The Role of Compatibility, Perceived Ease of Use, and Perceived Usefulness on the Digital Learning Platforms in the Malaysian Private Universities

Ahmed Abdo Abdullah Almanakhi
[1] Department of Business Management, Al-Madinah International University
57100/ Kuala Lumpur, Malaysia
almanaky2@yahoo.com

Barjoyai Bin Bardai
[2] Department of Islamic Banking and Finance, Al- Madinah International University
57100/ Kuala Lumpur, Malaysia
barjoyai.bardai@mediu.edu.my

Abstract

Mobile learning (M-learning) has emerged as a transformative educational tool, leveraging advancements in mobile technology to provide flexible and personalized learning experiences. In Malaysia, M-learning holds strategic significance for enhancing educational accessibility and quality, aligned with national initiatives. This study investigates the determinants of M-learning adoption among Malaysian students, focusing on Compatibility, Perceived Usefulness, and Perceived Ease of Use. Through a quantitative approach and survey of 379 students, the study validates strong positive relationships among these factors, highlighting their impact on students' behavioral intention to use M-learning services. Findings underscore the critical role of Compatibility in influencing Perceived Usefulness and Ease of Use, essential for fostering adoption and optimizing learning outcomes. Recommendations for universities include diversifying pricing models, enhancing cultural inclusivity, and ensuring technological compatibility and usability to promote broader M-learning acceptance. Future research directions include longitudinal studies and mixed-methods approaches to deepen insights into M-learning adoption trends and educational impacts.

Keywords: M-learning Technology adoption, Compatibility, Perceived usefulness, Perceived ease of use, Educational technology.

1. Introduction

Mobile learning (M-learning) has recently emerged as a significant mode of education, supported by the rapid evolution of mobile technology and the internet (Stead, 2005; Alzaza & Yaakub, 2011). This growth aligns with the shift from traditional face-to-face education to more flexible forms like distance learning and e-learning (Keegan, 2002; Azizan, 2010). M-learning leverages portable devices to provide educational experiences that can occur anytime and anywhere, fostering personalized learning experiences (Kukulska-Hulme & Shield, 2008; Behera, 2013; Shuler, 2009; Kim et al., 2013).

In the Malaysian context, the implementation of M-learning services is seen as a strategic move to enhance educational accessibility and quality (Robertson, 2008; Embi & Nordin, 2013). The Ministry of Education Malaysia has recognized the potential of M-learning and has recently allowed students to bring mobile phones to school, reflecting a broader national vision to integrate advanced technologies into education (Ismail et al., 2013). Despite its potential, M-learning in Malaysia is still in its early stages, necessitating further research to understand its full impact and effectiveness (Alzaza & Razak, 2010; Ismail et al., 2010; Norazah et al., 2010; Hashim et al., 2011).

This study focuses on the variables that influence the use of M-learning services in Malaysia, specifically examining Compatibility, Perceived Usefulness, and Perceived Ease of Use. These factors are critical in understanding user behavior towards M-learning adoption. Compatibility refers to the degree to which M-learning aligns with users' needs and existing values (Rogers, 2003; Moore & Benbasat, 1991). Perceived Usefulness measures the extent to which users believe that M-learning will enhance their learning performance (Davis, 1989; Venkatesh & Davis, 2000). Perceived Ease of Use assesses how effortless users find it to utilize M-learning services (Davis, 1989; Venkatesh, 2000).

Understanding these variables is essential for educators and policymakers to develop effective strategies for M-learning implementation. This study aims to contribute to the growing body of knowledge by providing insights into the determinants of M-learning adoption in Malaysia, thereby supporting the country's educational goals and Vision 2020. This research will help to identify the factors that can enhance or hinder the adoption of M-learning, enabling targeted interventions to promote its usage among students and educators.

2. Problem Statement

The acceptance of mobile learning (M-learning) by students is critical to the successful implementation of such systems (Huang, 2014). Therefore, it is essential to understand the factors that influence students' intentions to use mobile learning (Alrasheedi & Capretz, 2015). Personal attitudes towards M-learning play a significant role in this acceptance, as students' context is a major factor affecting their behavioral intention to use information technology (Park, Nam, & Cha, 2012). The adoption and acceptance of mobile devices vary across different countries (Mtebe & Raisamo, 2014), and issues related to the usage and deployment of these devices are often highlighted in students' feedback on learning systems (Sevillano-Garcia & Vazquez-Cano, 2015).

Technological advances in the educational environment can evoke a range of emotions among students, including curiosity, frustration, and anxiety (Mei-jung, 2014). Students may also fear technical difficulties, which can lead to a dislike for new technologies (Limniou, Holdcroft, & Holmes, 2015). Moreover, students might reject technological advances due to perceived poor ease of use (Adewole-Odeshi, 2014). Understanding what truly affects users' attitudes and behavioral intentions to accept new technologies is crucial (Cho & Sagynov, 2015).

This study seeks to investigate the impact of Compatibility, Perceived Usefulness, and Perceived Ease of Use on the adoption of M-learning services in Malaysia. Compatibility refers to how well M-learning fits with students' existing needs and values (Rogers, 2003; Moore & Benbasat, 1991). Perceived Usefulness is the degree to which students believe that using M-learning will enhance their learning performance (Davis, 1989; Venkatesh & Davis, 2000). Perceived Ease of Use is the extent to which students find M-learning to be free of effort (Davis, 1989; Venkatesh, 2000).

Existing models of technology acceptance, such as the Technology Acceptance Model (TAM) and the Innovation Diffusion Theory (IDT), have been helpful in understanding these factors, but there is a need to enhance these models to better fit the mobile age. This includes recognizing the essential role of mobility and communication in learning, the importance of context in establishing meaning, and the transformative effect of digital networks in supporting virtual communities (Cha, 2018; Chung et al., 2018; Chou et al., 2017).

By focusing on these variables, this study aims to bridge the gap in understanding the determinants of M-learning adoption in the higher education environment of Malaysia. This research is crucial for developing more effective and meaningful M-learning services that align with the educational goals of Malaysia and support the successful implementation of mobile learning technologies (BrckaLorenz, 2013; Shaqour, 2014; Al-Qudah & Ahmad, 2014).

3. Literature Review

3.1 Compatibility

Compatibility refers to "the degree to which an innovation is perceived as being consistent with the existing values, needs, and past experiences of potential adopters" (Rogers, 1989). Previous studies have established a positive relationship between compatibility and the intention to use

M-learning (Kapoor et al., 2015; Schierz et al., 2010; Yang et al., 2012; Zhang et al., 2022). Compatibility, along with perceived ease of use and perceived usefulness, are significant indicators of technology adoption (Kim, Mirusmonov, & Lee, 2010). In this study, compatibility is conceptualized to indirectly influence the behavioral intention to use M-learning through perceived ease of use and perceived usefulness. Therefore, one could hypothesize that:

H1: The compatibility of M-learning services has a direct effect on the use behavior of M-learning services.

3.2 Perceived Usefulness

Perceived usefulness significantly impacts the intention to use technology, as extensively documented in information systems research (Agarwal & Prasad, 1998; Davis et al., 1989; Venkatesh, 2000; Venkatesh & Davis, 1996, 2000; Venkatesh & Morris, 2003). In the context of M-learning, individuals are likely to adopt these systems because they find them beneficial for their learning needs. Therefore, one could hypothesize that:

H2: The perceived usefulness of M-learning services has a direct effect on the use behavior of M-learning services.

3.3 Perceived Ease of Use

Perceived ease of use refers to the degree to which an individual believes that using a system will be free of effort (Davis, 1989). In the context of M-learning, this means the system should be easy to use and free from significant mental and physical effort (Wei et al., 2009). Davis (1989) found that perceived ease of use is an antecedent to perceived usefulness and attitude, asserting that simpler systems allow users to focus more on other activities. For M-learning services, it is crucial that they are easy to learn and use, with minimal complexity, to develop a positive attitude and enhance performance, thereby encouraging adoption. Therefore, one could hypothesize that:

H3: The perceived ease of use of M-learning services has a direct effect on the use behavior of M-learning services.
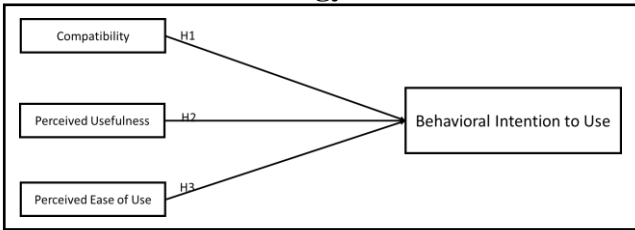
4. Research Methodology

Figure 1: Research Framework

5. Research Methodology

Primary data was collected from the undergraduate and postgraduate students of Al Madinah International university in Malaysia and Asia e University. Therefore, simple random sampling was utilized, and 379 questionnaires were distributed to the students on the basis of their willingness to participate in the study

6. Findings
6.1 Respondent Profile

In the demographic information section, respondents in the Al Madinah International university and Asia e University were categorized by their Gender, Education Level, and Profession, as displayed in Table 1.

Table 1: Respondent Profile

		Frequency	Percent
Gender	Male	204	53.8
	Female	175	46.2
Education Level	B.Degree	199	52.5
	Master Degree	167	44.1
	PhD	13	3.4
Profession	Teacher	224	59.1
	Business	147	38.8
	Not working	8	2.1
	Total	379	100

6.2 Regression Model

The relationship between perceived usefulness, compatibility, and perceived ease of use and their best predictors based on the maximum probability criterion was depicted in the model's construction and illustration presented in Table 2. The findings demonstrated that the majority of the compatibility, perceived usefulness, and perceived ease of use items loaded well onto their respective constructs and had unstandardized loadings that were statistically significant. Since every item is much over the 0.4 criterion, the high standardized loadings were also attained. All of the items' standardized loading findings generally supported other research on perceived usefulness, compatibility, and ease of use in mobile learning, including that done by Al-Emran (2020), Al-Rahmi et al. (2022), and Bayhan & Coşkunçay (2023).

Table 2: Standardized Regression Weights of Compatibility, Perceived Ease of Use and Perceived Usefulness

			Estimate
EU5	<---	Perceived_Ease_Of_Use	.488
EU4	<---	Perceived_Ease_Of_Use	.710
EU3	<---	Perceived_Ease_Of_Use	.702
EU2	<---	Perceived_Ease_Of_Use	.722

			Estimate
EU1	<---	Perceived_Ease_Of_Use	.745
PU3	<---	Perceived_Usefulness	.493
PU4	<---	Perceived_Usefulness	.477
PU5	<---	Perceived_Usefulness	.408
PU2	<---	Perceived_Usefulness	.497
PU1	<---	Perceived_Usefulness	.485
CON1	<---	Compatibility	.726
CON2	<---	Compatibility	.704
CON3	<---	Compatibility	.797

Moreover, the covariance and correlations result in Tables 3 and 4 supported the relationship between Compatibility, Perceived Ease of Use and Perceived Usefulness and Behavioral Intention to Use, which are all positive and highly significant based on the estimates which value should be higher than 0.050 for it to be significant. The results in Table 4 showed that highest positive significant relationship is between Compatibility and Perceived Ease of Use (correlation 0.976, at 0.001 P level). This means that Compatibility—which is the degree to which technology aligns with current needs, experiences, and values—influences both Perceived Usefulness and Perceived Ease of Use directly and indirectly, which in turn affects adoption intention, even though PU and PEOU are known in previous studies to have a significant impact on technology adoption intention. Compatibility and perceived ease of use are closely related in m-learning, and both are essential for user adoption and effective learning results. A compatible mobile learning system reduces the perceived requirement for in-depth system knowledge by seeming organic and familiar. As a result, there is less cognitive burden and more mental capacity for the actual learning material. On the other hand, a system that lacks compatibility (due to its complicated interface or foreign language) causes confusion and demands more work to comprehend and use efficiently. This may seriously impair the user's perception of ease of use and deter further participation. This is in line with the conclusions and findings of Al-Emran, Arpaci & Salloum (2020), Alyoussef (2021), and Bayhan & Coşkunçay (2023).

Table 3: Covariances of Compatibility, Perceived Ease of Use and Perceived Usefulness

			Estimate	S.E.	C.R.	P
Compatibility	-->	Behavioral Intention to Use	.461	.060	7.722	***
Perceived Usefulness	-->	Behavioral Intention to Use	.273	.045	6.071	***
Perceived Ease Of Use	-->	Behavioral Intention to Use	.155	.028	5.458	***

Another new finding in this study is the strong positive relationship between Perceived Ease of Use and Perceived Usefulness (0.886, at 0.001 P level). This might be because students are more likely to believe that an m-learning system can be beneficial to their learning when they find it to be user-friendly. Students spend more time concentrating on the material and participating in the learning activities, and less time battling with the technology. Students are more inclined to utilize m-learning systems consistently and for a longer amount of time if they believe they are beneficial and efficient. Their ongoing involvement strengthens their favorable opinion of it and confirms its value. Also, Learners are more likely to be interested in the learning process and to be happy with their m-learning experience when both PEOU and PU are high. Positive perceptions about the technology's usability and simplicity of use can lead to improved learning outcomes since students can concentrate on studying the material rather than stumbling over it, especially as students are more likely to accept and stick with an m-learning system over time when they believe it to be both simple and beneficial.

Table 4: Correlations of Compatibility, Perceived Ease of Use and Perceived Usefulness

			Estimate
Compatibility	<-->	Perceived_Ease_Of_Use	0.976
Compatibility	<-->	Perceived_Usefulness	0.821
Perceived_Ease_Of_Use	<-->	Perceived_Usefulness	0.886

Besides, there is a strong positive and significant relationship between Compatibility and Perceived Usefulness (0.0.821), which supports previous studies that indicate that in m-learning environments, perceived usefulness and compatibility are strongly correlated because users are more likely to think that the m-learning platform and material will aid in their effective learning if they find them to be easy to use and navigate. M-learning solutions that are customized to each user's preferences and learning style are more likely to be seen favourably. Also, students are more likely to continue with and actively participate in m-learning when they believe it to be beneficial and easy to use. M-learning platforms that are

deemed beneficial can improve information retention and skill development, while students who are happy with m-learning are more inclined to spread the word about it and encourage others to use it. Similarly, compatibility and perceived usefulness have a link that must be understood in order to successfully create m-learning experiences. Through guaranteeing alignment with users' requirements and elevating its perceived value, mobile learning platforms can realize their maximum potential in augmenting learning and involvement.

The aforementioned findings confirmed that there are strong positive relationships between Compatibility, Perceived Ease of Use and Perceived Usefulness, which have to do with Research Question Three. Hence, the researcher proceeded to Research Question Four and Five.

7. Discussion

To achieve its objectives, the study employed a quantitative approach. Following validation by experts in the field and research technique validation, a survey questionnaire was used, yielding 379 valid responses from Malaysian students who utilize m-learning services. The data was collected in English and analyzed using SPSS. The researcher performed an independent analysis of the data using the steps of analysis specified. The data was used to address several problems, particularly on students' acceptance of M-learning services in Malaysia. The descriptive results of Students' perception of the acceptance of M-learning services in Malaysia are generally positive and mostly fell between the strongly agree and agree of the Likert scale.

The covariance and correlations result supported the relationship between Compatibility, Perceived Ease of Use and Perceived Usefulness, which are all positive and highly significant based on the estimates which value should be higher than 0.050 for it to be significant. The results showed that highest positive significant relationship is between Compatibility and Perceived Ease of Use (correlation 0.976, at 0.001 P level). This means that Compatibility—which is the degree to which technology aligns with current needs, experiences, and values—influences both Perceived Usefulness and Perceived Ease of Use directly and indirectly, which in turn affects adoption intention, even though PU and PEOU are known in previous studies to have a significant impact on technology adoption intention. Another new finding in this study is the strong positive relationship between Perceived Ease of Use and Perceived Usefulness (0.886, at 0.001 P level). This might be because students are more likely to believe that an m-learning system can be beneficial to their learning when they find it to be user-friendly. Similarly, there is a strong positive and significant relationship between Compatibility and Perceived Usefulness (0.0.821), which supports previous studies that indicate that in m-learning environments, perceived usefulness and compatibility are strongly correlated because users are more likely to think that the m-learning platform and material will aid in their effective learning if they find them to be easy to use and navigate. Through guaranteeing alignment with users' requirements and elevating its perceived value, mobile learning platforms can realize their maximum potential in augmenting learning and involvement.

8. Future Recommendations

Having analyzed students' perceptions of M-learning acceptance in Malaysia, the research suggests the following recommendations for universities:

- Universities should diversify pricing models and offer discounts to make M-learning more accessible across different financial backgrounds. Seeking external funding through partnerships or grants can help reduce costs.
- Cultural inclusivity should be prioritized by providing multilingual support and culturally relevant content to engage a diverse student body effectively.
- Ensuring M-learning platforms are compatible across various devices and operating systems, with accessibility features for all users, is essential. Customization options should also be offered to cater to individual learning styles and preferences.
- Transparency regarding data collection, usage, and security measures is crucial to build trust. Collaboration with reputable institutions can enhance credibility and address privacy concerns effectively.
- Designing user-friendly interfaces and providing accessible training materials will boost users' confidence in using M-learning platforms. Emphasizing the relevance of content and simplifying user interfaces can enhance usability and perceived usefulness.
- Promoting the advantages of M-learning, such as flexibility and accessibility, over traditional methods, and integrating incentives or gamification elements can encourage greater adoption and engagement.
- Continuous monitoring of user feedback and behavior will facilitate ongoing improvements and adaptation of M-learning platforms.
- For further research, exploring mixed-methods approaches and longitudinal studies can deepen understanding of M-learning adoption trends and impacts. Interdisciplinary collaboration will be valuable in advancing M-learning strategies and technologies.

References

[1] Adewole-Odeshi, E. (2014). Attitude of Students Towards E-learning in South-West Nigerian Universities: An Application of Technology Acceptance Model. Library Philosophy and Practice, 0_1.

[2] Agarwal, R., & Prasa, J. (1998). A conceptual and operational definition of personal innovativeness in the domain of information technology, Information Systems Research, 9(2), 204–301. doi: 10.1287/isre.9.2.204.

[3] Al-Emran, M., Arpaci, I., & Salloum, S. A. (2020). An empirical examination of continuous intention to use m-learning: An integrated model. Education and information technologies, 25, 2899-2918.

[4] Al-Qudah,O.M., & Kamsuriah Ahmad.(2014). Cultural Technology Acceptance Model for Consumers' Acceptance of Arabic M-learning Websites. Engineering and Technology 7(8): 1623-1633.

[5] Alrasheedi, M., & Capretz, L. F. (2015). Determination of Critical Success Factors Affecting Mobile Learning: A Meta-Analysis Approach. TOJET: The Turkish Online Journal of Educational Technology, 14(2).

[6] Alyoussef, I. Y. (2021). Factors Influencing Students' Acceptance of M-Learning in Higher Education: An Application and Extension of the UTAUT Model. Electronics, 10(24), 3171.

[7] Alzaza, N. S., & Yaakub, A. R. (2011). Students' awareness and requirements of mobile learning services in the higher education environment. American Journal of Economics and Business Administration,3(1), 95-100.

[8] Alzaza, N. S., and Abdul Razak Yaakub. "Conference. (2010). Student's Mobile Information Prototype (SMIP) for the Higher Education Environment." Proceedings knowledge management fifth international "conference.

[9] Azizan, F. Z. (2010). Blended learning in higher education institution in Malaysia. In Proceedings of Regional Conference on Knowledge Integration in ICT (pp. 454-466).

[10] BAYHAN, N. A., & COŞKUNÇAY, D. F. (2023). Students' Adoption of m-Learning in Higher Education: An Empirical Study. Current Perspectives in Social Sciences, 27(2), 160-171.

[11] Behera, S. K. (2013). E-and M-Learning: A comparative study. International Journal on New Trends in Education and Their Implications, 4(3), 65-78.

[12] Cho, Y. C., & Sagynov, E. (2015). Exploring Factors That Affect Usefulness Ease Of Use, Trust, And Purchase Intention In The Online Environment. International Journal of Management & Information Systems (Online), 19(1), 21.

[13] Davis, F. D., Bagozzi, R. P., & Warshaw, P. R. (1989). User Acceptance of Computer Technology: A Comparison of Two Theoretical Models. Management Science, 35(8), 982-1003.

[14] Embi, M. A., & Nordin, N. M. (2013). Mobile learning: Malaysian initiatives and research findings. Malaysia: Centre for Academic Advancement, Universiti Kebangsaan Malaysia, 1-131.

[15] Ismail, I., Idrus, R. M., Ziden, A. A., & Rosli, M. (2010). Adoption of Mobile Learning Among Distance Education Students in Universiti Sains Malaysia. International Journal of Interactive Mobile Technologies (iJIM), 4(2), 24-28. doi: 10.3991/ijim.v4i2.1167.

[16] Keegan, D. (2002). The future of learning: From eLearning to M-learning . Hagen, Germany: Fern Universidad.

[17] Kim, D., Rueckert, D., Kim, D. J., & Seo, D. (2013). Students' Perceptions and Experiences of Mobile Learning. Language, Learning & Technology, 17(3), 52.

[18] Limniou, M., Holdcroft, C., & Holmes, P. S. (2015). Increasing Research Students' Engagement through Virtual Communities. Curriculum Design and Classroom Management: Concepts, Methodologies, Tools, and Applications: Concepts, Methodologies, Tools, and Applications, 407.

[19] Mei-jung, W. A. N. G. (2014). The current practice of integration of information communication technology to English teaching and the emotions involved in blended learning. TOJET: The Turkish Online Journal of Educational Technology, 13(3).

[20] Moore, G. C., & Benbasat, I. (1991). Development of an Instrument to Measure the Perceptions of Adopting an Information Technology Innovation. Information System Research, 2(3), 192-222. doi: 10.1287/isre.2.3.192.

[21] Moore, G. C., & Benbasat, I. (1991). Development of an Instrument to Measure the Perceptions of Adopting an Information Technology Innovation. Information System Research, 2(3), 192-222. doi: 10.1287/isre.2.3.192.

[22] Mtebe,S., & Raisamo, R. (2014). Investigating students' behavioural intention to adopt and use mobile learning in higher education in East Africa University of Dar es Salaam, Tanzania. International Journal of Education and Development using Information and Communication Technology, 10(3), 4-20.

[23] Park, S. Y., Nam, M. and Cha, S. (2011). University Students? Behavioral Intention to Use Mobile Learning: Evaluating the technology acceptance model. British Journal of Education Technology, 43(4), 592-605.

[24] Rogers, E. M. (2003). The Diffusion of Innovations (5th ed.). New York: Free Press.

[25] Sevillano-Garcia, M. L., & Vazquez-Cano, E. (2015). The impact of digital mobile devices in higher education. Educational Technology & Society, 18(1), 106-119.

[26] Stead,G.t.C.o.m.,CapeTown,SouthAfrica.http://www.mlearn.org.za/CD/papers/Stead.pdf. (2005). Moving mobile into the mainstream. Paper presented at the MLearn. 4 thWorld Conference on M-learning , Cape Town, South Africa. http://www.mlearn.org.za/CD/papers/Stead.pdf

[27] Suki, N. M., Norazah Mohd Suki, A. R. Eshaq, and Koo Ah Choo. (2010). "Using mobile device for learning: Students' perspective." In Proceedings of the International Conference on e-Learning, pp. 291-299.

[28] Venkatesh, V., & Davis, F. D. (2000). A Theoretical Extension of the Technology Acceptance Model: Four Longitudinal Field Studies. Management Science, 46(2), 186–204. doi: 10.1287/mnsc.46.2.186.11926.

[29] Venkatesh, V., Morris, M. G., Davis, G. B., & Davis, F. D. (2003). User Acceptance of Information Technology: Toward a Unified View. MIS Quarterly, 27(3), 425-478.

[30] Zhang, X. and Hu, J. (2022), "A study on the learning behaviors and needs of design-maker communities of practice in the era of mobile learning", Library Hi Tech, Vol. ahead-of-print No. ahead-of-print. https://doi.org/10.1108/LHT-12-2021-0486