role of Mobile Devices was to exchange messages and voices but due to changes in human needs, this Mobile Device usage was extended to mobile learning with the aim of supplementing the brick and mortar teaching. Widespread ownership of mobile technologies has created opportunities to explore the use of these tools for teaching and learning [23]. According to [24], Mobile technology can be used for both formal and informal learning. Informal learning, students can use their mobile devices to access course materials while they are on the move or anytime they want to learn. It improves accessibility, efficiency, and quality of learning by facilitating access to education resources and services, and enhances the interest of the learners, promotes collaboration, interaction, and support differentiated instruction [25]. [26] said the mobile technologies and smart devices allow student interaction with educational content and more, learning occurs regardless of location. Devices such as smartphones and tablets enable innovation and help students, teachers, and parents gain access to digital content and personalized assessment vital for a post-industrial world. Mobile devices improve learning for students [27]. Similarly, a study carried by [28], cited by [29] showed that students who use mobile technology devices had more motivation for learning than those who do not. Similarly, a survey study conducted by [11] showed that the majority of students indicated sending or receiving text messages during class time. [30] urged that mobile technology can be used to deliver the Content, including Multimedia content. The Teacher can use the Computing power of the mobile technology to develop Simulation and games and can prompt the learner for data and then process the data. The learner can Capture information for learning and sharing using features such as camera, audio, GPS, sensors, etc. The Communication features of the mobile technology allow the learner to communicate with other Learners and with the teacher and to share information. [31] also added that students can use their mobile devices to respond to multiple-choice questions, allowing professors to collect active feedback within minutes. [32] observes that learners who use mobile technologies for learning are not only far away from their lecturers and tutors, but they are also in full control by having access to information on their mobile devices, thereby giving them a certain amount of liberty, freedom, and independence in their course of learning.

C. Negative Effects of Using Mobile Devices During Lectures

Despite numerous opportunities offered by mobile learning in education, mobile devices disrupt the driving performance by diverting students' attention away from the task of driving [7-9]. Study by [10] and [11] also found out that with mobile devices, cheating can take place, students can create threats by using devices, make disruptive noises during the class, access to inappropriate content, test performance is significantly lower for the students who are distracted by mobile devices during a lesson and loss of concentration if students are doing non class-related tasks.

[33], [34] also urged that the use of Mobile Devices during lectures by students cause disruptions to lectures, loss of attention among students due to discreet exchanges of text messages and playing mobile games. Additionally, incorporating a form of text-based messaging system to allow students to send their queries using their mobile devices may result in lecturers not being able to respond promptly to an avalanche of students' queries [35]. Similarly, there is a concern that students could cheat in examinations using mobile devices [36].

[37] reported a belief among teachers that constant use of digital technology hampered their student's attention spans and ability to persevere in the face of challenging tasks. [38] found texting during class partially affected a students' ability to self-regulate their attention to classroom learning.

D. Lecturers' Attitude Towards the Use of Mobile Devices During Lecture Time

Some lectures believe that with cell phones being used to supplement pedagogy, they see cell phones as distractions to displace their work [18]. [39] says that some professors were worried about the use of mobiles devices for learning in HEIs because the use of Mobile Devices such as laptops would cause a distraction in learning.

E. Challenges Hindering the Use of Mobile Devices for Learning

There are many challenges hindering the use of Mobile Devices for Learning which includes the following:

IT Infrastructure

According to [40], the challenge is "Maintaining and upgrading infrastructure to accommodate more devices and technologies that cross paths with IT domains, predicting what the next technology will be in order to proactively be ready to accommodate it." Studies have suggested that lack or poor Internet connectivity can cause disruption to mobile learning activities. Similarly, [41] found that students had difficulties in completing learning activities due to technical problems associated with reduced network capacity. According to [42], most institutional technology infrastructures are built on the assumption that student Internet access occurs within computer labs for a period of time. The same infrastructure supporting those computer labs is used for administrative purposes.

Network security

According to [43], Allowing students to connect their personal mobile devices to the institutional network can expose sensitive information. The number of mobile devices that students currently bring to university campuses has strained the existing security. Several network security risks include, the loss of a mobile device that is unprotected could mean exposure to personal or corporate data that users might have stored in that device. A further risk is that mobile devices can communicate with various networks concurrently, regardless of firewalls. If a mobile device is connected to an institution's network as well as a public network, an unprotected path to the institution's central information system can potentially be opened, creating a security issue. A mobile device can become a gateway to an institution's private information [44], [16].

Lack of IT support

According to [45], mobile learning creates a demand for support structures and its development is dependent on the institutional capacity to provide such support. A study by [46], for example, suggested that if the number of mobile device users increased, then the institution's IT department would be overwhelmed with demands for technical support for those devices. However, supporting multiple mobile devices with different models and operating systems can be more complicated than supporting a range of identical devices purchased and maintained by IT staff [47], [16].

Lack of awareness

The lack of awareness among teachers about the positive educational value that mobile phones can add, and a generalized conservatism toward the use of mobile phones by young people, also serve as inhibiting factors [48], [16], [49]. For example, in South Africa a few cases reported in the media suggested that students were using their mobile phones to send 'bullying' messages to other students, cheat on tests using SMS messaging, and access pornographic materials and sex chat rooms. These reports have influenced teachers' perceptions of mobile phone use by their students and have led many educators to support the banning of mobile phones from schools.

Costs

According to [14], the biggest problem for developing nations is that the organizations trying to offer technology for mobile learning are in their tight budgets. Due to the high cost of deploying mobile learning technologies, most educational institutions in developing nations cannot implement mobile learning [50].

Negative attitude

According to [48], This negative attitude is not helped by the lack of leadership on mobile learning from government Ministries of Education, which are constrained by limited human and financial capacities. Ministry of Educations in the region are invariably involved with the roll-out of ICT access in schools and universities, and perhaps their preoccupation with traditional models of ICT in education has not yet provided the space for exploring the efficacy of mobile phones to support educational outcomes. This result is in agreement with [18] who asserts that cultural norms and attitudes play a big role in mobile learning: although experts consider significantly the potential for mobile phones have to transform learners, parents and teachers have not yet shown much interest.

Low digital fluency

Adoption of mobile devices into educational settings is also challenging due to instructor 'low digital fluency' [51] combined with changing educational paradigms regarding the role of the instructor, student and models for teaching and learning in the midst of these modified roles and expectations [16], [49].

Equity

The Bring Your Own Device (BYOD) program may widen the digital divide. It has been argued that if students' personal mobile devices become an institutional requirement in teaching and learning, then all students must have access to a device and a wireless network [42], [52]. [53], indicated that during the implementation of learning activities, the instructor unintentionally disadvantaged students who did own a mobile device. Although mobile device ownership among students is widespread, not all can afford the latest technology, or devices may be less powerful compared to others' [54]. A study by [55] also reported concerns with equity issues. According to the results, although all students owned a mobile device, only

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a few had subscriptions to a local Internet service provider. Lack of ownership of Mobile Devices by students also pose a challenge [49]

Cognitive challenges

Insufficient text and content display of mobile devices to support mobile learning is a cognitive challenge. The learning procedure, context, and usability factors such as display size and battery life affect user practices. This is equally important for features of smartphones and tablets [14]. Another cognitive challenge for mobile learning implementation is how to manage and evaluate the assessment of the learning processes and outcomes. In the traditional learning mode of education, there are many well-established and accepted methods for the assessment of learning activities, such as essay writing, multiple choice tests, open-book exams, and normally written examinations.

Device battery capacity

According to [18], if the Mobile Device technology is poor i.e. low battery capacity, it can affect the functionality of the device thus disrupting usability. This can affect the person using the Mobile Device for learning purposes especially in areas of limited or fluctuation power source to charge the device.

Slow speed

According to [49] and [18], If the technology of the Mobile Device is poor, it may interfere with its functionality such as speed, thus affecting mobile learning.

III. METHODOLOGY

Quantitative designed was employed. Through quantitative data analysis, information regarding frequency, Attitude, and factors hindering the use of Mobile Device was obtained.

A questionnaire containing a five (5) point Likert scale items ranging from Strongly Agree, Agree, Neutral, Disagree-Strongly and Disagree and open-ended items was utilized in this study to obtain quantitative information to answer the research questions: (a) what are the negative effects of using Mobile devices during lectures for other activities not related to the Lecture? (b) what are the reactions of lecturers towards the use of Mobile devices during lecture time? which factors are hindering the use of Mobile devices for learning? The tool was not tested for validity or reliability. The population comprised of all students of Muni University from the faculty of Technoscience totaling to 331 and a sample of 181 was obtained using a table of Krejcie and Morgan which was further verified by using sloven's formula. Stratified sampling was used to get the respondents; sampling fraction of 0.546 was used to get respective samples from each stratum as shown below in the table. The analysis was carried out at the institutional level. From 181 questionnaires distributed, only 159 questionnaires were returned representing 87.8% response rate. The respondents comprised of 125 Male and 34 Female students; where 71 (44.7%) respondents were offering Bachelor of Information Systems, 37 (23.3%) Bachelor of Science in Information Technology, 16 (10.1%) Bachelor of Science of Midwifery & Nursing and 35 (22.0%) Bachelor of Science with Education. Data from the questionnaire were analyzed using SPSS v.20 software to compute Descriptive Statistics, Frequency Tables, and Means of the Respondents.

TABLE 1. Demographic information about participants.

S/No	Gender	Frequency	Percentage (%)
1	Male	125	78.6
2	Female	34	21.4
TOTAL		**159**	**100.0**

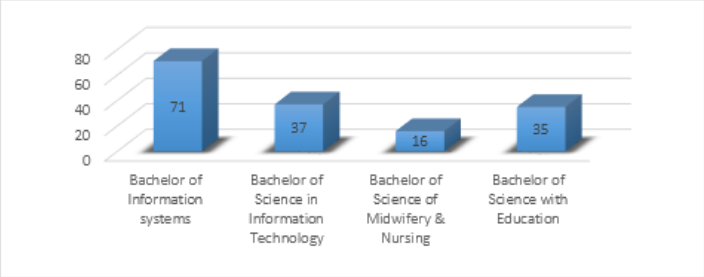

Fig. 1. Programmes of the participants.

IV. RESULTS AND FINDINGS

The empirical findings of this study are organized into three sections in order to provide answers to the research questions as analyzed below:

Most Frequently used Mobile Devices in Lecture Room

From the 159 respondents, 56.6% (90) respondents use Smart Phones, 42.1 % (67) use Laptops and only 1.3 % (2) use Kindle in Lecture Room. This shows that majority of the students use Smartphone and laptops in class.

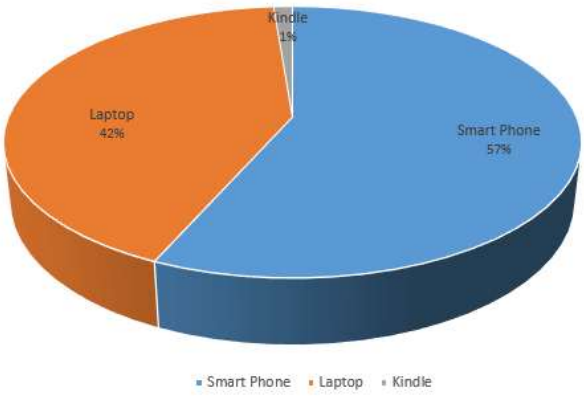

Fig. 2. Mobile device most frequently used in lecture rooms.

A. *Research Question 1: What are the negative effects of using Mobile Devices during lectures for other activities to the related Lecture?*

TABLE 2. Effect of using mobile devices during lectures for other activities to the related Lecture.

S/N	Item	N	X	SD	Rank
1	May distract students' attention	157	1.99	1.27	1
2	May disturb other students	156	2.30	1.34	2
3	Disturbs the instructors and the course of the lesson	155	2.32	1.32	3
4	Reflects disrespect for the instructor	157	2.50	1.44	4

It was also cited that using a Mobile Device in the classroom for activities not related to the lecture has the

following effects; (a) distract student attention(mean=1.99), (b) may disturb other students (mean=2.30), (c) may distract the lecturer in the course of the lesson(mean=2.32), (d) reflects disrespect for the lecturer(mean=2.50).

B. Research Question 2: What is the lecturers' reaction towards the use of Mobile Devices during non-practical classes?

TABLE 3. Lecturers' reaction towards the use of mobile devices during none practical classes.

S/N	Item	N	X	SD	Rank
1	Ask Student to stop the activity and to focus on the lesson	153	2.22	1.22	1
2	Don't mind	152	2.74	1.50	2
3	Demand to shut down the device immediately	153	2.77	1.47	3
4	Do mind but have no choice but to accept it as part of the reality	147	2.81	1.34	4
5	Order student to move out of Class	154	3.93	1.32	5
6	Ban laptops or Mobile Devices in Class	152	4.13	1.25	6

Respondents also revealed that (1) some lecturers normally stop students from using Mobile Devices for activities not related to the lecture (mean=2.22). (2) respondents disagree that students are asked to leave the classroom when found using Mobile Devices for activities not related to the lecture (3.93) and respondents revealed that lecturers do not ban Mobile Devices in class in case they find the student using it for other activities(mean=4.13).

C. Research Question 3: What are the challenges hindering the use of Mobile Devices for learning?

TABLE 4. Challenges facing the use of mobile devices in lecture rooms.

S/N	Item	N	X	SD	Rank
1	Network Connections Issues	152	1.85	1.22	1
2	Slow Speed of the mobile device	159	1.87	1.15	2
3	Power problems	155	2.01	1.27	3
4	Lack of Mobile devices	154	2.10	1.37	4
5	Battery problem	155	2.48	1.36	5
6	Limited memory	155	2.66	1.40	6
7	The slow speed of the device	155	2.84	1.28	7
8	Small screen sizes	153	2.86	1.41	8
9	Lack of Usability policy	145	2.89	1.35	9
10	Lecturers' Attitude	155	2.99	1.47	10
11	Lack of Skills	154	3.21	1.37	11
12	Complicated to use	148	3.45	1.41	12
13	Lack of interest	155	3.50	1.42	13
14	Course not suited for Mobile Devices	151	3.60	1.47	14

The findings also revealed that the following were ranked among top three (3) challenges facing the use of Mobile Devices for learning: a) network connection issues (mean=1.85), b) slow speed of the mobile devices(mean=1.87), c) power problems(mean=2.01), but disagreed that the courses are not suited for mobile devices(mean=3.60), lack of interest(mean=3.50) and complicated to use (mean=3.45).

V. DISCUSSION

The results showed that using a Mobile Device in the classroom for activities not related to the lecture can distract student attention which is in line with the findings of [7], [8], [9] and [56]. It is also supported by [33], [34] who note that use of Mobile Devices during lectures by students cause disruptions to lectures. Furthermore, it was also found that using mobile devices in class may disturb other students and may distract the lecturer in the course of the lesson, reflects disrespect for the lecturer.

In terms of lecturers' reaction towards the use of Mobile Devices during non-practical classes, the results revealed that some lecturers normally stop students from using Mobile Devices for activities not related to the lecture because it causes disruptions. This outcome is consistent with the study conducted by [39] where it's noted that some professors were worried about the use of mobiles devices for learning in HEIs because the use of Mobile Devices such as laptops would cause a distraction in learning. Respondents disagree that students are asked to leave the classroom when found using Mobile Devices for activities not related to the lecture and respondents revealed that lecturers do not ban Mobile Devices in class in case they find the student using it for other activities.

Finally, in terms of the Challenges facing the use of Mobile Devices for learning the results showed that network connection issues, slow speed of the mobile devices, power problems, which were in line with the results of [40], [41]and [42].

VI. CONCLUSION & RECOMMENDATIONS

The study showed that most frequently used Mobile Devices were smartphones and laptops and it recommended that Smartphone's and laptops should be encouraged to be used in class depending on the topic given that even students disagreed that lack of interest is not hindering the use of Mobile Devices and should be discouraged to use Mobile Devices in class for other activities not related to the topic and noted that Implementing mobile device usage requires a high level of commitment from both lecturers and students.

The study further recommended that some lecturers whose attitude is against the use of Mobile Devices should be enlightened on the importance of Mobile Device usage so that their attitudes can change.

It was also recommended that institutions should formulate the usability policy of Mobile Devices for proper management of Mobile Device usage in a classroom.

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