Learner Acceptance of Mobile Learning & Its Impact on Academic Achievement: A Conceptual Framework

N. Yuvashree[1], Dr. A. Bharathy[2]

[1]N. Yuvashree, Research Scholar, Department of Management Studies, Pondicherry University
[2]Dr. A. Bharathy, Assistant Professor & Research Supervisor, Department of Management Studies, Pondicherry University Community College

Abstract – **Education can only help our nation in its transformative process as it has the power to eradicate poverty and help achieve development targets by imparting knowledge through learning. Technology tools are constantly revolutionizing the learning process and this needs more research studies to understand the learning conditions that can increase the outcomes of teaching and learning process. The paper points out to the foremost role of Mobile learning (MBL) to impart 21st century skills (P21) from cradle to career building leading to lifelong learning. By identifying various drivers and barriers the research establishes a conceptual design connecting variables from perceived enjoyment, usefulness and ease of use of MBL to its impact on performance in the light of intervening variables like social media factors, cognitive load and gamification that needs explanation. The paper thus establishes furtherance of the existing scientific knowledge on MBL acceptance to assessment of its impact on performance or academic achievements.**

Keywords — **Mobile Learning Acceptance, Academic Achievement, Gamification, Social Media factors, Cognitive Load**

I. INTRODUCTION

"Education is a movement from darkness to light." - Allan Bloom

Education has an indomitable role in changing one's life. It helps an individual to think, to perceive, to act, to learn, to empathize, to interact with others and to liberate oneself from preconceived notions and to expand their horizons. It is a weapon to develop one's personal self and career. Its role in the development of the society and nation cannot be underestimated. Further at a time when our nation aims to achieve developed status by 2047 (Viksht Bharat) when India turns 100, is an ambitious target for the developmental vision in various facets such as economic health and wealth, social development, advancement and environmental sustenance. At our current pace of growth, achieving these needs immense dedication and the best use of the vast pool of talent available in our country.

"Education is the key to unlocking the world, a passport to freedom." – Oprah Winfrey

It is here that education will help our nation in its transformative process as it has the power to eradicate poverty and help achieve development targets by imparting knowledge through learning. India ranks at number 2 in terms of population and has an overall literacy rate of 74% (World Population Review, 2024). Kerala[19] has the highest rate of 94% and Jharkhand has 66.41%. This literacy rate statistics only highlights that our nation needs to focus on education as the global literacy rate is 83.41%. There are also disparities in terms of urban and rural areas and also in the case of male (82.4%) (high) and female (64.8%) (low) literacy rates in our country (World Population Review, 2024). As education is a definite tool to economic growth and sustenance, there is a need for an immediate action plan to provide "education for all". Also, policy initiatives like free education alone cannot moot the change, technology tool support should be sought as technology diffusion seems to be faster among the literate and the illiterate community than the other services essential or not so essential and policy benefits.

Today technology has revolutionized the education field. It has expanded education globally and has enabled a platform where teachers and students can engage for knowledge acquisition effectively. Educational technology tools like mobile, apps,

platforms, computers are being used right from designing the curricula to implementation and assessment in a systematics and scientific way. Educational technology is about "learning teaching conditions to develop the efficiency of teaching and training and also it is the systematic application of science knowledge[7]". It also facilitates personalized learning and directs students to match their skills with profession. It is able to suggest high level mastery courses for the fast learner and necessary course revisions for the slow/poor learners and guide in their career development. Thus, "online learning became synonymous in the domain of education with web technology-oriented learning, e-learning, computer-assisted instruction, and Internet-based learning[12]".

Digital technology promoted learning reached a new peak as technology devices started becoming smaller and smaller from the desktop to laptop, palmtop and smart phones. This resulted in a more mobile and flexible learning using smartphones to learn on the go (M-Learning). The actual credit for M-Learning goes to Alan Kay in the late 60's with the launch of his Dynabook (book size computer) and followed by IBM5000, a portable computer (1975) and the first handheld device Palm OS (1996) and 2001 saw European Commission explore the use of mobile learning for education[14]. A look at the smartphone penetration in India by Statista report in 2024 shows a statistic of 71% penetration in 2023 and is projected to reach 96% in 2040. Also, 53% had internet access on their mobile phones in 2020 and this is projected to grow to 96% by 2040 (Statista Report, 2024). This has opened up opportunities for M-Learning. The growth of mobile phones with internet penetration can be used for mobile learning in tandem to achieve goals in education for social and national development.

As we navigate the digital age, M-Learning (MBL) stands at the forefront, reshaping the educational experience and paving the way for a more personalized and adaptable approach to learn the 21st century skills (www.p21.org). Considering the benefits of mobile devices for learning, has churned a battery of studies[1] as to how these devices can be used for various online learning situations on one hand and exploration of drivers (acceptance/adoption factors/theoretical models) of MBL on the other hand.

However, the research does not want to stop with identifying the drivers of MBL but would also like to throw light upon how it can impact performance or academic achievement skills. This would help the stakeholders of the educational sector to use MBL in a sustainable way.

II. LITERATURE REVIEW

M-LEARNING (MBL)

Mobile learning also known as M-Learning (MBL) can be considered a "subdivision of online learning, which refers to the process of learning across various settings through social and content exchanges through mobile devices such as smartphones, and wearable technology[18,21]".

FACTORS INFLUENCING M-LEARNING (MBL)

Research works have shown that MBL significantly impacts collaboration during learning with other students, influences their grades (Perceived usefulness), is easy to use mobile devices for learning (perceived ease of use) and this has a positive effect on acceptance of technology for learning apart from attitude[10]. Subjective norm factors like family and friends influence were also considered as motivating in this regard. But it is seen that technology acceptance is influenced by proper training available (self-efficacy) to use it and also necessary financial support available to use it, in case it is expensive[11]. Prior learning using electronic devices was also not a pre-condition that enhances M-Learning. This paper also suggests the need for more in-depth qualitative research in this area and to identify the influence of other factors.

Another dimension that has made significant impact is the recognition that short-term benefits of usage of technology can positively impact long-term acceptance/usage such that students can use them to meet future goals[10]. This result is arguable in comparison to earlier finding that prior learning is not a condition for acceptance[11]. A longitudinal study conducted has also iterated the view that student's acceptance is dependent on the strength of technology and less repeating issues. The study indicates that the "adoption of IS/IT for education purposes is quite different from the adoption of IS/IT for business

purposes[10]". Also, TAM (Technology Acceptance Model) is a popular theoretical background in work related innovations but its application to education related context needs more research. Also, adoption is considered as the first step of M-learning success. The UTAUT model is another popular model in literature to study acceptance/use of technology.

ACADEMIC ACHIEVEMENTS AND COGNITIVE LOAD IN MOBILE LEARNING

Studies has researched on improvement in student's academic achievements as a primary cognitive goal of education through M-Learning[8,23]. The cognitive load theory perceives that knowledge acquisition is the foundation of learning. The study focused on student-related factors in the learning environment to significantly affect academic achievements including "academic self-efficacy, academic stress, learning motivation, learning style, intelligence, learning strategy, subject performance and learning attitude[9]". Cognitivism seeks to "identify various processes associated with the acquisition of knowledge and thus to provide strategies that support student learning, educators can use cognitive approaches to help students effectively achieve their educational goals". The paper also highlights some very interesting facts like how stress in management of academics can also be reduced by improving academic performance. The authors advised promoting the use of mobile learning for education as well as facilitating PU, PEU, PE, TTF (Task Technology Fit), and PR (Perceived Risk). It was seen that integration of mobile in the education system can affect learner's educational sustainability as well as academic performance. The study is based on student opinions, which might not necessarily reflect real-world effects and may be expanded within universities and higher education comparing and contrasting viewpoints from and other countries.

ASSESSMENT OF ACADEMIC ACHIEVEMENT IN M-LEARNING

Academic performance has been found to be a measure of "psychological, personal, demographics, educational background, academic advancement and other environment variables[15]". It is seen that a large volume of data is generated during the process of learning and mining this data provides powerful analytics that can be used to improve learning quality. The quality of education is evaluated by two aspects - teacher feedback and student success. The learning quality of the training was evaluated on the grades received from the different courses. This study helped to identify poor quality of teaching and poor performance of students so as to take corrective measures. Here academic performance was measured using the grades obtained by the students in various courses that belong to 3 study programmes.

MOBILE LEARNING AND SOCIAL MEDIA

Social media promotes collaboration backed up by a software that enables content sharing, tagging, social networking, blogs, wikis and RSS[3]. Sociological community studies have emphasized on the negative of social media on academics. Here course grade point average and course credits obtained were used to assess performance in academics.

Research studies have discussed typical usage of social media platforms, to interact with its users in multiple ways[17]. It also elicits responses from its follower base – who may respond to these contents, which may be followed by other users down the network. Educators are trying to improve the teaching and learning through social media applications and mobile technologies. The growing belief that enhanced communication and interaction are key values in learning, places social media at the centre of the new didactic technologies.

GAMIFICATION AND MOBILE LEARNING

Studies focussed to enhance the learning of students focus on using gamification as a tool to enhance learning using mobile gamification tools. This is supposed to contribute towards sustainability in learning using mobile technology[13]. It shows that PEOU followed by PU and PE influences in a very significant way the utilization of educational games through mobile phones.

This study aims to extend gamification tools and multimedia resources for education, achievement, participation and motivation among the student and teacher in the subject of musical education and its didactics within higher education[4]. We can use gamification in the classroom as a facilitator of

learning and generator of positive attitudes within the group or class. ICT has become a powerful technology that helps us create and select motivating and personalised activities. Different studies have used gamification in education and have seen it increases motivation, learning outcomes and active engagement using gamification tools. Gamification elements help to motivate students and also enhance learning experience and this leads to academic success of the students. Studies show that gamification adds value to the teaching and learning process as it influences the internal drive of the students to engage better in the learning process[6]. Further today we see that social media platforms provide immense opportunities to engage students in the learning process when used in education situations. However, its use needs to be studied as it can cause negative impacts among low performing students that might lead to anxiety and stress rather than enjoying the learning elements.

III. THEORETICAL INSIGHTS

In order to address the issues raised in the literature review, theoretical insights of the models widely explaining adoption of technology were conducted by the researchers. TAM (Technology acceptance model) adopted from TRA (Theory of reasoned action) has been the basis for studies in this direction. It is developed on the core constructs of perceived usefulness and perceived ease of use that determines behavioural intention. TAM also recognises the use of other variables including self-efficacy, subjective norm and attitude[11]. Prior use of e-learning was not accepted as an external variable in this study. TAM is popularly used to infer behavioural intentions more prevalent in work space IT adoption, while its use in learning environments and e-learning are significantly less. A revised model of TAM namely UTAUT (Unified Theory of Acceptance and Use of Technology) is being adopted/adapted in usage/acceptance of technology studies and this also guides to explore the factors driving intention to use MBL as well as online learning. This is justified as the use of TAM model[5] has been argued as it does not provide sufficient details about individuals' opinion towards new technology applications. It also ignores the indicators and directly considers PEOU and PU apart from not considering the relation between usage attitude and usage intention. Hence a more realistic approach to study MBL is possible through the UTAUT model [20] that is an integration of 8 models. Subsequent studies have built upon UTAUT and uses perceived enjoyment, mobile self-efficiency as contextual predictors in addition to the UTAUT drivers[5]. This forms the base for the study while it does not limit to mere analysis of drivers in usage of MBL but also extends to get insights on its impact on academic performance of the students by measuring their grades subsequent to MBL.

The literature study also brings out another dimension of the influence of cognitive load and its impact on academic performance and is less explored upon area and is backed by the cognitive load theory (CLT). Cognitive load theory (1980) explains that cognition consists of short-term and long-term memory, where cognitive processing takes place. Inadequate education and strategies can cause increased cognitive load due to the overload of students working memory. It is observed that cognitive load is divided into several separate categories called intrinsic, extraneous, and germane cognitive load. Using the cognitive load concept [23], studies have established the relationship between influence of cognitive load on improving educational performance and in the case of mobile learning environment, there is a need to develop suitable pedagogy. This can reduce the cognitive load of students and contribute to effective learning. With the basis of these theories this study also understands the role of social media and gamification as factors that can influence cognitive load and impact on academic performance.

IV. RESEARCH METHODOLOGY

The review of literature on MBL acceptance has helped to synthesize the past research work in the area of mobile learning and various relationships it has been subjected to. This has enabled the researcher to think more broadly to gain a larger perspective of the scenario in the present situation and thereby help to identify relationships that have not been explored upon or needs to be studied. In this way the study can contribute to the development of new knowledge that can make mobile devices contribute to learning rather than being considered as a social evil. Students also find academic stress with the increasing competition and expectations of the educational system in our country, there is an urgent need to address how the students are using this information

explosion/distractions through MBL to perform in their academics and most of all how are they managing their cognitive load.

This paper thus follows designing a conceptual paper to summarize the fragmented field and to argue upon the questions/theories explaining the current phenomenon[2,22]. The paper focuses on designing a conceptual model that depicts necessary relations that need to be addressed for making MBL a more sustainable tool else too many stakes may be placed and it may become just another technology tried and failed.

V. CONCEPTUAL MODEL

Mobile technologies provide anywhere and anytime learning, contribute to academic achievement, and open up channels of education and cognition for students. They have indeed transformed the way education is being consumed right from school, college to continuous learning requirements. Further technological advances have changed mobile learning from asynchronous to synchronous learning mode.

A lot of studies in the past have shown there is a need to explore the importance of MBL and its acceptance as this will help to improve its usage as a tool of MBL[11]. There is also a need to continue the studies to understand long term intention to use MBL[10]. Mobile learning acceptance has been evaluated under the context of various dimensions like perceived extent of use level of mobile learning, effort level perceived in learning the use of mobile learning technology, factors influencing the behavioural intention to use technology as popularly studied in various cases of diffusion of innovation, perceived enjoyment that can enhance mobile learning.

Studies have justified that the internet has a large volume of learning resources made available through the social media platforms. Its influence on mobile learning ranges from collaboration among peers, teachers and also with a larger global audience encouraging creative talent apart from diverse perspectives. This then necessitates mindfulness in the use of social media so that it can impact academic performance too. A subjective appraisal of its influence on mobile learning behaviour and academic performance can help to initiate strategies to harness its use for education attainment[17]. Collaboration

between teacher and student can be enhanced through integration of social media in the MBL content[16.]

There is also a need for studies to explore the impact of specific areas of cognitive load in mobile learning situations that can result in enhancing the academic achievements of students[23]. It also identifies a new dimension for researchers to focus on cognitive management studies rather than trying to find ways to reduce the cognitive load in mobile learning. This is because mobile based learning leads to development of new knowledge from a wide gamut of sources unlike the traditional classroom-based learning. Further widely used theoretical frameworks for understanding M-Learning were TAM and subsequently UTAUT models that stress that extent of the perceived usefulness, use of technology, subjective norms, academic self-efficacy can be major drivers in acceptance of MBL. While the increasing adoption of social media tools and the role of gamification being used to attract a larger audience to various online resources and its effect on MBL acceptance also needs to be reviewed. The constraining role of social media on MBL is not specifically researched upon. Also, the role of cognitive load management and the subsequent effect on academic performance needs a thorough evaluation. This model can serve to design better MBL courses and help to develop a more robust learning management tool through MBL.

Thus the following conceptual model has been designed to understand mobile acceptance as a learning device based on how much people value it as a tool for learning, how easy it is to learn the use of the tools and techniques, the academic readiness/self-efficiency of the learner, the use of social media for learning, the perceived enjoyment in using MBL as it needs a lot of self-motivation and self-discipline and the role of gamification factors in this process of academic achievement through MBL. Subsequently the role of cognitive load management and its impact on academic performance will be measured. Further review can be done to identify the moderators and mediating roles of some of the variables identified in this study.

Some studies in recent times have studied how students' sustainability in learning is influenced by mobile gaming applications included in the learning

process[13]. But studies in this direction are only limited. This study will also consider these variables' role in MBL acceptance and academic performance.

Academic performance is an important variable to measure learner success. While studies show that this can be stressful to learners. Hence identifying factors that can reduce academic stress through necessary interventions has to be conducted like cognitive load management and gamification [9]. Based on these gaps identified in the literature reviewed the following conceptual design (Fig:1) has been developed.
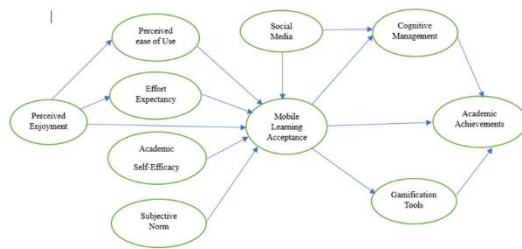

Fig:1 Conceptual Design

VI. OBJECTIVES/ RESEARCH QUESTIONS

From the most significant gaps identified in the literature and the subsequent design of a conceptual model for understanding the usage of MBL as a more robust learning management tool, the following objectives/ research questions have been raised to be tested (i) to analyse the relationship between the socio demographics (age, gender, location) and technographics (use time) of the student learners and MBL acceptance, (ii) to identify how MBL acceptance impacts on learner's Cognitive Load impact/management, (iii) to explain if there is any relationship between MBL acceptance and Academic Achievement of the learners or to determine the achievement of cognitive goal of education through MBL, (iv) to explore the drivers of MBL like perceived ease of use, Perceived usefulness, subjective norms, academic readiness efficiency, social media influence and perceived enjoyment, (v) to analyse how student engagement through interactive content creation/collaboration on social media can encourage MBL, (vi) to examine how gamification using multimedia elements can make learning enjoyable and

also affect academic performance and (vii) to examine the role of any mediating variable (Cognitive Load Management/Social Media factors) in the relationship between MBL and Academic Achievement.

VII. IMPLICATION OF THE STUDY

Globally and in India significant efforts are underway to make "education for all". This is applicable for a developing nation like India where literacy rates are less than the global average. On the other hand, India is recognized to have the advantage of the largest population that would have a median age of 29 years, the young workforce for the next 2-3 decades. If we need to benefit from this advantage and overcome our shortfalls, then increasing the literacy rates and employability quotient is important. Further continuous learning and lifelong learning are needed. In this regard this study can provide valuable inputs to the policy makers, educational institutions, teachers, content designers and to the learners. Consequently, it will enrich the existing base of literature and help in identifying new connections among the key variables being studied while contributing to new/ relevant theory building.

VIII. CONCLUSION

Technology has been a boon to the education sector since time immemorial. This research work will consider existing and new potential factors influencing the adoption of M-Learning are discussed, including perceived ease of use, perceived usefulness, social influence, and academic self-efficacy. These factors impact students' attitudes and intentions to use mobile learning technologies. It will understand how mobile learning can influence cognitive load management which in turn impacts performance. This will add a new dimension to the existing body of knowledge and evaluate the near term and subsequently the long-term acceptance and use of MBL. Studies show that this attractiveness of technology is a major driver that speeds adoption. The role of integrating social media platforms for education can also be explored. This can help us to initiate right actions as early and in the right age of the learners to benefit from demographic dividend and to reach a developed country status by 2040 (Viksht Bharat).

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