



# A Model to Enhance Students Intention to Adopt and use Mobile Learning in Ugandan Universities

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**Keywords:** *m-learning, adoption and use, students' intention, m-learning systems.*

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*Strictly as per the compliance and regulations of:*



# A Model to Enhance Students Intention to Adopt and use Mobile Learning in Ugandan Universities

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**Abstract-** M-learning systems have become the order of the day for universities in countries like Uganda to conduct studies to their students. The main attention towards M-learning is the increase in the number of mobile devices such as mobile phones, PDAs, Smart Phones, laptops, and iPads as well as enhancements in the technological capabilities of these devices. The purpose of this study was to develop a model to enhance students' intention to adopt and use mobile learning. A number of factors have hindered the adoption and use of M-learning. Various solutions have been put forward but they have not adequately addressed the issue of adoption and use of M-learning in Ugandan Universities. In developing countries, M-learning adoption and use is also constrained by lack of information about its requirements. The need therefore remains, to determine requirements and customize existing M-learning adoption models to suit the needs of universities in developing countries. This paper reports on a study that developed a model for enhancing student's intention to adopt and use M-learning services in Ugandan universities, as an example of a developing country.

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## I. INTRODUCTION

A recent trend in Universities has been to seek out and integrate new tools into the educational process to facilitate student learning (MacCallum, 2011). Universities continually search for ways to support student learning that is both engaging and effective. Technology has often been viewed as a way to provide both of these things to the learner. The adoption of Mobile Learning technologies (M-learning) has fundamentally transformed a wide range of educational, administrative and support tasks (Dwumfuo, 2012).

According to MoES (2013), the government of Uganda is now encouraging alternative means of meeting the demand particularly of higher education, one of these being M-Learning, especially in higher institutions of learning. Subsequently Universities have tried to develop and implement M-Learning information systems (Muyinda, 2013). Mobile applications and devices such as Smartphone's and tablets are changing

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the way that Universities conduct learning activities to provide information, deliver services and engage with the students (UCC, 2012). To keep up with the pace of change in technology, Universities need to adopt a strategic approach that implements these new technologies and integrates them with existing service, information and communication channels. (Kajumbula, 2006)

Universities in Uganda have implemented M-learning systems to support Distance learners particularly Makerere University is running distance education (DE) degree programmes managed by the Department of Distance Education to students scattered across Uganda (Kajumbula, 2009). However, Muyinda (2011) and Kajumbula (2009) reveal that Universities in Uganda that have implemented M-learning such as Makerere university, Kampala university among others have not registered the persistent and long term usage of these M-Learning systems, an indicator that M-learning systems have not been continuously adopted and utilized by students. Muyinda (2011) states that at Makerere University, only 85 users of M-learning system were found to be active out of the thousand students. Similar scenario was reported by Kamugisha (2015) that 18 students were found to be active on the M-learning system installed at Kampala University. This low usage of M-learning systems by students in these universities means that the adoption of such systems remains low yet maximum benefits can be realized from the M-learning system during and after its adoption (Chong et al., 2011).

Despite the wide acceptance of cell phones and mobile devices among university students, adoption of mobile learning in universities, and academic libraries is still low and the determinants of acceptance are not clear. M-learning adoption and usage has faced a number of challenges stated by different scholars, for example Ally (2009) urges that student have unwillingness or disinterest in using mobile devices for academic purposes. Chikh & Berkani (2010) states that students demonstrate a preference for traditional campus based education may resist mobile learning out of fear. According to Lawrence, et al., (2008) cites that students report the following negative issues with mobile technology: limited storage, small screens, limited access to online reference material, and slow

downloading. Essegbey & Frempong (2011) asserts that usability barriers like small keyboards are barriers to mobile learning. Lawrence, et al., (2008) identify both the cost imposed by telecommunications for access and mobile devices to be primary cost barriers for students.

Therefore, this study aimed at developing a model for M-learning adoption and use in Ugandan universities, as an example of a developing country. A model defining dimensions of awareness and sensitization, user friendly M-learning systems, enhanced security, privacy and confidentiality, tax reduction on Mobile Devices, effective monitoring and evaluation, and M-learning usage policies and guidelines as pre-requisites that can enhance student's intention to adopt and use M-learning in Uganda was developed. The model describes requirements that are critical to successful adoption and use M-learning in Uganda. It therefore has potential to enhance students' intention to adopt and use M-learning services in Ugandan universities and other developing countries with similar contexts. The model is generic and can therefore be applied to other developing countries. Furthermore, understanding of requirements for M-learning adoption and use contributes to extending existing M-learning adoption and use models.

## II. LITERATURE REVIEW

### a) M-Learning adoption Models

This section presents a review of existing M-learning models with the aim of identifying the gap to be addressed in the new framework.

- i. *A Model for Mobile Learning Adoption:* Lu and Viehland (2008) developed a model for enhancing mobile learning adoption among University students in New Zealand. This model was developed with the expectation that mobile learning will enhance their learning activities if universities provide facilities for mobile learning. Lu and Viehland (2008) considered six key factors that influence the behavioral intention of users to adopt mobile learning; they are perceived usefulness of mobile learning, perceived ease of use of mobile learning, attitude toward using mobile learning, subjective norm, self-efficacy and perceived financial resources. The framework largely helped to improve Education delivery by use of mobile devices that enabled anywhere / anytime learning that allowed students to more closely integrate learning activities into their busy lives.

Lu and Viehland (2008) M-Learning model was based on Attwell's M-learning model (Attwell, 2005). Cohen (2010) shows that the Lu and Viehland (2008) model was successfully tried in New Zealand in 2009 and has since been introduced in other developed countries such as Canada, Malaysia where it is doing well. However, Lu and Viehland (2008) did not consider

the role of perceived enjoyment as a prior and reliable factor that influences the behavioral intention to adopt mobile learning. Besides, the model is only good for developed countries and is largely based on the assumption that mobile wireless technologies are available in a given University.

Further, Lu and Viehland (2008) ignored the variable of Students self-management of Learning in enhancing adoption and use of M-Learning by University students. Students can promote acceptance of m-learning by adding value to their traditional learning methods using m-learning. This is because Self-management of Learning comes as a result of developing competence and skill in learning how to learn.

- ii. *A model to investigate student's behavioral intention to adopt and use mobile learning:* Mtebe and Raisamo (2014) developed a model to investigate student's behavioral intention to adopt and use mobile learning in higher education in East Africa. The model was developed to widen access, increase flexibility and mobility to access learning resources in Universities of East Africa. Mtebe and Raisamo (2014) model was based on the original UTAUT model of Venkatesh et al. (2003) which was adopted and extended to examine students' behavioral intention to adopt and use mobile learning. The four constructs in the UTAUT model were specifically selected to develop the model to investigate student's intention to adopt and use Mobile Learning (Mtebe and Raisamo, 2014). The constructs included Performance expectancy, Effort expectancy, Social influence, Facilitating conditions. According to Prajapati & Jayesh (2014), the mobile Learning model was successfully applied in a few universities in Kenya and Tanzania which helped those who were involved in planning and developing mobile learning for higher education in East Africa to make mobile learning services relevant and acceptable to learners in their universities.

However, a critical look at Mtebe and Raisamo (2014) model for mobile learning adoption by Prajapati & Jayesh (2014) shows that Mtebe and Raisamo ignored and did not investigate the effect of Gender, Age or Experience in behavioral intention to use mobile learning were the majority of students in universities are not of the same age and have variations in technological experiences. Further, Mtebe and Raisamo (2014) did not consider adding new factors in the model for M-Learning in order to predict behavioral intention to adopt and use mobile learning in a given context. Some of the factors which can be considered are perceived enjoyment, (Huang, 2014), self-management of learning (Huang, 2014; Prajapati & Jayesh, 2014), Self-efficacy (Lu & Viehland, 2008), and Perceived attainment of value (Huang, 2014) which can be integrated in to the

model to predict students' behavioral intention to adopt and use mobile learning.

iii. *A model for Students' Acceptance of M-Learning in Universities*

A model was developed by Abu-Al-Aish & Love (2013) for Students' Acceptance of M Learning in Brunel University. Abu-Al-Aish & Love (2013) states that the model was developed with a view of stirring M-learning to play an increasingly significant role in the development of teaching and learning methods for universities basing on the unified theory of acceptance and use of technology (UTAUT) (Venkatesh et al., 2003). Abu-Al-Aish & Love (2013) developed a model to identify the factors that influence the acceptance of m-learning in Universities and to investigate if prior experience of mobile devices affects the acceptance of M-learning.

Prajapati & Jayesh (2014) shows that the Abu-Al-Aish & Love (2013) model was successfully tried in Denmark in 2014 and has since been introduced in other developed countries such as India, china, where it is doing well. The model uses existing mobile devices which are widely used in developed countries to support universities in teaching and learning methods. Mobile devices moderate the effects of effort expectancy, lecturers' influence quality of service, and personal innovativeness on behavioral intention.

b) *Challenges to M-Learning adoption*

*Lack of acceptance to M-learning adoption:* Donaldson (2011) states that the lack of acceptance to M-learning adoption is due to a fear that it will reduce classroom interaction or cause miscommunication or confusion. This has hampered the adoption of M-learning among students. Despite the wide acceptance of cell phones and mobile devices among the teen and adults, faculty and support staff acceptance of mobile learning in universities, and academic libraries is still low and the determinants of acceptance are not clear (Lawrence, et al, 2008). Ally (2009) urges that student have unwillingness or disinterest in using mobile devices for academic purposes. Chikh & Berkani (2010) states that students demonstrate a preference for traditional campus based education may resist mobile learning out of fear. This fear may stem from perception that mobile learning will reduce classroom interaction or cause miscommunication or confusion due to inability to see facial, body, or voice cues from instructors and peers.

*Complexity of use:* Essegbey & Frempong (2011) asserts that it is complex to use M-learning initiatives on Mobile devices. This may result from issues like small keyboards which may pose a barrier to mobile learning. However, technology advancements in virtual keyboards may address this issue (Chikh & Berkani, 2010) Small screen size can make viewing complex, cause eyestrain, or be difficult for vision impaired individuals. In addition,

web pages are not always designed for small screens (Donaldson, 2011). Small keyboards, storage, and memory, and document editing capabilities may limit mobile academic activities (Muyinda, 2011).

*Cost:* The findings from the study carried out by Vosloo (2012) revealed that it's expensive to own and maintain mobile devices for purposes of M-learning. Personal ownership of mobile devices (for example smart phones) and the cost of unlimited Internet access are prohibitive for some students to fully adopt and use M-learning as a tool to improve on learning activities (Vosloo, 2012). Lawrence, et al., (2008) identify both the cost imposed by telecommunications for access and mobile devices to be primary cost barriers for students.

*Inadequate security, privacy and confidentiality:* According to Adedoja et al (2013), Mobile learning user information are meant to be confidential and secure, however the education sector is constrained by genuine concerns about privacy, security and confidentiality of education records of the students. This is consequently constraining the adoption and usage of M-learning in Universities (Muyinda, 2011). According to Lawrence, et al., (2008), for flawless sharing of students information to be realized, the relevant stakeholders have to be committed to security of information of the students and they have to assure students that their personal information will be secured and protected from unauthorized access.

*Inadequate top management support on the use M-learning systems:* According to Crescente & Lee (2011), without the existence of a leadership and governance structures, it is difficult to coordinate M-learning initiatives and align them with university priorities. This limits the necessary leadership needed to engage students so as to promote M-learning initiatives. Chikh & Berkani (2010) stated that insufficient top management support to adopt and use M-learning systems is a major challenge that is hindering M-learning adoption and use among university students. Further, Ally (2009) urge that without good leadership and governance from top management, then it can be difficult to provide for the necessary decision making rules and procedures that give direction to, and oversee M-learning initiatives thus hindering M-learning adoption and usage.

*Access to desired information:* Ngarambe (2013) states that access to information when and where an information seeker desires is seen as a potential barrier for instructors. For instance, ready access to mobile information during class may not be part of the instructor's agenda. Effective monitoring and evaluation of a mobile initiative is necessary for successful implementation (Kutluk & Gülmez, 2013).

### III. METHODOLOGY

#### a) Research Design

The study used Participatory Design approach mainly because it encouraged direct participation and active involvement of users during the study. Participatory design approach called for involving potential users which gave better insights that could not have been attained by not letting them participate. Descriptive statistics involving mean and standard deviation were used to understand the level of respondent agreement with the challenges and solutions to M-learning adoption and use. The purpose of this was find out if these challenges and solutions can later be used as design requirement for M-learning adoption model to enhance students intention to adopt and use M-learning systems. The study population from two selected universities comprised of 11, 363 students according to Muyinda (2013), Makerere University (2013) & Kampala University Strategic Planning Report (2014). The study scope was limited to two public and Private Ugandan Universities; Makerere University and Kampala University because they had earlier explored M-learning technologies with low rates of student's intention to adopt and use M-learning services. The sample size of 370 respondents out of a population of 11, 363 was target and arrived at basing on the table for determining sample size by Krejcie and Morgan (1970) which gives a fair representation of the study population. Myers (2009) supports this by stating that a researcher needs to get the appropriate sample size in terms of accuracy and cost and that for any population above 10,000 but less than 15,000 the sample size is constant (370). However, of the 370 questionnaires administered 232 were obtained giving us about 62.7% response rate. Purposive sampling was used to select the universities for carrying out the study and simple random sampling was used to select the 370 respondents from the total population of 11, 363 students as a unit of analysis. Based on the chosen sample, questionnaires were distributed to the students who are always involved and engaged in the use of M-learning services.

#### b) Data collection

The main data collection instrument that was used included the questionnaire, with other tools such as literature review. Questionnaires contained structured series of questions and prompts relating to the study variables. Questionnaires were used to collect primary data on challenges hindering M-learning adoption and use in Ugandan universities and the possible solutions to these challenges. The data gathered from the questionnaire helped the researcher in deriving the requirements that were used in developing the model to enhance student's intention to adopt and use M-learning systems. The questions on the questionnaires were set up on an interval scale with respondents answering in line with the extent to which they strongly agree, Agree, Not Sure, Disagree, strongly disagree. Briefly and to the point, questions were designed addressing only a single variable at a time and avoiding expressions that could bring out unacceptable responses. Each challenge and solution was measured by at least five questions that were relevant. In terms of prior research ambiguous and vague question were either improved or deleted. Following the guidelines by Carcary (2008), the questionnaire contained a heading clearly informing respondents that results would be completely anonymous as means of seeking for honesty and avoiding exaggeration while.

### IV. RESULTS

#### a) Descriptive statistics for challenges and solutions to M-learning adoption and usage

In order to understand the challenges to M-learning adoption and the possible solutions, descriptive statistics involving mean and standard deviation were used to understand the level of respondent agreement with the challenges to M-learning adoption and use and the proposed solutions. The purpose of this was to blend these challenges and solutions later as design requirement for enhancing students intention to adopt and use M-learning systems as seen in tables 2, 3 and 4 as seen below;

*Table 2:* Descriptive statistics for challenges to M-Learning adoption and Usage

Items (N=232)	Mean	SD
There is lack of acceptance to M-learning adoption due to fear that will reduce classroom interaction or cause miscommunication or confusion	4.4979	0.67785
It is complex to use M-learning systems on Mobile devices	4.5883	0.69787
There is Inadequate security, privacy and confidentiality of M-learning System	4.4435	0.65394
It's Expensive to own and maintain a mobile devices for purposes of M-learning	4.4934	0.78857
Inadequate top management support on the use M-learning systems	4.3680	0.66748
Access to desired information by the students is a potential barrier to adopt M-learning	4.4787	0.68470

*Source: Primary Data*

From table 2 above, finding revealed that the most leading challenges to adoption and usage of M-learning systems are; complex to use M-learning

systems on Mobile devices (Mean=4.589, SD= .6979), followed by lack of acceptance (Mean=4.498, SD= .678), followed by It's Expensive to own and maintain a

mobile devices for purposes of M-learning (Mean=4.493, SD= .789), followed by access to desired information by the students is a potential barrier to adopt M-learning (Mean=4.479, SD=.685). Inadequate security, privacy and confidentiality of M-learning System (Mean=4.354, SD=.654), finally

Inadequate top management support on the use M-learning systems (Mean = 4.368, SD=.66748). These finding means that the above challenges should be considered and corrected by universities if they are to enhance student's intention to adopt and use M-learning systems to enable students attain learning outcomes

Table 3: Descriptive Statistics for Suggested solutions to challenges that confronts M-learning adoption and usage

Item (N=232)	Mean	SD
Create more awareness and sensitizations on the benefits of M-learning systems to student	4.2462	.87482
Develop user friendly M-learning systems suitable for student needs	4.2168	.87911
Enhance security, privacy and confidentiality of the M-learning systems	4.3766	.74070
Providing tax reductions to enhance increased possessions on Mobile devices	4.3386	.73059
There should be policies and guidelines in place to support effective and continuous use of M-learning systems	4.4346	.69327
There should be effective monitoring and evaluation of a mobile learning course content	4.4583	.73170

Source: Primary Data

From Table 3 above, the finding of the study revealed that the respondents agreed with the above suggested solutions to the challenges to M-learning adoption and usage. Most overriding solutions to the challenges to M-learning adoption and usage are; effective monitoring and evaluation of a mobile learning course content (Mean=4.458, SD=.732), followed by There should be policies and guidelines in place to support effective and continuous use of M-learning systems (Mean=4.435, SD= .693), followed by Enhance security, privacy and confidentiality of the M-learning systems (Mean= 4.377, SD=.741), Providing tax reductions to enhance increased possessions on Mobile devices (Mean=4.339, SD=.741), Create more awareness and sensitizations on the benefits of M-learning systems to student (Mean= 4.246, SD= .875) and finally Develop user friendly M-learning systems suitable for student needs (Mean= 4.217, SD=.879). These finding means that the above solutions should be considered by universities if they are to enhance student's intention to adopt and use M-learning systems to enable learners attain their learning goals. These

challenges and solutions can now be derived as design requirements for enhancing student's intentions to adopt and use M-learning system.

b) Discussion of the requirements for developing a model

The requirements for enhancing student's intention to adopt and use M-learning systems system in Ugandan universities are here then discussed based on the results in table 2 and 3. This was done in order to derive requirements from the solutions to the challenges to M-learning systems adoption and usage and there after use those as requirements for design specification for the Model to enhance student's intention to adopt and use M-learning in Ugandan universities. Therefore, the requirements for developing a model for enhancing students intention to adopt and use M-learning in Ugandan universities as presented in table 4 with codes CM1 to CM6 represent the challenges to M-learning adoption and usage while codes R1 to R6 representing the requirements which are also derived as solutions to the challenges.

Table 4: Matrix showing challenges and derived requirements that should be addressed by universities in developing countries like Uganda

Code	General challenges to M-learning adoption and usage	Code	Requirements (Solutions)
CM1	There is lack of acceptance to M-learning adoption due to fear that will reduce classroom interaction or cause miscommunication or confusion	R1	Create more awareness and sensitizations on the benefits of M-learning systems t student
CM2	It is complex to use M-learning initiatives on Mobile devices	R2	Develop user friendly M-learning systems suitable for student needs
CM3	There is Inadequate security, privacy and confidentiality of M-learning System	R3	Enhance security, privacy and confidentiality of the M-learning systems
CM4	It's Expensive to own and maintain a mobile devices for purposes of M-learning	R4	Providing tax reductions to enhance increased possessions on Mobile devices
CM5	Inadequate top management support on the use M-learning systems	R5	There should be policies and guidelines in place to support effective and continuous use of M-learning systems
CM6	Access to desired information by the students is a potential barrier to adopt M-learning	R6	There should be effective monitoring and evaluation of a mobile learning course content

Source: Primary Data

**Lack of acceptance to M-learning adoption (CM1):** This challenge hinders the adoption and usage of M-learning systems. The result in table 2 revealed that most students lack acceptance to M-learning system and this was hindering the adoption and usage of M-learning systems. This is in line with Donaldson (2011) who stated that lack of acceptance to M-learning adoption due to fear that will reduce classroom interaction or cause miscommunication or confusion has hampered the adoption of M-learning among students.

**It is complex to use M-learning systems on Mobile devices (CM2):** This challenge hinders the adoption and usage of M-learning systems. The result in table 2 revealed that most respondents find M-learning systems as complex to use and this was hindering the adoption and usage of M-learning systems. This is in line with Essegbey & Frempong (2011) who asserted that it is complex to use M-learning initiatives on Mobile devices. This may result from issues like small keyboards which may pose a barrier to mobile learning. Donaldson (2011) relates this challenge to small screen size which makes viewing complex, cause eyestrain, or be difficult for vision impaired individuals.

**Inadequate security, privacy and confidentiality of M-learning System (CM3):** This challenge hinders the adoption and usage of M-learning systems due to fear that student’s information may be exposed to non authorized individuals. This is in line with Adedoja et al (2013) who asserted that the education sector is constrained by genuine concerns about privacy, security and confidentiality of education records of the students. This challenge is also in line with Muyinda (2011) who stated that security concerns are consequently constraining the adoption and usage of M-learning in Universities.

**Expensive to own and maintain mobile devices for purposes of M-learning (CM4):** The result in table 2 revealed that costs to acquire and maintain mobile devices for purposes of learning are high. This was hindering the adoption and usage of M-learning systems. This challenge undermines the abilities of the students to adopt and use M-learning for academic purposes. This is in line with Vosloo (2012) who stated that it's expensive to own and maintain mobile devices for purposes of Mobile learning.

**Inadequate top management support on the use M-learning systems (CM5):** This challenge hinders the users of M-learning system from knowing what they supposed to do with the system when and where (Chikh & Berkani, 2010). The findings in table 2 revealed that there is Inadequate top management support on the use M-learning systems. This is in line with the finding from Crescente & Lee (2011) who stated that Inadequate top management support on the use M-learning systems constrains the adoption and usage of M-learning. Crescente & Lee (2011) further states that without the existence of a leadership and governance structures to guide the use of M-learning, it is difficult to coordinate M-learning initiatives and align them with university priorities. This limits the necessary leadership needed to engage students so as to promote M-learning initiatives.

**Access to desired information by the students is a potential barrier to adopt M-learning (CM6):** This challenge affects student’s ability to efficiently use M-learning system. The result in table 2 revealed access to desired information by students is a potential barrier and this was hindering the adoption and usage of M-learning systems. This is in line Ngarambe (2013) who stated that access to information when and where an information seeker desires is seen as a potential barrier for instructors. For instance, ready access to mobile information during class may not be part of the instructor’s agenda which ends up affecting students need to access the desired information any time anywhere.

c) *Model Development*

The model development Process was done with the aim of identifying the factors that are necessary for designing “MESIAUM” a model for enhancing student's intention to adopt and use M-learning In Ugandan Universities. This section presents the design of the model for adoption and use of mobile learning in Uganda. The Model was developed with stakeholders being identified and their roles outlined. The following stakeholders were identified so as to enable the researcher to develop the model;

The table 5 shows the role played by different actors in the process of designing Model to enhance student’s intention to adopt and use M-learning:

Table 5: Stakeholders and Their Roles

Stake Holder	Roles
Telecommunication Companies	The Telecom companies include MTN, UTL, Airtel and Orange. They help to set-up mobile network infrastructure for mobile learning systems to operate on.
Mobile-learning users	Provide user requirements, test and use the designed Model
University Top Management	Setup the infrastructure, Identify stakeholders, Carry out evaluation, organize and train users, sensitize users , provide economic resources and bench mark M-learning system models elsewhere
Government	Set up the infrastructure through Ministries and bodies such as Ministry of ICT, NITAU

	for the case of Uganda, setting up the Mobile learning policies through Ministry of ICT and NITAU.
<b>ICT Personnel</b>	To train the users

i. *Derived Variables from Primary Data*

The below shows the variables that were extracted from the respondents' feedback. The derived variables were extracted from the challenges that were presented on the questionnaires (Table table 2 and table 3) This implies that awareness and sensitizations,

user friendly M-learning systems, Enhanced security, privacy and confidentiality, tax reductions, policies and guidelines effective monitoring and evaluation should be highly considered in development of a model to enhance students intention to adopt and use M-learning in Ugandan Universities.

*Table 6:* Derived Variables

Code	Requirements/solutions	Code	Derived variables
R1	Create more awareness and sensitizations on the benefits of M-learning systems t student	DV1	Awareness and Sensitization
R2	Develop user friendly M-learning systems suitable for student needs	DV2	User friendly M-learning systems
R3	Enhance security, privacy and confidentiality of the M-learning systems	DV3	Enhance security, privacy and confidentiality
R4	Providing tax reductions to enhance increased possessions on Mobile devices	DV4	Tax reduction on Mobile Devices
R5	There should be policies and guidelines in place to support effective and continuous use of M-learning systems	DV5	Provide M-learning usage policies and guidelines
R6	There should be effective monitoring and evaluation of a mobile learning course content	DV6	Effective monitoring and evaluation

ii. *Variables from the Literature Review*

In order to align the adoption and usage model to existing models, variables from existing models were also considered. These variables were also considered

appropriate in the factor analysis. These variables were subjected to factor analysis to be able to identify the most important factors that influence the adoption and usage of M-learning initiatives in Ugandan universities.

*Table 6.1:* Variables Adopted From Existing Models

Model	Variable	Source
UTAUT	Social Influence	Venkatesh et al.'s (2003)
UTAUT	Facilitating Conditions	Venkatesh et al.'s (2003)
UTAUT	Students Intention to use	Mtebe and Raisamo (2014)
UTAUT	Adoption	Venkatesh et al.'s (2003)

*Table 6.2:* Variables from Literature Review

Title	Variable	Author
Factors that influence student's intention to adopt and use M-learning	Self-management of Learning	Huang (2014)
Factors that influence student's intention to adopt and use M-learning	Perceived Enjoyment of learning	Wang and Li (2012)

d) *The Model to enhance student's intention to adopt and use M-learning in Ugandan Universities*

The Model to enhance student's intention to adopt and use M-learning was developed to incorporate the factors that influence M-learning adoption and usage from both the constructs identified in tables 6, 6.1 and 6.2 Further the model also put into consideration the stakeholders and the roles they play in ensuring that mobile learning systems can be adopted and used in Uganda.

The Figure 1 illustrates the developed model

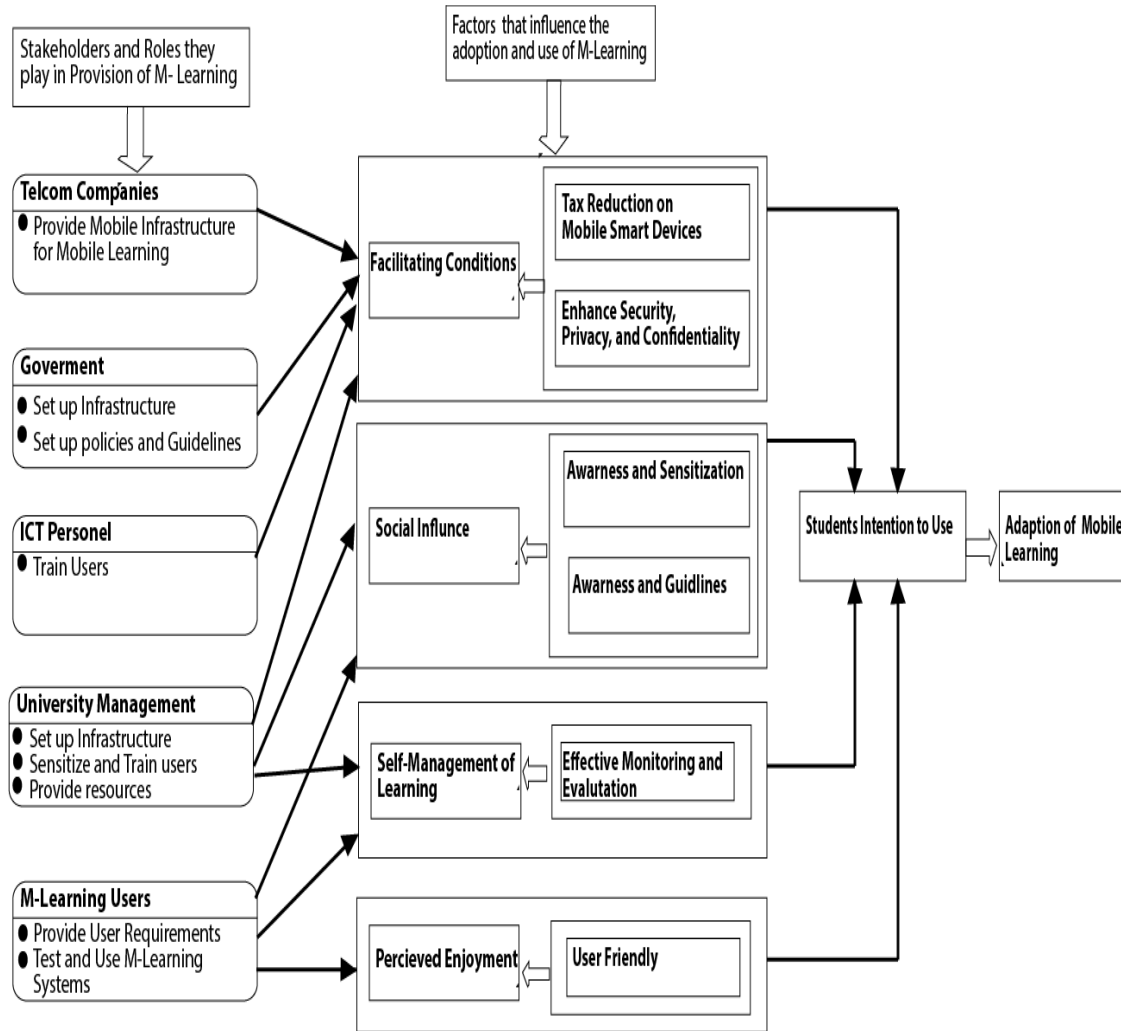


Figure 1: Model to enhance student's intention to adopt and use M-learning in Ugandan Universities

## V. CONTRIBUTIONS OF THE MODEL TO M-LEARNING ADOPTION AND USE

While the outlined model in Figure 1 extends an existing one as described by Mtebe and Raisamo (2014), it also makes a contribution by presenting new features useful for adoption and use of M-learning systems in the context of Ugandan universities as a developing country. The model provides for new dimensions required for the M-learning adoption and use process mentioned and discussed here under the themes of awareness and sensitization, user friendly M-learning systems, enhanced security, privacy and confidentiality, tax reduction on Mobile Devices, effective monitoring and evaluation, and M-learning usage policies and guidelines.

### a) User friendly M-learning systems

The primary challenge to M-learning adoption and use in Ugandan universities is complexity to use M-learning initiatives. The need therefore remains for the

university management to endeavor and ensure that user friendly M-learning systems suitable for student needs are designed to enable both learners and educators achieve their intended goals. The systems should not be complex to use because a complex system hinders efficient usage of a technology. Technologically, a user friendly system increases the end users ease of use of mobile learning systems. This is because complex mobile learning systems hinder students from using such services; if students find the systems can easily support self management of learning then it is perceived to be useful. Hence this can help solve the challenge of complex to use M-learning systems on Mobile devices

### b) Awareness and Sensitization

Lack of acceptance to M-learning adoption due to a fear that it will reduce classroom interaction or cause miscommunication or confusion is recognized as one of the main challenges for M-learning adoption and use in developing countries like Uganda. Following

successful user friendly M-learning systems, There is need for the university management to train, create more awareness and sensitize their students on how to Use M-learning systems and what are the likely benefits of adopting and using M-learning systems for academic purposes and this will go a long way in enhancing students intention to adopt and use M-learning systems. Hence this can help in solving the lack of acceptance to M-learning adoption due to fear that will reduce classroom interaction or cause miscommunication or confusion.

c) *M-learning usage policies and guidelines*

Setting up usage policies and guidelines are important as prerequisites for enhanced student's intention to adopt and use M-learning systems in universities in a developing country like Uganda. It is therefore important for universities to set policies and guidelines in place to support effective and continuous use of M-learning systems as one of the solutions to enhance adoption and use of M-learning systems in Ugandan universities. This is because, good leadership and governance from top management, provides for the necessary decision-making rules as well as procedures that give direction to, and on the use of M-learning. Good policies and guidelines build trust and confidence among the different education service, spells out roles and usage of system clearly, the functionality that must be met by the system among others. The policies have to also be reviewed on a regular basis to make sure that they remain aligned with the adoption and use of M-learning systems objectives of the universities. Hence this will help address the challenge of Inadequate top management support on the use M-learning systems.

d) *Effective monitoring and evaluation*

There is a need for Lecturers at the universities to routinely upload M-learning contents or materials that promote learning and create knowledge among the learners to ensure that there is mobility of learning any were any time. Availability of contents on M-learning systems makes students derive a sense out of the M-learning. Hence this would help address a challenge of Access to desired information by the students as a potential barrier to adopt M-learning.

e) *Tax reduction on Mobile Devices*

The Universities in collaboration through the Ministry of Education, sports and ICT, should request the government of Uganda to provide tax reductions on mobile smart devices for of academic purposes to increase on the possessions of smart mobile devices to ensure that university students can posses' mobile devices that can be used to carry out academic tasks and to promote learning activities.

f) *Enhance security, privacy and confidentiality*

Inadequate security, privacy and confidentiality hold back M-learning adoption and use in Ugandan

universities. The need therefore remains to provide adequate security, privacy and confidentiality in the M-learning systems used by students. Security and privacy measures should be considered in the design of M-learning systems. This is because security and privacy measures ensure confidentiality, integrity and availability of students' information as it is being exchanged across different M-learning modules. Authentication techniques such as password, fingerprints, retina scans and biometric devices such as finger print readers and voice scanning systems can be used to help ensure data security. To enhance security, privacy and confidentiality, it requires establishing the appropriate security and privacy measures and therefore, implies the need for the following steps:

- Identify the potential security threats
- Identify the available security measures
- Assess the strength and weakness of each security measure
- Determine the most appropriate security measure to use.

## VI. CONCLUSION

The existing M-learning adoption models have been of little use in enhancing the adoption and usage of M-learning systems in Ugandan universities for a case of Uganda as a developing country. This is largely because the models were developed based on requirements of the universities in developed country environments. Therefore, the requirements and motivation toward M-learning adoption is essentially different in developing countries due to these fundamental differences in the challenges that deter efficient adoption and usage of M-learning. For universities in a developing country like Uganda, The need remains for tailored M-learning models that will significantly enhance the adoption and use of M-learning. This requires identifying the major challenges that obstruct students from adopting M-learning initiatives, blend the identified challenges into viable requirements and incorporate them into the existing models that were designed based on the conditions in developed countries.

This study therefore identified requirements critical to an enhanced adoption and use of M-learning systems in universities in Uganda as a developing country. The model that was developed incorporates activities required for enhanced adoption and use of M-learning systems. These requirements include I) awareness and sensitization, II) user friendly M-learning systems, III) enhanced security, privacy and confidentiality, IV) tax reduction on Mobile Devices, V) effective monitoring and evaluation, VI) M-learning usage policies and guidelines. This model outlined the factors that can influence M-learning adoption and usage, the roles played by stakeholders in enhancing

the students' intention to adopt and use M-learning. This Model is therefore a step towards supporting Ugandan universities to enhanced adoption and use of M-learning initiatives in Uganda.

The model is generic and can be applied in other universities in developing countries with similar contexts. Furthermore, the understanding of requirements and development of a model for M-learning systems contributed to the extension of existing knowledge on M-learning adoption and usage models.

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