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Mobile Learning and Life-long Learning: Nurturing Higher Education Students' Learning in the Face of Uncertainty

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Abstract

Since the beginning of the COVID-19 disease in late 2019, a majority of the learners from Higher Education Institutions (HEI) have resorted to blended and distance learning. There has been extensive discussion concerning distance learning; however, the aspects that motivate learners to use mobile phones for learning are yet to be explored comprehensively. This paper identifies the aspects that could potentially motivate learners to start using mobile devices for learning, which is referred to as mobile learning (m-Learning); it motivates the learners to participate in studies. Such is the case because a majority of the learners need to find time to focus on studies. This is especially significant for remote studying because it brings several challenges like domestic work and work-life balance that need to be ensured along with studies. Furthermore, learners may miss online classes due to lack of stable connectivity. This is where m-Learning has its advantages since it is independent of place and time. With the intent to provide HEI learners with an appropriate learning environment, this paper comprises a review of previous research concerning m-Learning design. It is understood that the situation and age of an HEI learner should be the basis for determining the andragogical factors. It is suggested that future research in this domain focus on assessing the factors that promote m-Learning among HEI learners so that these individuals can continue education despite having physical distance from their peers.

Keywords: *Higher Education Learners, Mobile Learning, Andragogy, Pandemic, Uncertainty.*

INTRODUCTION

The typical present-day HEI learner is relatively modern and uses mobile devices to access learning content and connect with peers. Such interaction engages learners and educators and brings these practitioners closer using a virtual classroom platform that is considered responsive learning. M-Learning facilitates a responsive learning scenario when the digital experience for the learner is optimised. Such a learning environment facilitates information searching and accessibility independent of time and satisfies the requirements of the users by providing such facilities through mobile devices. That said, wireless internet and mobile devices like smartphones, personal digital assistants (PDAs), and tablets, among many more, are critical for mobile applications (Barianos, Papadakis & Vidakis, 2022).

The Statista Research Department conducted the Handphone Users Survey in Malaysia (HPUS) in 2022, where the mobile-device growth rate from 2010 to 2020 was reported. The expected number of smartphone users in Malaysia for 2021 is 29 million. Up to 2025, there will be an additional 1.74 million smartphone users in Malaysia due to the country's expanding population. The demographics of a handphone user for the 2010-2025 timeframe are depicted in Figure 1.

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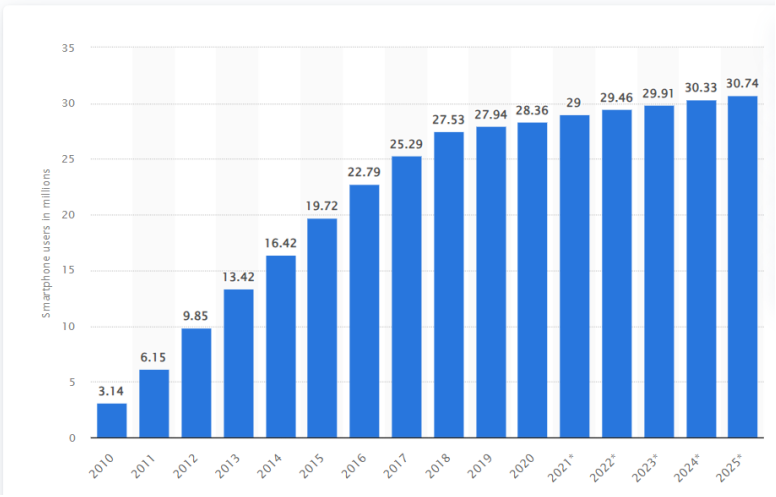

Figure 1: Number of smartphone users in Malaysia from 2010 to 2020 and a forecast up to 2025*(in millions)*
(Source: https://www.statista.com/statistics/494587/smartphone-users-in-malaysia/)

Previous studies indicated that the application of m-Learning significantly enhances the learning experience (Juraev, 2023). Additionally, it was suggested that m-Learning factors and instructional processes should be emphasised to have better integration of practice with theory (Al-Emran, Arpaci, & Salloum, 2020). Also significant is the identification of the aspects that facilitate success concerning m-Learning adoption and use; such steps are required for the fulfilment of the objectives related to learner aspirations and needs. Essentially, the suggestion is that there should be factors which ensure that learner needs and requirements are met.

Against this backdrop, this paper examines the nuances of implementing mobile learning strategies in higher education institutions during the pandemic. It delves into the transformative potential of mobile learning in preserving the educational experience, while also scrutinizing the need for adaptable pedagogical approaches that leverage the unique attributes of mobile devices. Furthermore, the exploration extends to considerations of learner engagement, assessment methods, and the evolving roles of educators in this digital paradigm.

As we navigate the complexities of the present and envision the future of higher education, this paper seeks to offer insights into how mobile learning can serve as a catalyst for innovation, inclusivity, and resilience within higher education institutions during a time of uncertainty. By critically examining the opportunities and challenges that mobile learning presents, we aim to contribute to the ongoing dialogue surrounding effective pedagogical strategies and technological integration in the realm of higher education in the face of global crises.

LITERATURE REVIEW

Mobile Learning Concept

There has been a review of several studies concerning the fundamentals and definitions pertaining to m-Learning processes. The concept defines three types of mobility which are learner, learning, and technology. These mobility aspects help explain the significance of their role. At the same time, the latest mobile technology mediates learners' action and learning activity using wireless internet.

The use of mobile devices, regardless of place or time, pertaining to knowledge acquisition, is defined as Technology Mobility. Modern facilities like cloud computing, advanced networks, storage, big data, and mobility provide the support required for enhancing this concept using different types of learning activities. Tlili et al., (2022) specify the limitations of m-Learning, specifically in the context of technical aspects like network access, memory, mobile battery life, and bandwidth. Such issues can be handled by carefully crafting m-Learning functionality so that formal part-time learners can access knowledge without needing very-high device specification or wastage. In the education sector, mobile technology may be integrated with the curriculum to benefit from the strengths of technology.

Learner mobility is a concept associated with learning benefits and access independent of place and time. HEI learners have a perception that classroom education is challenging specifically during the pandemic. Several factors like geographical distance, impractical travel, and work and family commitments are the roadblocks to learning.

In the educational context, learning comprises congruence, cooperation, and cross-border transfer of information. Presently, learner mobility-specific retention is a significant challenge for the teaching scenario and HEIs. Hence, learners must prepare themselves for using technology effectively, as opposed to its use only for informational and communicative purposes. The use of theory to this context is understood to benefit the learners with enhanced outcomes and achievements using an integration of learning performance and participation.

To enhance m-Learning performance, academicians have suggested several aspects that are specified in Table 1. The majority of the researchers indicate that the provision of a collaborative platform equipped with a search function is required. In the collaboration and knowledge acquisition context, mobile devices have been established to be useful for HEI learners (Castillo, Clunie T., de Clunie, & Rodríguez, 2013). These devices facilitate m-Learning processes to provide learners with a medium towards self-sufficiency (Al-Emran, Arpaci, & Salloum, 2020)

Table 1: Suggested features specific to m-Learning

Suggested Features	Sources
Mobile computing, gesture-recognition, e-books, visual data analysis, and open knowledge.	(Wu, Jim Wu, Chen, Kao, Lin, & Huang, 2012)
Communications, search, use of expression, record creation, provide and receive feedback.	(Sung, Chang, & Liu, 2016)
Organised learning, orientation, structured documents, better accessibility to learning systems.	U. Aldraiweesh and A. Aldraiweesh (2022)
Analysis and display of information, provision for remote control, social network integration, monitoring aspects for tweeting, informal posts regarding learning activities.	U. Aldraiweesh and A. Aldraiweesh (2022)
Learner-oriented, versatile, self-paced, practical multimedia players, interaction and collaboration facilitation	(Sung M. , 2015)
Search box, suggestions, automatic summary, group history, web annotation function, simple discussion forum	(Su, Huang, & Ding, 2016)
Remote and local accessibility, group handling, dynamic association, accessibility, content sharing system for external and local content.	(Weyns, Milrad, Nussbaum, Gil, Iglesia, & Felipe, 2015)
Sharing, information finding, and organising.	(Hernandez, Vegas, Llamas, & Gonzalez, 2014)
Chat venues, several group functions, a place for social interactions, forums, and online asynchronous discussion teams	(Angelaki & Mavroidis, 2013)
Chatrooms, forums, and blogs	(Huang & Chiu, 2015)

m-Learning as a Tool

Latest studies suggest that m-Learning is among those tools that may be used for such applications (Al-Emran, Arpaci, & Salloum, 2020) because it is versatile. There is confirmed evidence of its advantages on learning efficiency. Nevertheless, if the distinct aspects of m-Learning remain unexplored by the learners, there is a high chance of failure to meet the objectives, which would lead to higher dropouts for HEIs. Several tools, such as personal digital assistants (PDAs), mobile phones, smartphones, tablets, and the internet, are typically used for m-Learning.

Regardless, m-Learning platforms are used for the moderation of the educational goals of the learners by offering software-based facilities to create software applications (Frohberg, Göth, & Schwabe, 2009). The last few years have seen significant growth in the opportunity regarding the accessibility of learning tools regardless of time and location. Moreover, such mobile-based tools also help build learner confidence using applications that facilitate effective and easy learning. The learning process, when aided by m-Learning tools, could lead to enhanced academic outcomes for the learners (Altomonte, Logan, Feisst, Rutherford, & Wilson, 2016).

Literacy and use of mobile devices, computers, and the internet is essential since m-Learning is facilitated using such devices; the lack of knowledge may become a roadblock to learning (Chauhan, 2016). If there is inadequate knowledge regarding these aspects, the learning outcomes specific to m-Learning may be suboptimal. At the same time, if learners do not learn well about m-Learning platforms and their functions, it is possible that teachers may become aware of the confusion regarding the same and could take advantage of that (Frohberg, Göth, & Schwabe, 2009; Anggara et al., 2023; Ateş and Khameneh, 2023; Disho et al., 2022). Hence, interactive tools must have an engaging and intuitive layout. Such aspects are expected to motivate HEI learners to adopt mobile learning. Higher adoption is associated with a vast user-base that facilitates better knowledge sharing, enhanced learning and collaboration between peers (Altomonte, Logan, Feisst, Rutherford, & Wilson, 2016).

METHODOLOGIES

Certainly, conducting an article and literature analysis involves systematically reviewing and synthesizing existing research to gain insights, and identify challenges and trends. Here's a step-by-step explanation of the methodology for conducting an article and literature analysis:

i. Search Strategy

Develop a comprehensive search strategy to identify relevant articles and literature. Academic databases were referred: Scopus, IEEE, Google Scholar and ACM databases, institution's library catalogues, and search engines to find peer-reviewed articles, conference papers, and other relevant sources. The combination of keywords, phrases, and controlled vocabulary terms has been used to maximize the scope of the search. Example of the combination has shown below:

"Mobile learning" AND "Higher education" AND "Uncertainty"

ii. Inclusion and Exclusion Criteria

The criteria for including or excluding sources has been defined. These criteria could include publication date ranges, research type, language, and relevance to the research aims.

iii. Data Collection

Gather the articles and literature that meet the inclusion criteria. All the sources are keep tracked using Mendeley management tools, as well as recording key details such as authors, publication dates, titles, and abstracts in excel file.

CHALLENGES FACING HEI LEARNERS

This section discusses the challenges specific to content, coordination, and time that are faced by HEI learners. The reasons behind the challenges are specified, especially in the context of HEI learners.

Table 2: Challenges faced by HEI learners

	Time	Content	Collaboration
Challenges	Learners may have several commitments and other work, due to which they need flexibility in their learning schedule (Hooshangi, 2015)	There is little research concerning the needs and behavioural aspects of HEI learners (Hashim, Tan, & Rashid, 2015)	There was a lack of collaborative functionality on existing learning portals (Manuel & Ferreira, 2014).
Cause	Emphasis is not given to HEI learner behaviour (Ur-Rehman et al., 2016) Several online learning aspects lacked focus on activities that could promote participation (Gumbheer, Khedo, & Bungaleea, 2022) There is little engagement and contribution by learners during traditional classroom exercises (Hernandez, Vegas, Llamas, & Gonzalez, 2014)	Several information sources and extensive information (Siriwongs, 2015) A majority of mobile learning applications are created for children or formal undergraduate students (Ur-Rehman et al., 2016)	There is a lack of mobile technology use by HEI learners (So, 2016). The competency necessary for m-Learning participation is not present (Juraev, 2023)

HEI learners have to deal with several commitments simultaneously; therefore, time is often a challenging aspect, especially during the present pandemic situation. Several learners resort to part-time jobs to provide financial support to family and also pay for personal studies. At the same time, many need to stay at home to take care of the family. There is a chance of distraction due to discomfort, improper internet access, presence of family members, and motivation, among other factors. Hence, careful time management is critical to handle learning activities and balance them with individual responsibilities (Postan, 2014). Learners face time constraints due to class schedules, which often cause missed classes and a consequent decline in interest in completing studies (Angelaki & Mavroidis, 2013). Learners must balance social commitments and rigorous study schedule and, at the same time, also find time for family. After the learners determine the techniques for effective time management, they may start changing their daily routine and also remain flexible concerning behavioural aspects to relieve time-related strain.

Specific to learning content, previous-generation frameworks like digital and e-learning should be modified to emphasise on mobile solutions and discussions that can be facilitated by enhancing accessibility, availability, real-time feedback, and subject content sharing (Tlili et al., 2022). At the same time, it remains essential to understand mobile application features that offer ease of use for HEI learners failing which, learners could be demotivated.

The next aspect is collaboration, and it offers an appropriate replacement for sophisticated teaching and learning frameworks. Collaboration comprises content accessibility, regular contact, communication within the educational system, and facilities for completing assignments, tests, and exams. Nevertheless, all learners from HEIs are adept at using technology, which also depends on learner propensity to adopt the technology. For instance, leaners may not consider m-Learning technology as difficult and complicated; however, if this is not true, the learners may be demotivated from using technology-enabled systems (Hashim, Tan, & Rashid, 2015). Consequently, the mental ability of a learner to accept academic content, considering their requirements and demands, is a challenge with regard to restricted cognitive abilities (Hagen & Park, 2016).

Nevertheless, the literature has little mention regarding research aimed towards addressing the challenges regarding cognitive load caused due to personal commitments, time, and HEI learners' needs, especially concerning the instructional framework. A different learning technique may be appropriately adopted by the learners only when they understand their requirements and dedicate effort towards skill enhancement. Therefore, the next section discusses m-Learning system design that can facilitate effective mobile learning.

DESIGNING MOBILE LEARNING SOLUTIONS FOR HIGHER EDUCATION INSTITUTIONS

When creating an m-Learning application, it is necessary to identify the influence of attributes. This process helps ascertain the aspects of HEI learners in the context of using mobile devices for learning. It is crucial to consider learners who will depend on mobile technology since a majority of these learners are between 18 and 29 years, which is the age range when students attend higher education institutions (Crompton & Burke, 2018). Furthermore, in this Education 4.0 scenario, it is critical to the transition from face-to-face education delivery to mobile delivery (Gómez-Ramirez, Valencia-Arias, & Duque, 2019).

During the pandemic scenario, the removal of a traditional classroom setting makes the pedagogical process less relevant, especially with regard to learning and teaching because it brings several problems (Sălăvăstru, 2014). Among these problems is the dissimilarity between the andragogic and pedagogical perspectives, where the is a transition to student-oriented learning from teacher-orientated learning (Tlili et al., 2022). The experience of HEI learners leads to action when they perceive the content as being relevant for earning. Hence, the learners need help to handle their commitments failing which, there is a chance that they affect the learning of other individuals.

Mobile technology is unique in the sense that it allows the teachers to provide education according to their design while also ensuring that the learners are engaged (Khan, Abdou, Kettunen, & Gregory, 2019).

Considering the educational content design for m-Learning, Wang, Chen & Min (2014) suggest that three factors, namely technical, andragogical, and usability design, be considered. As highlighted before, the emphasis of m-Learning is on adequate access to learning material using mobile devices. In the m-Learning context, delivery and content need to be planned so that HEI learners do not feel cognitive pressure; additionally, the content should be in line with the essential constructivism foundation because learners have different expectations especially from the andragogical perspective. Concerning the environment, it should be made sure that the learners understand the material properly and it can be retained for future requirement. This though is parallel to the lifelong learning aspect defined by numerous academicians.

Andragogy is the science and art that facilitates adult learning (Siriwongs, 2015). In the self-directed learning context, the reason and process are such that they provide effective, well-planned, and appropriate learning (Siriwongs, 2015). Knowles (1979) asserts that it is essential for teachers to focus on learners' interest than what the teachers believe is essential for the learners. Most HEI learners are adults; therefore, the application of the andragogical concepts to the age groups of these learners should be assessed.

Knowles (1979) presented the assumptions concerning the four principles where the author states that the assumptions are based not only on past research but also consider learning orientation and readiness, prior experience, and self-direction. Adult learners have distinct characteristics in the context of the effects of learning (Karimi, 2016); therefore, it is crucial to design material relevant for significant adoption of m-Learning for HEI learners since these individuals have unique challenges and limitations. For a majority of m-Learning applications, the learning objectives do not match the aspects of a typical HEI learner, especially concerning learning preferences and management.

DISCUSSIONS

This section allows for an in-depth exploration of the various aspects introduced in the introduction and analysis sections, drawing connections between theory, research findings, and real-world applications. A large number of studies found in the body of knowledge typically focus on determining the processes and techniques for addressing content. Even though m-Learning design studies have been validated considering numerous distinct situations, there is still a need for refinement especially for m-Learning and other technologies; in addition, the optimal approaches for different environments or contexts should be considered. Mosunmola, Mayowa, Okuboyejo, & Adeniji (2018) indicate that HEI learners are not adequately utilising remote learning. Hence, institutions must determine the steps required for enhancing usage and, subsequently, ensure that learning is facilitated using the m-Learning ecosystem. Particular aspects that facilitate monitoring behavioural aspects that have little influence on learning comprise using mobile devices as m-Learning instruments. Analysis of multi-channel data concerning learning events is expected to facilitate academicians in gathering information that clarifies the theoretical aspects of the psychological learning framework (Bernacki, Crompton, & Greene, 2019). Discuss issues related to digital inequality, where students from underserved backgrounds might lack access to devices or stable internet connections. Delve into the potential difficulties students might face in adapting to virtual learning environments and maintaining a productive study routine.

Furthermore, it is essential to consider the andragogy theory utilisation, which facilitates HEIs to create an appropriate m-Learning ecosystem that fulfils the requirements of the learners. The andragogical perspective would be set as a learning framework for adults that facilitates the design and development of m-Learning content for HEI learners. Therefore, the basic necessity concerning m-Learning and the adult learner theory should be considered when the focus area is higher education institution students. Taking this information into cognisance will allow the elimination of oversight or errors; instead, it would lead to better focus on the primary measures for m-Learning adoption by learners (Kumar, Goundar, & Chand, 2020).

CONCLUSIONS

When exploring contemporary mobile technology, it is recommended that learners explore the ecosystem and optimise the use and functions specific to the technology failing which, there is a chance that the learners view the learning framework as being unconducive towards learning and unsupportive of user requirements, especially from the mobile technology use perspective. Such issues arise when application developers have a

propensity to develop applications with school students and adolescents as the target population. Furthermore, there is a likelihood of learners feeling underconfident that remote m-Learning will lead to performance improvement. Consequently, mobile technology may fail to gain success as a learning platform.

Academicians like Chauhan (2016) and Miloševic, Z˘ivkovic, Manasijevic, & Nikolic (2015) have indicated that mobile platforms are conducive for learning. Nevertheless, if users are not adequately motivated, they may not be receptive to learning; additionally, there is a chance that the content holds little meaning from the learners' perspective. Furthermore, if the perceived value of the content and study material is less, there could be a lack of motivation, which could lead to lesser acceptance and adoption of mobile technology as a learning ecosystem.

Considering the aspects and discussion specified in this paper, it may be concluded that the roadblocks resulting from inefficient m-Learning utilisation have not been addressed thoroughly. Hence, it is recommended that future research caters to the aspects that drive HEI learners to employ m-Learning during this pandemic and keep themselves busy without any constraint regarding location or time.

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Abstract

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suggested that future research in this domain focus on assessing the factors that promote m-Learning among HEI learners so that these individuals can continue education despite having physical distance from their peers.

Author keywords

Andragogy; Higher Education Learners; Mobile Learning; Pandemic; Uncertainty

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