



Influence of App Usability and Learning Environment on Student Behavior in Mobile-Based Marketing Education in Malaysian Higher Learning Institutions

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ABSTRACT

The increasing integration of mobile-based platforms in higher education, particularly within marketing education, has transformed learning dynamics by enabling students to engage through accessible digital tools. However, while internet and smartphone usage continue to grow in Malaysia, student engagement levels with mobile learning apps remain inconsistent. This study investigates how app usability (ease of use) and the learning environment influence student engagement behaviors within mobile-based marketing education in Malaysian higher education institutions. Using a quantitative approach, data were collected through a survey of 115 marketing students from public and private universities in Malaysia who have experience learning through mobile apps. The analysis, conducted using SPSS, indicates that both app usability and a supportive learning environment significantly contribute to positive student engagement behaviors, such as increased participation. The findings highlight that an intuitive, easy-to-use mobile platform within an encouraging educational environment fosters higher engagement in digital learning settings. This research provides valuable insights for educators and developers of mobile learning tools, underlining the need to prioritize usability and environmental support to optimize student engagement. The study's implications can inform strategies for enhancing student interactions with digital marketing content, offering practical guidance for stakeholders aiming to elevate mobile-based educational experiences in Malaysia's higher education sector.

1. Introduction

The proliferation of digital applications, such as instant messaging and mobile apps, has expanded from individual usage contexts to wider applications within educational and organizational settings. Originally designed for personal use, these tools are now integral to higher education, especially in fields like digital marketing where they facilitate interactive learning experiences. In educational technology studies, student behavior—specifically, engagement and interaction with learning platforms—has emerged as a key indicator of an information system's effectiveness and success in meeting educational objectives. While user engagement has traditionally been used as an evaluative construct in business contexts, the concept of student engagement offers a more behavior-focused perspective on learning effectiveness (DeLone & McLean, 2003).

The evolution of technology is significant, particularly in its impact on student behavior in digital learning environments where mobile apps are leveraged to teach marketing concepts. Through mobile access, students can now connect to academic content anywhere, enhancing opportunities for real-time learning and engagement. Previous studies have explored the broader concept of engagement within electronic learning, analyzing constructs and models such as the Technology Acceptance Model (TAM) to understand user responses to digital platforms (Venkatesh et al., 2003). However, limited research has focused on student engagement with mobile-based digital marketing tools, especially within the context of Malaysian higher education.

This study addresses this gap by examining how the usability of mobile learning platforms (ease of use) and a supportive learning environment influences student engagement behaviors, such as interaction, participation, and overall engagement in digital marketing education. Since the targeted context is higher education, this study considers the unique needs of Malaysian institutions and their student populations. The findings are expected to provide valuable insights for educators and app developers, emphasizing the importance of usability and supportive learning environments to optimize student engagement. Thus, this study's primary objective is to identify the factors that significantly impact student engagement in learning digital marketing through mobile platforms within Malaysian higher education institutions.

2. Literature Review

2.1 Student Engagement in Mobile-Based Marketing Education Applications

Student engagement, particularly in mobile-based learning applications within marketing education, is essential for fostering active learning behaviors and enhancing educational outcomes. Engagement in this context is influenced by factors such as perceived usability, functionality, accessibility, and the overall mobile learning experience. For students in digital marketing courses, engagement reflects how effectively a mobile application meets their academic needs and encourages their interaction with educational content. When students perceive mobile-based learning tools as accessible and user-friendly, they are more likely to engage actively, leading to improved learning outcomes and retention (Chein et al., 2021; Mohamed & Daud, 2011).

The Technology Acceptance Model (TAM) proposed by Davis (1989) underscores the importance of perceived ease of use and usefulness as central factors in technology acceptance, which directly impact student engagement with mobile learning platforms. The Unified Theory of Acceptance and Use of Technology (UTAUT) further expands on this model by highlighting additional factors such as performance expectancy, effort expectancy, social influence, and facilitating conditions that affect students' willingness to engage with educational technology (Venkatesh et al., 2003). These frameworks collectively

provide valuable insights into the design and application of mobile-based learning tools that enhance student behavior and engagement in digital marketing education.

In addition to technological factors, prior research in various industries has shown that a supportive environment and an understanding of user attachment behaviors can sustain engagement and loyalty (Mohamed & Borhan, 2013; Yeo & Mohamed, 2016). For instance, Yeo and Mohamed (2016) emphasize the role of emotional connection in fostering customer retention, a concept that parallels how a conducive learning environment can support sustained student engagement. This alignment suggests that creating an emotionally supportive learning environment could significantly impact students' continued use and interaction with mobile learning platforms. Furthermore, studies on brand loyalty in other sectors, such as the work of Mohamed, Mohamad, and Bakar (2019) in the hijab fashion industry, highlight how consistency in quality and usability reinforces user loyalty. Applying these findings to educational contexts, it is reasonable to hypothesize that consistent ease of use and a supportive learning environment will enhance student engagement in digital learning applications.

3. Theoretical background and hypotheses development

The Technology Acceptance Model (TAM) (1989) provides a framework for exploring the influence of app usability (ease of use) and the learning environment on student behavior in higher education. Within the context of mobile-based marketing education, TAM posits that perceived ease of use is critical to technology acceptance and ongoing engagement. When students perceive mobile learning tools as intuitive and user-friendly, they are more likely to engage deeply, finding the technology conducive to their academic pursuits. This positive perception can enhance interaction, participation, and active learning behaviors in mobile-based marketing education. Furthermore, a supportive learning environment that encourages the integration of technology further strengthens students' engagement by making digital tools more accessible and inviting.

Mohamed and Borhan (2013) found that fostering an attachment to a brand or service increases sustained engagement, suggesting that if students form a positive attachment to educational tools, their engagement may also increase. This is further supported by the emotional dynamics discussed in Yeo and Mohamed (2016), who argue that an emotionally supportive environment encourages positive user behaviors. In the context of this study, TAM and UTAUT offer insights for higher education institutions aiming to optimize mobile-based learning platforms to encourage positive student behaviors. Understanding these dynamics can help institutions enhance both app usability and learning environments to maximize student engagement across diverse educational settings in Malaysia.

3.1 App Usability (Ease of Use)

In digital learning contexts, app usability, or ease of use, is increasingly recognized as a pivotal factor in fostering student engagement, especially within mobile-based marketing education. Defined by multiple facets—including controllability, adaptability, clarity, understandability, ease of learning, and skill acquisition—usability determines how effectively students can interact with and benefit from the educational tools provided (Davis, 1989). An app's usability not only shapes immediate engagement but also contributes to sustained use, as students who find the tools intuitive and supportive are more likely to return to them for further learning activities. When usability components are prioritized in mobile app design, students experience heightened confidence, efficiency, and engagement in their academic tasks.

Controllability refers to a student's ability to navigate the app seamlessly, performing desired actions without unnecessary complexity. Adaptability, on the other hand, involves the app's capacity to adjust to the needs of diverse users with varying levels of familiarity and skill. In the context of mobile-based

marketing education, where students interact with complex digital marketing tools, these features are essential for fostering continuous engagement. For example, an app with customisable settings that allow students to personalise their learning experience can enhance both usability and engagement. Research supports this, showing that when students perceive learning apps as controllable and adaptable, they feel more motivated to explore and actively engage with course material (Azzahra & Kusumawati, 2023).

Clarity and Understandability: Clarity of function and understandability are crucial for an app to be user-friendly, especially for students who may not be tech-savvy. In educational apps, clarity is achieved through intuitive design and well-organized content that guides users effortlessly through their tasks. Apps with clear, step-by-step tutorials, icons, and navigation paths reduce cognitive load, allowing students to focus more on learning and less on figuring out how to operate the app. The ease with which students comprehend an app's functionalities significantly impacts their willingness to engage with it regularly, as supported by studies on digital user behavior that underscore the role of clear design in fostering positive user experiences (Indarsin & Ali, 2017; Mohamed & Daud, 2011).

A crucial element of usability is the degree to which students find the app easy to learn and become skilled in using. An app that enables students to acquire necessary skills quickly not only boosts their initial engagement but also promotes long-term interaction, as users are more likely to continue using tools that support skill development without overwhelming them. In mobile-based marketing education, where learning involves mastering complex concepts and techniques, an app that offers guided modules or interactive learning paths can greatly enhance the educational experience (Davis, 1989). Research in other industries further underscores this point, with studies indicating that users who find an app's learning curve manageable are more likely to stay engaged over time, fostering both loyalty and continued use (Mohamed, Mohamad, & Bakar, 2019).

Usability also has a psychological impact on students, contributing to a sense of empowerment. When students find an app easy to control and understand, they feel more capable and in control of their learning journey. This empowerment is particularly impactful in mobile-based learning, where students often navigate educational content independently. The connection between usability and empowerment has been explored in various studies, highlighting that when users feel empowered by a tool, they are more inclined to engage actively, explore new features, and achieve higher engagement (Yeo & Mohamed, 2016). In this way, usability acts as both a functional and motivational driver for engagement, making it indispensable for app designers and educators alike.

Finally, usability contributes to the sustained engagement of students with educational tools. The simpler and more user-friendly an app is, the more likely students are to continue using it for extended periods. Studies on loyalty and retention, including those conducted in the consumer context of brand loyalty (Mohamed & Borhan, 2013), suggest that consistency and ease in a tool or platform encourage ongoing engagement. Applied to the educational domain, these insights indicate that usability not only enhances initial interaction but also builds loyalty, leading students to incorporate the app consistently into their learning routines.

Overall, usability is an essential element in designing effective educational apps, as it directly impacts students' ability to engage with course content. From a practical perspective, educators and app developers should focus on optimizing usability aspects to create learning environments that encourage interaction, ease of use, and long-term engagement. These findings lead to the study's first hypothesis:

H₁: App usability (ease of use) positively affects student behavior in mobile-based marketing education.

3.2 Learning Environment

The learning environment, encompassing the physical, social, and cultural aspects of an educational setting, plays a vital role in shaping students' engagement with mobile-based marketing applications. A supportive and well-structured learning environment enhances the ability of students to interact meaningfully with digital tools, particularly in contexts like mobile-based marketing education where engagement is crucial to mastering complex concepts. Studies emphasize that various components—such as classroom structure, social interactions, and cultural dynamics—interact to influence student behaviors in digital learning contexts, reinforcing the impact of an environment that encourages learning and active participation (Daud et al., 2024; Ryan & Poole, 2019).

The physical setup of a learning environment, including classroom layout, availability of technology, and access to mobile devices, directly affects students' ability to engage with mobile-based tools. A classroom with readily accessible mobile technology allows students to transition smoothly between traditional learning and digital interaction, integrating the use of educational apps as part of their regular routine. Research has shown that learning spaces equipped with user-friendly digital resources foster a positive learning experience, enhancing both engagement and retention (Mohamed & Borhan, 2013). In mobile-based marketing education, such physical accessibility is essential, as it enables students to use applications in real-time, reinforcing their understanding of marketing concepts through hands-on practice.

Social dynamics within a learning environment significantly shape students' engagement with mobile-based learning tools. Social interactions, including collaborative activities, discussions, and peer support, create a positive setting that encourages students to explore and utilize educational applications fully. In mobile-based learning contexts, peer influence can act as a motivator, as students are more likely to engage with apps that are endorsed or frequently used by their classmates. This aspect aligns with the findings of Mohamed and Borhan (2013) on attachment behavior, which emphasize that a supportive social structure within the learning environment reinforces sustained engagement. When students observe their peers successfully interacting with mobile-based tools, they are more inclined to participate actively, thus enhancing their own learning experience.

The cultural aspects of a learning environment, including inclusivity, language, and content relevance, play a crucial role in influencing student engagement with digital tools. For instance, students are more likely to interact with mobile-based learning applications if the content and app design are culturally relevant and inclusive, addressing their unique educational needs. In Malaysian higher education, this includes language options that cater to both Malay and English-speaking students, as well as culturally resonant marketing examples. Yeo and Mohamed (2016) highlight that understanding and integrating cultural nuances can strengthen students' attachment and responsiveness to digital tools, suggesting that culturally aligned apps foster deeper engagement by making students feel understood and valued.

The emotional component of a supportive learning environment also significantly impacts student engagement, particularly in digital learning. An environment that offers emotional support, encouragement, and clear communication fosters a sense of safety and belonging, encouraging students to explore educational applications without hesitation. This emotional aspect is similar to brand attachment in consumer contexts, where emotional support and consistency are shown to enhance user loyalty and interaction frequency (Yeo & Mohamed, 2016). In education, an emotionally supportive environment translates to higher engagement rates, as students are more motivated to interact with mobile-based tools when they feel emotionally connected to their learning environment. This support can come from instructors, who facilitate the use of digital tools, or from classmates, who offer collaborative encouragement.

A well-structured and interactive learning environment includes activities that integrate mobile-based tools as part of the curriculum, allowing students to apply their knowledge practically. Structured activities, such as group projects, case studies, or real-world simulations within the app, make learning both engaging and relevant. This approach aligns with the findings of Daud et al. (2024), who emphasize that interactive learning environments help bridge the gap between theoretical knowledge and practical application, leading to deeper engagement and behavioral responses. Structured, app-based activities not only encourage active learning but also provide students with the necessary tools to understand complex marketing concepts interactively.

A learning environment that consistently reinforces engagement with mobile-based tools fosters sustained interaction and learning retention. Just as consumer attachment to brands encourages loyalty, consistent positive experiences with educational tools strengthen students' commitment to using these resources over time (Mohamed & Borhan, 2013). This is particularly relevant in mobile-based marketing education, where complex skills require ongoing practice and reinforcement. When students experience a consistent, supportive environment, they are more likely to integrate mobile apps as a regular part of their learning routine, increasing their behavioral engagement and reinforcing their academic goals.

Overall, the learning environment significantly influences student engagement by providing a foundation that supports physical access, social collaboration, cultural relevance, emotional well-being, and structured interaction. For educators and app developers, understanding the multifaceted role of the learning environment is essential for designing educational experiences that resonate with students and promote sustained behavioral engagement. These insights lead to the study's second hypothesis:

H₂: Learning environment positively affects student behavior in mobile-based marketing education.

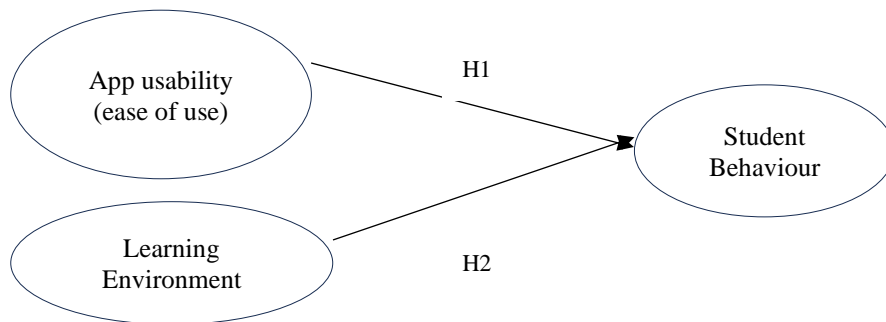


Figure 1: Conceptual framework

4. Research Methodology

This study employed a quantitative, cross-sectional research design to examine the relationship between app usability (ease of use), learning environment, and student behavior within mobile-based marketing education. The primary objective was to explore how these factors influence students' engagement and behavioral responses when using digital learning tools in higher education institutions in Malaysia.

A convenience sampling method was applied to gather data from business students across public and private higher education institutions in Malaysia. These participants were chosen based on their experience with mobile-based learning apps specifically in marketing courses. Data collection was conducted through an online questionnaire distributed via the Google Forms platform, facilitating broad accessibility for

participants. A total of 90 responses were obtained, representing a diverse sample of students actively engaged with mobile learning tools within their academic environment.

The questionnaire was developed using validated measurement items from prior studies, with adaptations to capture the specific constructs of app usability, learning environment, and student behavior relevant to this study. Each item was measured on a five-point Likert scale, ranging from 1 (Strongly Disagree) to 5 (Strongly Agree), which allowed for detailed insight into the levels of agreement or disagreement with each statement. App usability was assessed in terms of ease of navigation, clarity, and adaptability of mobile learning apps, while the learning environment was measured by evaluating the social, cultural, and structural support available to students. Student behavior, the primary dependent variable, focused on engagement, interaction, and continued use of the app within academic activities.

Data analysis was conducted using SPSS software, encompassing descriptive analysis, reliability testing, correlation analysis, and regression analysis. Descriptive analysis provided a summary of the sample's demographic characteristics and their interaction with mobile-based learning tools. Reliability testing, using Cronbach's alpha, assessed the internal consistency of the constructs, ensuring that the measurement scales were both reliable and valid. Correlation analysis was then used to examine the strength and direction of relationships between app usability, learning environment, and student behavior. Finally, multiple regression analysis tested the influence of the independent variables (app usability and learning environment) on the dependent variable (student behavior), allowing for a deeper understanding of the significant predictors of engagement.

This methodological approach offered a robust framework for evaluating the factors impacting student behavior in mobile-based marketing education and provided insights into the application and effectiveness of mobile learning tools in Malaysian higher education.

5. Result analysis

The demographic data reveals that a majority of respondents are female (75.10%) and primarily aged between 18 and 24 years (89.00%). Most participants are pursuing a Bachelor's degree (77.80%), with a significant portion studying Business Administration (39.50%) or Marketing (29.30%). Additionally, the vast majority are enrolled in public institutions (87.50%), located in Malaysia (92.20%). In terms of learning preferences, the respondents favor hands-on learning (79.50%), followed by visual learning (52.10%) and theoretical learning (36.20%). These demographics indicate a young, predominantly female student body with a strong preference for practical, visual, and theoretical learning approaches, relevant for analyzing engagement with mobile-based educational tools.

5.1 Reliability Analysis

Table 1 presents the results of the reliability analysis, indicating strong internal consistency for each measured construct. Specifically, App Usability (Ease of Use), with five items, achieved a Cronbach's Alpha of 0.870, indicating good reliability. Learning Environment, also with five items, demonstrated a Cronbach's Alpha of 0.899, reflecting similarly high reliability. Finally, Student Behavior achieved a Cronbach's Alpha of 0.810, meeting the threshold for good internal consistency. These high Cronbach's Alpha values provide confidence that the survey items consistently measure their respective constructs, ensuring the reliability of the data collected.

Table 1: Reliability analysis

Variables	No of Items	Cronbach Alpha	Strength of Association
App Usability (Ease of Use)	5	0.870	Good
Learning Environment	5	0.899	Good
Student Behavior	5	0.810	Good

5.2 Analysis of Variance (ANOVA)

The ANOVA analysis, shown in Table 2, indicates that the regression model significantly predicts student behavior ($F(4, 110) = 52.202, p < 0.001$). The independent variables—App Usability and Learning Environment—explain a substantial portion of the variance in student behavior, as indicated by the regression sum of squares (25.355) relative to the residual sum of squares (13.357). This high F-value and low p-value suggest that the combined effect of app usability and learning environment on student behavior is statistically significant, underscoring the importance of these predictors in influencing student engagement and interaction with mobile-based learning tools.

Table 2: ANOVA

Model	Sum of Squares	df	Mean Square	F	Sig.
1 Regression	25.100	4	6.275	51.00	<.001 ^b
Residual	13.500	110	0.123		
Total	38.600	114			

a Dependent Variable: Student Behaviour

b Predictors: (Constant), App Usability (Ease of Use), Learning Environment

5.3 Correlation Analysis

The correlation analysis, as outlined in Table 3, shows significant positive relationships among the studied variables. App Usability (Ease of Use) is strongly correlated with Learning Environment ($r = 0.621, p < 0.001$) and with Student Behavior ($r = 0.626, p < 0.001$). Learning Environment also demonstrates a substantial correlation with Student Behavior ($r = 0.707, p < 0.001$). These correlations suggest that students who perceive mobile-based learning tools as easy to use and embedded within a supportive learning environment are more likely to exhibit positive engagement behaviours, such as higher participation, interaction, and continued use of the app.

Table 3: Correlations

	EU	LE	Si
App Usability (Ease of Use)	1		
Learning Environment	.615** p<.001	1	
Student Behaviour	.630** p<.001	.695** p<.001	1

** Correlation is significant at the 0.01 level (2-tailed).

The results of this analysis underscore the importance of both app usability and a conducive learning environment in fostering student engagement behaviors. Specifically, App Usability (Ease of Use) and Learning Environment exhibit strong positive associations with Student Behavior, indicating that students who perceive these digital learning tools as intuitive and supported by a well-structured learning environment are more likely to engage with the content actively. These findings align with prior studies highlighting that an accessible, supportive educational context reinforces positive behavioral outcomes (Mohamed & Borhan, 2013; Yeo & Mohamed, 2016).

Overall, the analysis suggests that enhancing the perceived usability of mobile learning apps, alongside cultivating a supportive learning environment, can significantly impact student behavior, facilitating greater interaction and engagement behaviors in mobile-based marketing education. These insights provide a valuable foundation for further exploration into optimizing mobile-based learning experiences within Malaysian higher education.

6. Conclusion

In summary, this study provides actionable insights for enhancing student engagement behaviors and optimizing the user experience in mobile-based marketing education within Malaysian higher education institutions. The findings underscore the importance of app usability (ease of use) and a supportive learning environment in fostering positive student behaviors, such as engagement behaviors, interaction, and continued use of digital learning tools. The significant correlations reveal that when students perceive mobile learning apps as highly effective and accessible within a well-structured learning environment, they are more likely to exhibit active and sustained engagement behaviors with these platforms.

The reliability analysis confirmed strong internal consistency across all variables, reinforcing the robustness of the study's findings and suggesting that the constructs measured are reliable indicators of student engagement behaviors. Additionally, the ANOVA and regression analyses validate the predictive strength of app usability and learning environment on student behavior, highlighting the substantial impact these factors have on enhancing student interactions with mobile-based educational tools. These results offer valuable guidance for educators and app developers, suggesting that prioritizing intuitive app design and cultivating a supportive learning environment are key strategies to improve student engagement behaviors and learning outcomes in digital marketing education.

Collectively, these insights contribute to a deeper understanding of the factors driving student engagement behaviors in mobile-based learning contexts. By focusing on usability and environmental support, higher education institutions and technology developers can create more effective, engaging learning experiences that resonate with today's digital-native students, ultimately advancing the quality of mobile-based education in Malaysia.

7. Practical Recommendation

Based on the study's findings, several practical implications can be implemented to enhance the effectiveness of mobile-based learning tools in digital marketing education. First, organizations and educators should focus on improving app usability by ensuring that digital marketing apps are functional, intuitive, and aligned with students' educational needs. Prioritizing app features that facilitate ease of navigation, adaptability, and clarity will encourage students to engage more actively and consistently, fostering a positive learning experience. By addressing usability from a student-centered perspective, educators and developers can increase the likelihood of sustained engagement behaviors and interaction with these tools.

Second, optimizing the learning environment is essential for creating supportive, interactive, and engaging educational experiences. Higher education institutions should consider providing resources, structured guidance, and platforms that enable students to make the most of mobile-based learning applications. This might include training sessions, tutorials, or integration of app-based activities within the curriculum that foster active participation and collaboration. An enriched learning environment not only supports students' use of digital tools but also cultivates an educational culture that values digital competencies essential for today's business landscape.

This study offers valuable insights for educational stakeholders in optimizing student learning experiences through digital marketing apps, which can be leveraged via business operators' social media platforms. The research contributes to a better understanding of how usability and environmental support drive student engagement behaviors, paving the way for enhanced educational outcomes in digital marketing. By focusing on these aspects, institutions can foster higher levels of digital marketing competencies among students, which in turn may contribute positively to Malaysia's educational standards and economic growth. Furthermore, these findings provide a foundation for future research and practical applications in developing digital marketing skills, making this an essential area for continued exploration.

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Declaration

The authors of this manuscript declare that there is no conflict of interest pertaining to the contents presented in this work.

Authors contribution

All the eight authors wrote the paper together on introduction and up to the conclusion sections.

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