
AN EMPIRICAL STUDY ON ACADEMIC SUSTAINABILITY OF MOBILE LEARNING AT UNIVERSITY LEVEL

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ABSTRACT

This study proposes an investigation model for merging Technology Acceptance Model (TAM) for mobile learning utilization in the field of academic sustainability. Mobile education is not fully employ in the universities of Pakistan, so that is the reason why students/teacher Attitude Towards Technology (ATT) and learning teaching through empirical knowledge is at very low level in universities. The grounds of present study were to investigate state of contemporary adaptation of models in M- learning. This work supported the sustainability of portable learning through m-learning by mastery the elements that affect intention of users to use mobile education prior to apply it to make certain continuity or success. The key goal was to facilitate universities a comprehend sight of those elements that can affect the degree to which learners or students adopt any new technology. Resulted outcomes of present study can help academics along with managers to fully acknowledge the way mobile educating system utilization can affect learners' educational sustainability as well as academic performance. To achieve these results, an enlarge Technology Acceptance Model (TAM) was evolved, which bring out literature relevant to Mobile learning use in Pakistan universities. Furthermore there was no such research in this perspective in Pakistan which has integrated three models as TAM (Technology Acceptance Model), BIM (Behavior Intention Model), and TTF (Task Technology Fit Model) for acceptance of Mobile learning. The aim of present work was to couple essential features of TAM and constructivism with academic sustainability.

KEYWORDS

Academic Sustainability, Mobile Learning, Higher Education, Online Education, M-Learning, Technology Acceptance Model, TAM

INTRODUCTION

In present era of development and continuous advancement in the field of technology (Yongmei and Afzal 2023), possibility of worldwide access to Portable/mobile devices has enhanced the interest of individuals in the mobile learning day by day (Göksu and Atici 2013). Regardless of the fact that M-learning is relatively new procedure of learning in education world it possess brilliant and encouraging future as mobile learning can involve the student in the learning process by providing alternative environment. Mobile learning is service that provides general information digitally to the students (Jacob and Issac 2014). The meaning of mobile can be as “portable” or in other words the gadget which can be taken anytime, anywhere as laptop, cellular phones and tablet etc. M learning led focus on portability of learners interconnecting by portable technology employ learning instruments being developing support in stuff has become most vital element of casual learning. Mobile learning is appropriate as it is capable of being reached virtually in anywhere. Mobile learning is very active process in order to increase the exam scores (Al-Said 2015). Consequences of many researches show that students should need an instructor even though they have positive views regarding m learning and also motivation is required. Users’ attitude regarding sustainability of knowledge demonstrates as it needed to learn use of ICT-based knowledge, as the student’s views are very important in contribution to sustainability of learning. M-learning probably provide opportunities in educating field to device sustainability of uninterrupted learning (Crescente and Lee 2011). Many past works foretell m learning along with some other educational technologies can give solutions in finance and quality aspects to sustainable learning. Generally, understanding of sustainability has demonstrated as challenge to users. M-learning is sequel of enhancing communication and information system development that can affect learning domain. New scholastic models and theories are necessary to escort the revolution in system of learning. M-learning facilitate with opportunity to learners to linger their learning territory which cannot be acquire by just static tech devices. Switch in ideology of learning & teaching should move from to learner centered learning from teacher-centered approach. Sustainability is to maintain or preserve energies and resources for relatively long term (Afzal, Munir et al. 2023) likewise sustainability is capacity to continue or endure (Upadhyay 2006). If an activity is sustainable it may be recycle, repeated and reused over time as it has capability to continue and maintain itself. Educational sustainability stress upon application of renewability of victorious exercise by academic leadership evolution and revolution. It has been usually related with the debate of usage of portable learning in the classes. The sustainable competitive benefit of m- learning is the capability to apply and learn

accurate stuff faster. Learners' ATT the sustainability of m- learning signify obligation of acknowledgment of Information and Communication grounded learning's, as learners' views are critical in put up of sustainable learning. The success of M learning may depends on students willingness and readiness to use some new technologies that are separate by one which have been used before (Wang, Wu et al. 2009). The grounds of present study were to investigate state of contemporary adaptation of models in M-learning. This work support the sustainability of portable learning through m-learning by mastery the elements that affect intention of users to use mobile education prior to apply it to make certain continuity or success(Dyson, Litchfield et al. 2009). The key goal is to facilitate universities a comprehend sight of those elements that can affect the degree to which learners or students adopt any new technology. The rationale for present study comes from Hawkins' explanation that an inexpensive and convenient technology must be used in institutions to allow significant use among tutors, students and learners, especially in emergent nations(Demb, Erickson et al. 2004). Therefore, the use of mobile gadgets like personal computers for teaching and learning purpose in developing nations would be an attainable option. Using mobile technologies amid the student's it can be a satisfactory investment to let the learner replace the usual and traditional way of teaching and learning by using up to dated technology(Cochrane 2010).

The motivation of this study comes to probe about attitude and behavior Intention of students towards using mobile learning also its influence on learners' believes upon higher education, because of their insight of MLS. Furthermore, the present research was conducted to investigate the key influential factors in the mobile learning within the learners learning settings classroom to improve mobile learning sustainability of education. To achieve these results, an enlarge technology acceptance Model (TAM) is evolved, which bring out literature relevant to Mobile learning use in Pakistan universities.

Theoretical Framework and Adopted Model

There are too many theoretical models that used to support researches particularly in the field of users perception about acceptance and utilization of digital systems; likewise, Technology Acceptance Model (TAM) has been widely used. It was develop by Davis and Richard Bagozi. The model was basically developed to compute behavior about technology based on customers' attitude. It is powerful (model) for predicting and explaining user behavior(Chen, Shing-Han et al. 2011). Technology acceptance model (TAM) is the most influential theory of technology undertaking. TAM is statistical information theory that provides information about users influential factors to accept any new technology. TAM suggests whenever a new technology is presented to customers; too many factors are there to impact their decisions about when and how this can make their work easy and faster. Understanding TAM will guide finer

before hand knowledge to use the new technological resources(Masrom 2007).

The actual work of system is the extremity point where customers utilize that technology. BI leads the way consumers to use any new technology and is affected by the attitude that is general fancy of that technology. Adaptation and usage about technology services can contribute positively to development. Many factors are there that affect a learners intent about use of mobile as learning instrument, that are social, effective and cognitive need with aid of attitude. Different studies are also conducted to judge the behavior of university level students in this regards(Afzal, Lumeng et al. 2022). Technology Acceptance Model (TAM)(Afzal, Ahmad et al.) is adopted for this study formed on the historical background that can guide and help in present research. TAM is used to hypothesize that the behavioral intention of any person about usage a system is set on five basic factors (Sharp 2006). The following figure number 1 graphically represents the Technology Acceptance Model adopted to complete this study;

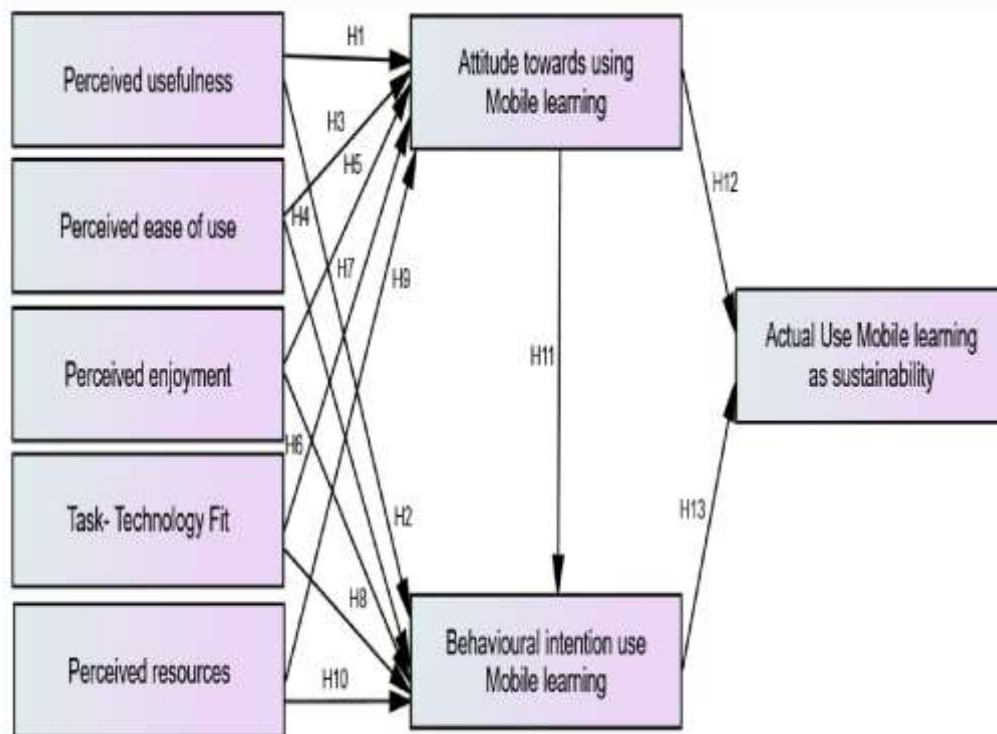


Figure 1: Graphical Representation of TAM

A number of researches used multiple technology acceptance models as TAM, unified

theory of acceptance and use of technology and also some others. Among all of them the most famous and widely popular model to use is TAM, developed in 1989. This was developed in order to measure consumers' behavior and intent towards use of computers. TAM have been used in number of researches to observe consumers acceptance of using new technologies in educational procedures, hence majority of these researches circled around teacher stated TAM as an efficient way to explain consumers behave in order to use any computing technology(Marangunić and Granić 2015). Behavioral intent of consumers is affected by attitude of user, and is indirectly and directly influenced by ease of use and usefulness. According to Cruz-cardenas (2019) attitude is vital factor in describing consumer's technology utilization and behavior(Cruz-Cárdenas, Zabelina et al. 2019). Following figure 2 represents the productive flow of researches on information technology systems usage lay hold diversity of theoretical contexts.

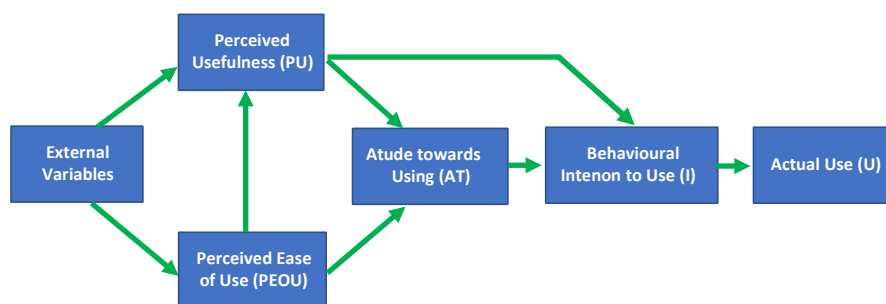


Figure 2: Productive Flow of Researches on Information Technology Systems

Research Gap and Novelty

Sustainability have been studied through different perspectives, in pastas scholars made research on sustainable university(Velazquez, Munguia et al. 2006), another research on sustainability in the higher education by interaction with teacher and lecturers(Holmberg, Svanström et al. 2008), unification of sustainable evolution in higher education curricula(Ranson, Ceulemans et al. 2017), sustainable consumption in universities(Al-Nuaimi and Al-Ghamdi 2022), Mobile universities a Critical sustainability factor(Coskun-Setirek and Tanrikulu 2021). This research was conducted to explore effects of sustainability factors of Mobile learning among university students. Furthermore there is no such research in this perspective in Pakistan which has integrated three models as TAM (Technology acceptance model), BIM (behavior intention), and TTF (Task technology fit) for acceptance of Mobile learning. The aim of present work was to couple essential features of TAM (Technology acceptance model) and constructivism with academic sustainability. This study is delimited to the students of Government College University Faisalabad, Hafizabad campus and Virtual University Hafizabad Campus. This survey was done

to make sure that all contributors had same exposure to devices and have well knowledge about proficiency of mobile devices. Some limitation can be discerned also. The survey was posted to the 60% population of BA/BSc/BS students of Government College University Faisalabad, Hafizabad Campus and 100% population of BS/B.A/BSc from Virtual University Hafizabad Campus. However some students showed less interest in responding questionnaire that may affect the results. The other possible limitation can that some participants may not respond frankly and honestly because of the sort of some statements as they may not want to confess that they are using their cell phone more often for non-learning associated activities.

RESEARCH OBJECTIVES

1. To analyze the factors that affect students’ behavior intention, their attitude towards using technology and sustainability of mobile learning.
2. To find out relationship between technology acceptance variables, student’s behavior intention, students’ attitude toward using new technology and sustainability of mobile learning.

RESEARCH METHODOLOGY

The study was descriptive in nature and adopts the survey method to collect quantitative data. For study all the two universities of Hafizabad district were selected. Population of the study was 480 students of B.A, BS and BSc. The sample of study was 60% population of Government college University Faisalabad, and 40% population from Virtual University Hafizabad Campus. Sample size has vital role in interpretation and estimation of SEM results commonly suggested by literature. For the study only primary data will be used. The data for studies will be collected using questionnaire. The table number 1 represents Respondent participation.

Respondents	Frequency	Percent	Valid Percent	Cumulative %
Male	184	38.3	38.3	38.3
Female	296	61.7	61.7	100.0
Total	480	100.0	100.0	

Table 1: Respondent participation

DATA ANALYSIS

Hypothesis Analysis (SEM)

In order to determine the effects of TAM model variables on the use of M learning for ATT mobile learning and BIM mobile learning, to examine the effects of task technology fit and PR variables a path modeling study was used. Findings are presented and explained in light of the results of the hypothesis testing (Al-Rahmi, Al-Rahmi et al. 2021). In the subsequent stage of the process, the author used PLS to

assess the structural equation model. Following figure number 3 represents PLS-SEM Analysis of hypothesis;

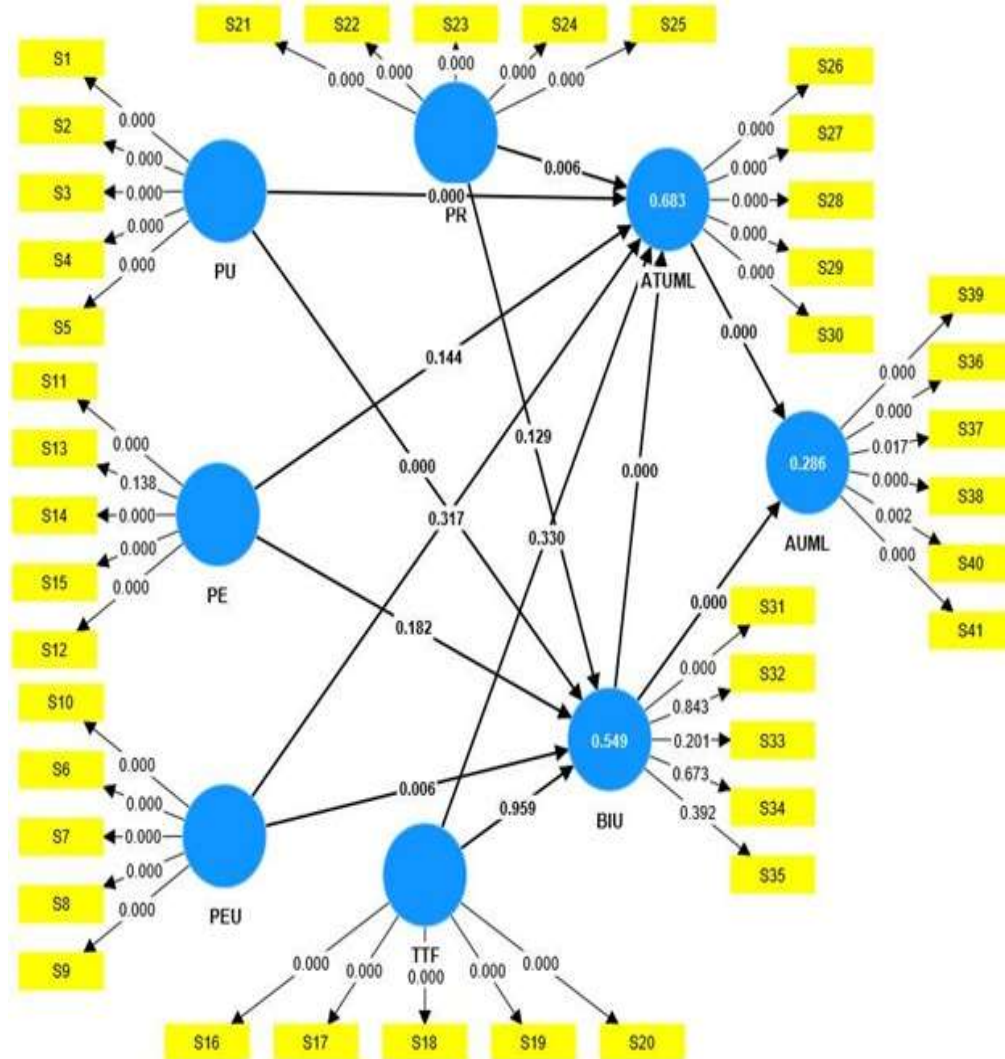


Figure 3: PLS-SEM Analysis of hypothesis

Factors analysis

To assess factor analysis, we first identified eight constructs included in our model namely PU, PEU, PE, TTF, PR, ATT, BI and AUML. The structural model and its path coefficients are depicted in figure number 3. To examine the predictive accuracy of the model, we determined R² values. From figure 3, it shows that R² is 0.549 for

BI. This indicates that the six constructs (PU, PEU, PE, TTF, PR, and ATT) explain 54.9% of the variance in BI. The inner model shows that ATT is strong predictor of BI (p-value=5.418) having t-value of significant level 5% in the one tailed test indicates a strong positive relationship with BI. Referring to ATT as an endogenous construct the model indicates that R² is 0.684 for ATT. This implies that the five constructs (PU, PEU, PE, TTF, and PR) explain 68.4% of the variance in ATT. Furthermore AUML as an endogenous construct shows that R² is 0.286 indicating that two constructs (AT, BI) explain 28.6% of the variance in AUML.

Hypothesis Testing

H₀₁: Usage of mobile learning has no effect on students' perceived usefulness and their attitude towards usage of mobile education.

Figure number 3 demonstrate (T-value=17.043) that perceived usefulness is substantially and positively associated to ATT. The result highlighted that the null hypothesis "Usage of mobile learning has no effect on perceived usefulness and their attitude towards usage of mobile learning" was rejected. Therefore the researcher is quite confident to say that the use of mobile learning has an influence on PU and attitude towards using mobile learning for education.

H₀₂: Mobile learning has no impact on perceived usefulness and BI of students' to utilize mobile learning.

Figure number 3 represents PU is definitely and significantly associated with BI mobile learning (t=17.284). So the null hypothesis was rejected that mobile learning has no influence on PU and BI of students to utilize mobile learning results demonstrate that mobile learning has an effect on PU and BI.

H₀₃: Mobile learning has no influence on user friendly environment and their attitude toward using mobile education in classroom.

Figure number 3 revealed research finding that PEU was certainly and significantly connected to ATT mobile learning (t=0.134,p=0.894)so null hypothesis was rejected that mobile learning has no influence on user friendly environment and their attitude towards using mobile education in classroom as results revealed that mobile learning has influence on perceived ease of use or user friendly environment and attitudes towards using mobile education in the classroom.

H₀₄: Perceived user friendly use of mobile education has no effect on Behavioral intent of students' about usage of mobile learning.

Moreover research showed that PEU was substantially and positively associated with BI mobile learning (t=2.754,p=0.006) hence null hypothesis no 4 was rejected that perceived user friendly use of mobile education has no effect on BI of students' about usage of mobile learning. As results demonstrate that; PEU of mobile learning has

positive influence on BI of mobile learning.

H₀5: Convenience and ease of using mobile studying have no impact on students' attitudes towards usage of mobile education for learning.

Moving on hypothesis 5, the findings demonstrate that perceived enjoyment of mobile learning has positive influence and substantially associated with students attitude towards usage of mobile learning for education ($t=1.773, p=0.076$). As result null hypothesis was rejected and the author was quite confident to say that perceived ease of use of mobile learning has positive effect on attitude of students towards using mobile education.

H₀6: Perceived enjoyment is not positively associated to students' attitude towards using mobile learning.

For hypothesis 6, (t value =1.334, p value 0.182) results showed that students perceived enjoyment is positively associated with students attitude towards using mobile learning. Hence null hypothesis proved to be false.

H₀7: TTF has no positive association with Attitude towards using mobile learning.

For hypothesis no 7(t value=0.885, p value 0.376) results revealed that task technology fit is positively associated with attitude towards using mobile learning, so the null hypotheses was rejected that there is no positive association between TTF and student Attitude towards using mobile learning.

H₀8: TTF is not significantly correlated with BI to use mobile learning.

For hypothesis no 8 results (t value=0.052, p value 0.959) showed that task technology fit is significantly correlated with BI to use mobile learning. So the null hypothesis was rejected as results showed are significantly associated with TTF and BI of students.

H₀9: Perceived resources are not favorably associated with Attitude towards using mobile learning.

For hypothesis no 9 results (t value =2.085, p - value=0.037) showed that perceived resources and attitude towards using mobile learning are positively associated with each other. Hence the null hypothesis was rejected that perceived resources ar is not favorably associated with attitude towards using mobile learning.

H₀10: There is no significant and positive link between Perceived resources together with Behavior intention to utilize mobile learning.

For hypothesis no 10 results showed (t -value=1.519, p -value=0.029) that is significant and revealed that there is positive association between perceived resources and BI of

students to use mobile learning. So null hypothesis was rejected and the author is quite confident to say that there is significant and positive link between perceived resources and behavior intention of students towards mobile learning.

H₀11: Behavior intention to use mobile education is not firmly and considerably linked to students' attitude towards utilization of mobile education.

For hypothesis 11 (t-value=5.418) showed that BI is strongly associated with students attitude towards using mobile learning so the null hypotheses was rejected. And the author is quite confident to say that student's behavior intention is firmly and considerably linked to student's attitude towards utilization of mobile education.

H₀12: Students' attitude towards mobile learning is not positively and significantly coupled with their mobile learning.

For hypothesis 12 results showed (t-value =3.669) which are significant so the null hypothesis was rejected and the author is quite confident to say that students attitude towards mobile learning is positively and significantly associated with students mobile learning.

H₀13: Behavior intention to use mobile gadgets for the sustainability of mobile education has no positive and substantial connection with mobile learning sustainability.

For hypothesis 13 results revealed (t-value=5.291) which are significant , so the null hypothesis was rejected and the author is quite confident to say that behavior intention to use mobile gadgets for the sustainability of mobile learning is positively and substantially associated with mobile learning sustainability.

DISCUSSION

According to the study's findings, all hypotheses significantly improved attitudes toward using technology for mobile learning and behavior intentions for mobile learning, both of which affect how long mobile learning can be sustained. Same conclusions have been observed in earlier research on technology adaptation and when referring to mobile services. Additionally, the characteristics showed direct strong connections with Mobile Learning attitudes and M-learning (Al-Rahmi, Al-Rahmi et al. 2021); because students depending more on the mobile learning versions that are already setup on their computers as a result, their opinions about usage are skewed and accurate. These factors may also be contributing to the increase in using mobile learning, as intended by students. Because of the nature of the link; increase in PU results in greater use of mobile learning. The importance of PU referring to mobile learning has drawn the attention of numerous researchers. The investigation's findings support those of other studies. The results also make two significant contributions to the TAM model in the context of education. In an effort to enhance students' use of

mobile learning for education, they advised promoting the use of mobile learning for education as well as PU, PEU, PE, TTF, and PR. Teachers ought to encourage students to use mobile learning for the purpose of education. Previous studies compared in person courses and online courses and the results were that online courses had a positive impact on MLS (Lakhal, Khechine et al. 2021). This study adds to those findings by usage of m-learning, BIM mobile education, and exchange of information. In the context of Pakistan, where mobile learning is being used for learning, it is important to note that theories are derived from and positioned within practice, which forms the foundation for the creation of new methods and concepts. It should be mentioned that this could be the first time the TAM theory has been used to higher education in Pakistan. The major goal behind the study is to determine how student attitudes and BIM towards mobile learning affect the long-term viability of education. Previous studies that discussed the use of mobile phones for education discovered that the following are the most important concepts and determinants of mobile education system adoption PU, PEU, PR, PE, attitude, and social effects. The research model determines that TTF and TAM variables are the most significant influences on students' academic performance when mobile learning is used as a sustainable educational strategy. As a result, it was discovered that this study's findings regarding attitude did, in fact, direct impact on the actual use of mobile learning by learner for educational sustainability; however, its impact on usage was completely mediated by students' BIM to use mobile learning. These results suggested that learner would develop a favorable attitude towards mobile learning and following their realization of the value of mobile devices, they expressed a desire to use mobile learning, their ease of use for learning, the accessibility of organizational and technical support, as well as peer pressure.

Five constructs, including PEU, PU, ATT, TTF, PR and Behavior intention towards m-learning, variables extracted from TAM, were noted as having the greatest impact on university students' use of mobile learning as sustainability. In order to support students' adaptation of mobile education for educational learning sustainability, universities are strongly encouraged to use PU, PE, and PEU, which is strongly suggested by the TAM model in this research. Further research examine planning advice for instructors on PE and Task technology is compatible with the widespread adoption of mobile learning and their positive assessment of its potential educational use. Another thing to keep in mind about the study is that it is based on student opinions, which might not necessarily reflect real-world effects. Future research in this field should take into account the opinions of the professors and other stakeholders in the higher education level regarding use of mobile learning in classrooms. The results of this study may be expanded, and a greater understanding of the best way to approach this problem with in universities and higher education may result from comparing and contrasting viewpoints from and with other countries.

RECOMMENDATION

It is recommended that there may be proper training of students regarding mobile learning.

It is recommended that institution may arrange m-learning coaching through seminars. It is recommended that there may be proper curriculum for the counseling of students in all classes.

It is recommended that teachers incorporate techniques that contribute towards students' m-learning.

It is recommended that the establishment of National Central M-Learning Council.

COMPETING INTERESTS

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

ETHICAL ISSUES

There are no ethical issues. All data in this paper is publicly available.

AUTHOR CONTRIBUTION STATEMENT

Jamil Afzal and Gulfam Anwar conceived idea and designed the research; Analyzed interpreted the data and wrote the paper.

FUNDING STATEMENT

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DATA AVAILABILITY STATEMENT

Some or all data that support the findings of this study are available from the corresponding author upon reasonable request.

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