

## Article

# An Empirical Investigation of Reasons Influencing Student Acceptance and Rejection of Mobile Learning Apps Usage

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**Abstract:** Sustainable learning and education (SLE) is a relatively new ideology based on sustainability principles and developed in response to the United Nations' recently proclaimed Sustainable Development Goals (SDGs). As a result, technologies should be adopted to equip educational institutions with the tools necessary to attain SLE. Recently, the coronavirus (COVID-19) pandemic has affected educational systems globally, leading them to embrace more innovative technological methods to meet academic demands while maintaining SLE principles. Mobile learning apps (MLA) refers to using the unique capabilities of mobile apps to engage and collaborate towards establishing robust online learning. However, the effectiveness of MLA depends on learners' acceptance. Therefore, the purpose of this study is to investigate the factors that could affect MLA acceptance. In order to analyze the collected data from 415 Jordanian students among schools and universities, structural equation modeling (SEM) was used. The empirical findings confirm that perceived usefulness and perceived ease of use are significantly influenced by self-efficacy and perceived compatibility. Furthermore, perceived usefulness is significantly influenced by perceived convenience and perceived ease of use. Additionally, perceived enjoyment significantly influences the behavioral intention to use MLA. On the other hand, perceived compatibility has no significant influence on perceived enjoyment. Finally, perceived ease of use, perceived usefulness, and perceived compatibility have no significant effect on behavioral intention to use MLA. This study addresses a critical research gap in the distance learning acceptance literature by proposing an exhaustive model in the post-COVID-19 era that can help to improve students' performance and outcomes in Jordanian schools and universities.

**Keywords:** sustainable learning; mobile learning apps; distance learning acceptance; technology acceptance model; structural equation modeling; social learning theory; innovation diffusion theory



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## 1. Introduction

SLE is a relatively new educational concept that aims to develop ways for Sustainable Learning and Education. Additionally, SLE seeks to assist students in applying their knowledge [1–3]. Our chances of achieving sustainability increase in direct proportion to public acceptance of its importance [4,5]. According to Ben-Eliyahu [6], SLE is a continual, responsive, and proactive learning process. As circumstances change, learners can successfully construct their knowledge. As such, it is lifelong learning, characterized by conscious and purposeful learning in the present despite adversity and limited potential [7,8]. With a focus on sustainability, SLE should be less structured and more flexible than traditional classrooms. A key SLE equation feature is the capacity of learning systems to swiftly adapt and transfer learning in complex and demanding situations [9,10]. Other aspects include providing students with the skills necessary for survival and the development of a sustainable future. Decentralized solutions, such as free online resources, will help students

to obtain and keep the information they need. Adopting mobile learning technologies during the COVID-19 pandemic demonstrated a substantial impact on the learning process and the development of teaching techniques as a result [11–15].

COVID-19 swept the globe, forcing half of the world's population to close down by April 2020 [16]. Its consequences affected many aspects of human life. The educational systems, for instance, witnessed instability that had never been experienced before. Therefore, educational institutions have adopted new technologies for processing and delivering materials anywhere and anytime [17–19]. These technologies have transformed education, leading to inquiries for novel technological methods. Here, one can consider the rise of distance learning as a substitute for traditional learning, where the traditional learning environments (i.e., face-to-face learning) have changed to distance learning.

Mobile technologies have been regarded as the most prominent invention in recent years [20–23]. These technologies allow learning to occur irrespective of time and place. For example, mobile devices encompassing wireless information and communications technologies provide societies with constant connectedness regardless of time or location [24]. Furthermore, individual users can also benefit from mobile devices regarding information processing and contribution [1,23,25].

Mobile learning is a novel, cutting-edge method that facilitates accessing learning content through mobile devices [26]. If they have a smart mobile device linked to the Internet, mobile users can learn whenever and wherever they want. Mobile learning possesses the potential of converting the existing state of face-to-face learning environments to remote learning. It encompasses a novel form of learning that combines universal communication technology and cutting-edge user interfaces [27,28]. This form of learning allows learners to experience individualized or remotely learning through their mobile devices [17].

Recent years have witnessed the emergence of some state-of-the-art mobile apps which combine mobile technologies with educational systems [28–31]. Meanwhile, following the outbreak of the COVID-19 pandemic, educational institutions were forced to close to enforce social distancing to limit virus spread. Accordingly, educational institutions were forced to use different teaching approaches [17,26,32]. Therefore, this has become a subject of interest among several researchers of technology adoption, as its success is determined by users' acceptance [33–35]. Furthermore, because M-learning apps are new, they have yet to be thoroughly investigated, particularly in terms of how these apps affect education [35,36].

Recent studies have started incorporating the well-established acceptance theories and examining their interrelationships to develop an acceptance model for mobile learning apps (MLA). Using various theories in one model allows the acceptance of technology from a unique perspective, leading to novel knowledge [20,34,35]. Yet, somehow, a literary gap was found to exist, involving a model that focuses on the intent of users to use mobile learning [17,35].

Studying the factors that influence MLA user acceptance was the focus of this study. It was therefore decided to develop a model and empirically validate it. The proposed model involves factors adopted from the social cognitive theory (SCT), innovation diffusion theory (IDT), and technology acceptance model (TAM), which were developed by Bandura [37], Rogers [38], and Davis [39], respectively. The literature on acceptance theories such as SCT, IDT, and TAM has a long research and development history. Moreover, these theories serve as a theoretical foundation for further research into user acceptance theory. Therefore, the researchers in this study adopted the self-efficacy (SE) factor from SCT. Additionally, perceived compatibility (PCOM) was adopted from IDT. Moreover, the perceived ease of use (PEOU) and perceived usefulness (PU) factors were adopted from TAM. In addition to these factors, the model also adopted the perceived convenience (PCV) factor from a study of Yoon and Kim [40], and the factor of perceived enjoyment (PE) was adopted from [41]. Thus, the effect of PU, PEOU, PCOM, SE, PCV, and PE on behavior intention to use MLA is examined here.

Therefore, this study explores the factors that can affect MLA adoption and acceptance in the post-COVID-19 era. However, the primary objectives of this study are to develop an exhaustive model based on well-established acceptance theories by adopting appropriate factors for the research purposes, namely PU, PEOU, PCOM, SE, PCV, and PE, and to assess their influence on MLA acceptance. To the best of the researchers' knowledge, no research has studied the effect of perceived usefulness, perceived ease of use, perceived compatibility, perceived convenience, perceived enjoyment, and self-efficacy on MLA adoption and acceptance. Second, the researchers sought to explore how the factors adopted from SCT, IDT, and TAM theories can affect the adoption of MLA in the post-COVID-19 period. Third, researchers sought to examine the mediating effects of perceived ease of use and perceived enjoyment in the relationship between perceived compatibility and behavioral intention to use MLA.

## 2. Literature Review and Hypotheses Development

This study brought together the SCT, IDT, and TAM as the theoretical foundation. SCT started as the social learning theory (SLT) by Bandura [37]. When it comes to SCT, individuals, environments, and behaviors are all assumed to be involved in a dynamic and mutually engaging process [37]. SCT is a learning model highlighting how individuals change their behavior in response to various environmental variables. Bandura [37] identified six factors: expectations, observational learning, reciprocal determinism, reinforcements, behavioral capability, and self-efficacy. The SLT was used to establish the first five factors. When the theory evolved into SCT, the element of self-efficacy was added. Later on, Compeau and Higgins [42] adopted the self-efficacy factor into their technology acceptance study. Accordingly, the researchers in this study adopted the self-efficacy factor from Compeau and Higgins [42].

IDT describes the diffusion of the innovation process, which begins with innovation advancement and progresses to the attitudes of users and their ultimate judgment of acceptance or refusal [38]. The factors examined in IDT concentrate only on technology-related factors [43]. Rogers [38] specified five essential factors related to the possible user's viewpoint: observability of the innovation, compatibility, relative advantage, trialability, and complexity. IDT's compatibility factor was incorporated into this study.

TAM originated from the theory of reasoned action (TRA) in order to anticipate and justify users' adoption and refusal of technology [39]. Using TAM as a foundation, researchers can examine the effects of external factors on user behavior and identify key determinants of technology acceptance. Technology acceptance behaviors are defined by TAM as a combination of PU and PEOU, and these two factors are influenced by external factors. Users' attitude (ATT) is influenced by factors such as PU and PEOU, according to the TAM's claim. As a result, the actual system use is affected by ATT and PU, which influence the behavioral intention (BI) [39]. This study developed a theoretical model to investigate the factors impacting MLA user acceptance, as depicted in Figure 1.

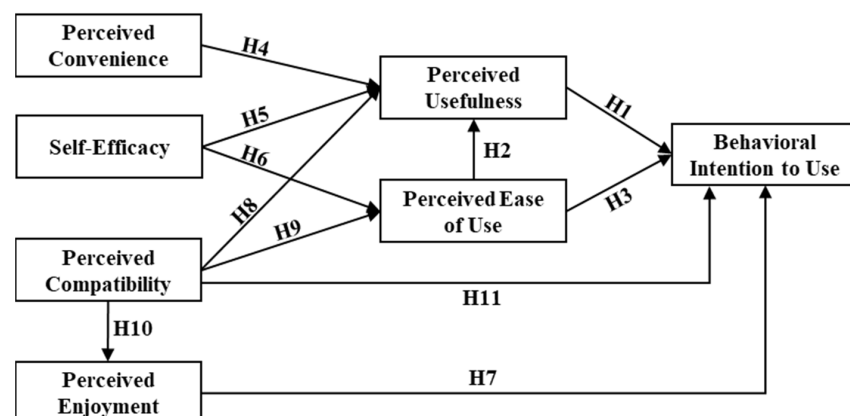


Figure 1. The research model.

The vitality of SCT, SCT, and TAM has been evaluated in the MLA. As a result, many previous studies adapted these acceptance theories to take into account newer aspects dependent on the technology under investigation [28,44–56]. The following sections provide in-depth explanations of each of the factors that have been adopted in this study.

### 2.1. Perceived Usefulness and Perceived Ease of Use

Numerous researchers have explored TAM empirically. Most of them proved that PU impacts BI [28,32,47,50–54,56–58], while other previous studies related to TAM found no significant association between PU and BI [23]. In addition, the outcomes of TAM studies confirmed that PEOU affects PU [47,50–52,54], while some of the prior studies also found no significant relationship between PEOU and PU [50]. Moreover, TAM studies confirmed that PEOU affects BI [23,28,47,53,54,56], while in [50] the researchers found no significant correlation between PEOU and BI. As a consequence, the following hypotheses were established in this study:

**Hypothesis 1 (H1).** *Perceived usefulness has a positive direct effect on Jordanian students' intention to use mobile learning apps.*

**Hypothesis 2 (H2).** *Perceived ease of use has a positive direct effect on perceived usefulness.*

**Hypothesis 3 (H3).** *Perceived ease of use has a positive direct effect on Jordanian students' intention to use mobile learning apps.*

### 2.2. Perceived Convenience

PCV was acquired from Yoon and Kim [40]. PCV has been used in multiple technology acceptance studies as a predictor of PU in a wide range of fields, such as MLA. For example, Taiwanese studies [59–61] found that TAM, when improved with other factors, could be a comprehensive model for evaluating MLA's user acceptance. Using PCV, they found that TAM was improved and that PCV was a reliable indicator of PU. Consequently, the subsequent hypothesis is presented:

**Hypothesis 4 (H4).** *Perceived convenience has a positive direct effect on perceived usefulness.*

### 2.3. Self-Efficacy

As discussed in the theoretical background, the SE factor originated from SCT [37]. Later on, Compeau and Higgins [42] adopted the SE factor into their technology acceptance study. Some researchers added the SE factor as the predictor of PU and PEOU. Another study was performed to explore university students' acceptance of MLA in South Korea [62]. The findings specified no obvious correlation between SE and PU. In a study in Bangladesh, TAM was improved to determine the university students' acceptance of MLA [63]. The findings demonstrate that SE was a major predictor of PU and PEOU. In additional research in Malaysia, TAM was improved to examine the university students' acceptance of MLA [50]. They confirmed that SE was a significant predictor of PEOU, and no significant correlation was found between SE and PU. In another study in Malaysia that asserted the robustness of TAM, a model was presented to explore the factors influencing the adoption of MLA [51]. The study found that SE was a major predictor of PEOU. Additionally, the adoption of MLA was examined among university students in Ghana [52]. They confirmed that SE was a significant predictor of PEOU. Moreover, the acceptance of MLA was studied among university students in Cambodia [54]. The findings confirm that SE was a significant predictor of PEOU, and no significant correlation was found between SE and PU. The present study proposes the following hypothesis:

**Hypothesis 5 (H5).** *Self-efficacy has a positive direct effect on perceived usefulness.*

**Hypothesis 6 (H6).** *Self-efficacy has a positive direct effect on perceived ease of use.*

#### 2.4. Perceived Enjoyment

PE was adopted from Davis, Bagozzi, and Warshaw [41]. Some researchers include the PE factor as the predictor of BI. Some studies were performed to examine the acceptance of MLA in Taiwan [59,60,64]. The findings confirmed that PE was a major predictor of BI. In a study in China, TAM was enhanced to determine the university students' adoption of MLA [55]. The findings confirm that PE was a major predictor of BI. In a study in Pakistan, TAM was enhanced to explore the university students' acceptance of MLA [65]. They found no significant correlation between PE and BI. In other studies in Malaysia, TAM was enhanced to explore the university students' acceptance of MLA [51,53]. They confirmed that PE was a major predictor of BI. In contrast, research found no significant correlation between PE and BI [66]. Furthermore, the adoption of MLA was examined among school students in Indonesia. The findings confirm that PE was a significant predictor of BI [48,56]. Because of this, the following theory is put forth:

**Hypothesis 7 (H7).** *Perceived enjoyment has a positive direct effect on Jordanian students' intention to use mobile learning apps.*

#### 2.5. Perceived Compatibility

As discussed in the theoretical background, the PCOM factor emerged from IDT [38]. The researchers added the PCOM factor as the predictor of PEOU, PU, PE, and BI. Some studies were conducted to explore mobile phone users' acceptance of MLA in Taiwan [60,64]. The findings confirm that PCOM was a major predictor of PU, PEOU, PE, and BI. In another study, an extended TAM was implemented to explore university students' acceptance of MLA in Jordan. They confirmed that PCOM was a major predictor of BI [49]. Thus, the following hypotheses are suggested:

**Hypothesis 8 (H8).** *Perceived compatibility has a positive direct effect on perceived usefulness.*

**Hypothesis 9 (H9).** *Perceived compatibility has a positive direct effect on perceived ease of use.*

**Hypothesis 10 (H10).** *Perceived compatibility has a positive direct effect on perceived enjoyment.*

**Hypothesis 11 (H11).** *Perceived compatibility has a positive direct effect on Jordanian students' intention to use mobile learning apps.*

#### 2.6. Mediating Factors between PCOM and BI

According to [67], a full mediator is one whose indirect influence exceeds the direct effect. If the indirect influence is less than the direct effect, however, it is not regarded as a mediator. Thus, identifying the mediators (PEOU and PE) between PCOM and BI leads us to consider if PCOM can be used as a method of adjusting PEOU and PE. Improving PEOU and PE among the MLA users can suggest appropriate PCOM to encourage increased BI to use MLA. Accordingly, this study proposed a related hypothesis as below:

**Hypothesis 12 (H12).** *Perceived ease of use mediates the relationship between perceived compatibility and on Jordanian students' intention to use mobile learning apps.*

**Hypothesis 13 (H13).** *Perceived enjoyment mediates the relationship between perceived compatibility and on Jordanian students' intention to use mobile learning apps.*



### 3. Methodology

A sample of 415 mobile phone users was selected randomly from Jordanian schools and universities during the 2020–2021 fall term. The gathered data were evaluated using SEM. The results are then presented and analyzed to see if the factors adopted have any impact on the level of acceptance among users of MLA. Table 1 summarizes the demographics of the survey participants. The survey's demographics reveal that the majority of participants are females under the age of 19. In addition, most of the students are high school students from private secondary schools.

**Table 1.** The respondents' demographics.

Category	Category	Frequency	Percentage %
Gender	Male	128	30.8
	Female	287	69.2
	Total	415	100.0
Age (Year)	Less than 19	176	42.4
	19 to 22	92	22.2
	23 to 29	41	9.9
	30 39	49	11.8
	40 to 49	38	9.2
	50 to 59	16	3.9
	59 and older	3	0.7
	Total	415	100
Education level	Secondary Degree	179	43.1
	Bachelor's Degree	172	41.4
	Master's degree	30	7.2
	Ph.D. Degree	34	8.2
	Total	415	100
Institution	Private Institution	373	89.9
	Governmental Institution	42	10.1
	Total	415	100
Category	University Lecture	44	10.6
	University Student	136	32.8
	School Teacher	70	16.9
	School Student	165	39.8
	Total	415	100

All measurement items were adopted from previous studies. A seven-point Likert scale was used, with 1 being the most disapproving, 4 being labeled as neutral, and 7 being the most agreeable. The questionnaire consisted of 34 items addressing all seven factors. The instrument's reliability was tested. The Cronbach's values (from 0.8 to 0.9) pointed out an adequate reliability level greater than what is typically necessary for exploratory research [68]. Expert judgment was used to assess the instrument's validity [67]. As a result, the questionnaire was subjected to expert assessment by a number of information technology Ph.D. holders to fine-tune it. Based on their feedback, an updated version of the questionnaire was created.

### 4. Data Analysis

In this study, SPSS and AMOS version 20 statistical analysis software were used to analyze the data. The data were processed and screened using SPSS. The structural model was also tested using SEM to determine the causal relationships between factors. The properties of the instrument items were validated using confirmatory factor analysis (CFA). Measurement models describe how observed variables are used to evaluate latent or hypothetical variables, as well as the validity and reliability of those observations [67,69,70]. For each measurement item, the factor loadings are shown in Table 2. To obtain a more

accurate measurement model, only the first two items ( $SE1 = 0.417$  and  $SE2 = 0.475$ ) were removed because their factor loadings were less than or equal to 0.50, indicating convergent validity [69,71–73].

**Table 2.** Measurements of factors.

Factor	Measurement Items	Mean	SD	Loadings
Perceived Convenience [40]	MLA is convenient since I may use it whenever I want.	5.88	1.248	0.861
	It is convenient to use MLA because I can take it with me everywhere I go.	5.85	1.261	0.859
	MLAs are convenient because they are not complicated.	5.56	1.339	0.778
Self-Efficacy [42]	I could complete my task using MLA if there was no one around to tell me what to do as I go.	5.56	1.411	0.588
	I could complete the task using MLA if I had never used an application like it before	5.43	1.410	0.726
	I could complete the task using MLA if I had only the application manuals for reference	5.33	1.466	0.768
	I could complete the task using MLA if I had seen someone else using it before trying it myself	5.52	1.365	0.835
	I could complete the task using MLA if I could call someone for help if I got stuck	5.39	1.411	0.700
	I could complete the task using MLA if someone else had helped me get started	5.51	1.422	0.810
	I could complete the task using MLA if I had a lot of time to complete the task for which the application was provided	5.53	1.439	0.869
	I could complete the task using MLA if I had just the built-in help facility for assistance	5.63	1.334	0.778
	I could complete the task using MLA if someone showed me how to do it first	5.65	1.456	0.588
	I could complete a task using MLA if I had used similar applications before this one to do the same task	5.61	1.417	0.726
Perceived Compatibility [74]	Using MLA is compatible with most aspects of my learning.	5.42	1.325	0.748
	Using MLA fits my learning style.	5.38	1.459	0.933
	Using MLA fits well with the way I like to learn.	5.42	1.480	0.822
Perceived Enjoyment [41]	I find using MLA to be enjoyable.	5.64	1.367	0.901
	The actual process of using MLA is pleasant.	5.58	1.396	0.944
	I have fun using MLA.	5.54	1.442	0.943
Perceived Usefulness [39]	Using MLA in my studying would let me to complete tasks more rapidly.	5.63	1.260	0.766
	Using MLA would improve my learning performance.	5.56	1.247	0.816
	Using MLA in my learning would increase my productivity.	5.58	1.271	0.852
	Using MLA would enhance my learning effectiveness.	5.53	1.264	0.793
	Using MLA would make it easier to do my task in my learning.	5.97	1.188	0.745
Perceived Ease of Use [39]	I would find MLA useful in my learning.	5.79	1.203	0.770
	Learning to operate MLA would be easy for me.	5.80	1.307	0.761
	MLA would be easy to use for my purposes.	5.44	1.263	0.800
	My interaction with MLA would be clear and understandable.	5.60	1.269	0.826
	I would find MLA to be flexible to interact with.	5.63	1.250	0.861
	It would be easy for me to become skillful at using MLA.	5.87	1.259	0.807
Behavioral Intention to Use [39]	I would find MLA easy to use.	5.81	1.248	0.843
	I intend to use MLA for my study.	5.61	1.508	0.918
	I predict that I would use MLA for my study.	5.60	1.362	0.902
	I plan to use MLA for my study.	5.56	1.478	0.882

For each factor, Cronbach alpha's, composite reliability (CR), average variance extracted (AVE), and the square multiple correlation are shown in Table 3. If the measurement reached convergent validity at the item level because all of the factor loadings were above 0.50, all of the composite reliability values were greater than 0.60, indicating a high level of internal consistency for the latent variables. Moreover, because each value of AVE surpassed 0.50 [67,69], the convergent validity was confirmed. A composite reliability value greater than 0.60 indicates that the latent variables have high internal consistency, and this is the case if the measurement has reached item-level convergent validity (all of the factor loadings went above 0.50). In addition, the convergent validity was confirmed because each AVE value exceeded 0.50 [67,69]. Furthermore, as shown in Table 3, all intercorrelations between factors were below the square root of the AVE estimations of the two factors, indicating discriminant validity [67]. As a result, the measurement results show that the convergent and discriminant validity levels in this study were adequate.

**Table 3.** Reliability, convergent validity and discriminant validity.

Factors	Mean	Alpha	CR *	AVE	PCV	SE	PCOM	PE	PU	PEOU	BI
PCV	5.763	0.868	0.80	0.84	0.91						
SE	5.516	0.915	0.87	0.88	0.489	0.92					
PCOM	5.406	0.886	0.80	0.84	0.673	0.418	0.91				
PE	5.586	0.950	0.90	0.77	0.600	0.600	0.420	0.88			
PU	5.676	0.908	0.86	0.88	0.668	0.478	0.700	0.570	0.91		
PEOU	5.691	0.923	0.88	0.90	0.703	0.449	0.640	0.660	0.653	0.93	
BI	5.590	0.927	0.86	0.89	0.750	0.730	0.780	0.833	0.770	0.721	0.94

\* The composite reliability (CR) was calculated using Fronell and Larcker's [75] formula. **Note:** The square roots of the AVE for each of the ten factors are used as diagonal elements. Elements that are off-diagonal are those that are linked to each other by correlation.

## 5. Discussion

SEM was conducted to examine the study hypotheses. Direct and indirect effects can both be tested simultaneously using SEM. The findings of the direct impact confirm that perceived usefulness did not have an influence on behavioral intention to use. Consequently, H1 was rejected. Perceived ease of use positively and significantly impacted Perceived usefulness, but not behavioral intention to use. As a result, H2 was approved, but H3 was not approved. Perceived convenience and self-efficacy impacted perceived usefulness. Self-efficacy impacted perceived ease of use as well; therefore, H4, H5, and H6 were accepted. Perceived enjoyment impacted behavioral intention to use. Hence, H7 was accepted. Perceived compatibility influenced Perceived usefulness and perceived ease of use, but it had no effect on perceived enjoyment and behavioral intention to use. As a result, H8 and H9 were approved, while H10 and H11 were rejected. Moreover, the determination coefficient ( $R^2$ ) for the dependent factors PEOU, PU, and BI were 0.335, 0.394, and 0.616, respectively. These findings support the hypothesis that the developed model's variation is properly accounted for by the model. Table 4 summarizes the hypotheses that were tested. Figure 2 depicts the basic model modified with the  $R^2$ , and p values of the relationships.

Additionally, this study tested the mediating effect of user acceptance, as shown in Table 5. As a result, it was discovered that PE acts as a moderator between PCOM and BI. However, the relationship between PCOM and BI and PEOU did not have a mediation influence. Thus, while H13 was supported, H12 was not.

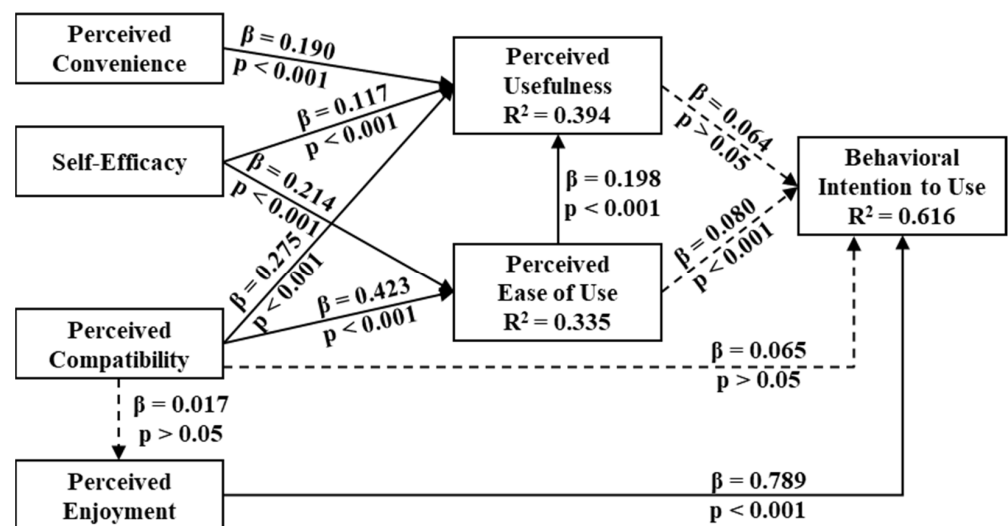
The purpose of this study is to develop a theoretical model that will be used to investigate the factors that influence users' acceptance of MLA. The model was developed on the basis of widely used and tested acceptance theories, including the SCT, the IDT, and the TAM. Additionally, the literature review identified six possible factors that may have influenced MLA's acceptance, namely perceived usefulness (PU), perceived ease of use



(PEOU), perceived compatibility (PCOM), self-efficacy (SE), perceived convenience (PCV), and perceived enjoyment (PE).

**Table 4.** Summary of the results of the hypotheses testing.

Research Proposed Paths	Coefficient Value ( $\beta$ )	t-Value	p-Value	Empirical Evidence
H1: PU $\rightarrow$ BI	0.064	1.148	0.251	Not supported
H2: PEOU $\rightarrow$ PU	0.198	4.815	0.000	Supported
H3: PEOU $\rightarrow$ BI	0.080	1.625	0.104	Not supported
H4: PCV $\rightarrow$ PU	0.190	6.304	0.000	Supported
H5: SE $\rightarrow$ PU	0.117	3.645	0.000	Supported
H6: SE $\rightarrow$ PEOU	0.214	5.835	0.000	Supported
H7: PE $\rightarrow$ BI	0.789	25.547	0.000	Supported
H8: PCOM $\rightarrow$ PU	0.275	8.596	0.000	Supported
H9: PCOM $\rightarrow$ PEOU	0.423	13.216	0.000	Supported
H10: PCOM $\rightarrow$ PE	0.017	0.334	0.739	Not supported
H11: PCOM $\rightarrow$ BI	0.065	1.608	0.108	Not supported



**Figure 2.** The revised model.

**Table 5.** Mediating effects.

Hypothesis	From	Mediation	To	Direct Effect	Indirect Effect	Mediation
H12	PCOM	PEOU	BI	0.423	0.024	Not mediation
H13	PCOM	PE	BI	0.017	0.024	mediation

Previous research indicates that PCV, SE, PCOM, PEOU, PU, and PE have not been evaluated in combination in MLA. Furthermore, earlier studies explicitly demonstrated that PCOM, SE, PCV, and PE influenced the PEOU, PU, and BI of the MLA. Additionally, the literature indicates that combining various acceptance theories may result in a more comprehensive understanding and explanation of user acceptance [20]. As a result, this study produced an acceptance model and discovered the relationships between factors through the formulation of thirteen hypotheses. Each relationship's strength was assessed through a survey of Jordanian school and university students, who were picked randomly from the autumn 2020–2021 semester.

The results demonstrate that neither PU (H1) nor PEOU (H3) had a significant direct influence on BI to use MLA. However, previous studies reported that PU significantly influenced BI [28,47,50–54,56] and PEOU [28,46,47,53,54,56]. The results in this study confirmed that these two factors are not predictors of BI. One possible clue is that all study participants have no option but to use MLA as a result of the scarcity of learning resources other than MLA during the COVID-19 pandemic. Additionally, students in Jordan, the so-called mobile generation, are significantly more likely to use mobile devices and access the Internet to obtain the required information. Because these results were uncommon in the previous studies, additional investigation into this phenomenon in the Jordan context is strongly encouraged. Moreover, the disparity between the findings of this study and those of prior studies could be ascribed to variation in student preferences as well as cultural differences between industrialized and developing countries.

This study also confirmed a significant positive influence of PEOU on PU (H2). There is a high correlation between these two factors, as proven by numerous studies on technology acceptance [23,28,47,50–52,54]. This conclusion shows that a productive MLA may not pique the interest of end-users if it is difficult to use. When it comes to the literature on how people adopt new technologies, PEOU and PU often appear to be highly correlated.

Furthermore, the research results confirm that PCV had a positive direct influence on PU (H4), which affirmed prior studies on user acceptance [59–61]. This means that users perceived MLA to be convenient because they were simple and could be utilized at any time and in any location. As a result, if users considered MLA to be useful, they would also find it to be convenient.

Furthermore, the findings confirmed, as in previous studies, the positive effect of SE on PU (H5) [63] and PEOU (H6) [50–52,54]. This indicates that SE enhances learning capacity and provides the necessary confidence to accept new technology.

PE plays an essential role in affecting BI to use MLA (H7), which confirmed earlier studies' findings [51,53,56]. Furthermore, the results show that PE is an excellent predictor of BI, indicating that Jordanian students find MLA enjoyable. Thus, PE has to be considered while designing content and applications for mobile learning. Students are more willing to use MLA if they find it pleasant, fun, and enjoyable. Further, the results demonstrated that PCOM has a positive direct influence on PU (H8) and PEOU (H9), which was in line with prior literature [60,64]. As a result, learners can rate MLA based on how well it fits their PCOM of MLA. As a result of this research, MLA providers should design their MLA to be compatible with learners' past experiences, needs, existing values, and learning styles.

The results also show that neither PE (H10) nor BI (H11) were affected by PCOM. Although previous studies reported that PE and BI were significantly influenced by PCOM [49], according to the results of this study, PCOM has no impact on either of these factors. Due to the rarity of these findings in the available literature, additional research into this phenomenon in the Jordanian context is strongly recommended. Finally, the data indicated that PEOU does not act as a mediator between PCOM and BI (H12). In contrast, contrary to earlier research, PE mediates the link between PCOM and BI (H13) [60,64].

## 6. Research Implications

As a theoretical implication, in this study, the researchers developed an exhaustive model based on well-established acceptance theories by adopting appropriate factors for the research purposes, namely PU, PEOU, PCOM, SE, PCV, and PE, and to assess their influence on MLA acceptance. The researchers argued that PU, PEOU, PCOM, SE, PCV, and PE could affect MLA adoption to embrace mobile learning post-COVID-19 age. The logic behind selecting those factors is to integrate social, technical and psychographic points of view in an exhaustive model. However, while many previous studies have proven a positive relationship among PU, PEOU, and PCOM on MLA adoption, these relationships have proven their validity in normal conditions, but not in the post-COVID-19 age, where these relationships were less critical from users' perspectives. Moreover, in the context of this study, we revealed that perceived enjoyment is directly and significantly affects

the behavioural intention to use MLA. Moreover, this study has practical implications for educational institutions. The software industry must consider perceived enjoyment while developing MLA to motivate students to use these apps. This type of learning enables students to experience personalized or distant learning via their mobile devices.

## 7. Limitations and Future Work

The researchers encountered a few significant limitations during this study. To begin with, technology and information have advanced at an incredible rate. As a result, over time, students' perspectives may shift. As a consequence, a subsequent study may tweak the current methodology in order to acquire more precise results. However, the research was limited to a single country (Jordan). As future work, it should be expanded to include different countries. Furthermore, the model is limited to theoretically proven factors of behavioral intention to use MLA. Finally, a future study in mobile learning acceptance may explore the various mechanisms that exist between voluntary and forced usage settings. Additionally, the effects of geography and culture should be taken into account in future studies since various studies have shown that user acceptance of novel and modern technology is directly tied to their specific characteristics [76–80]. Another way to test the validity of this model is to look at other factors that could affect its acceptance by MLA users. Additionally, to generalize the concept in the IT sector, this theoretical model might be verified by assessing users' acceptance of various information technology applications, such as embracing augmented reality in MLA.

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