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Student Acceptance of Mobile Videos in Online Learning: An Application of the Technology Readiness and Acceptance Model

Nghi Nguyen* & Le Thi Dieu Hien
Can Tho University, Vietnam

*Corresponding Author
Khu II, Đ. 3 Tháng 2, Xuân Khánh, Ninh Kiều, Cần Thơ, Vietnam
e-mail: quocnghi@ctu.edu.vn

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Abstract: This study examines student acceptance of mobile videos in online learning by applying the Technology Readiness and Acceptance Model (TRAM). The research investigates the relationships between technological readiness, perceived ease of use, perceived usefulness, and students' intention to use mobile video-based learning tools. A quantitative research design was employed, with data collected from university students using a quota sampling technique. Structural Equation Modeling (SEM) was applied to test the proposed research model and examine both direct and indirect relationships among the constructs. The findings indicate that technology readiness has a significant positive effect on perceived ease of use, perceived usefulness, and students' intention to use mobile videos in online learning. Furthermore, perceived ease of use and perceived usefulness are found to significantly influence students' behavioral intention to adopt mobile video-based learning. These results highlight the critical role of individual readiness toward technology in shaping students' acceptance of digital learning media. The study contributes to the literature on adoption of educational technology by confirming that technology readiness is a key antecedent of mobile learning acceptance. Practical implications suggest that educational institutions should strengthen students' technological readiness to enhance the effectiveness and sustainability of mobile video-based online learning.

Keywords: technology readiness, mobile video, online learning, intention to use

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INTRODUCTION

The COVID-19 pandemic has changed the way of traditional teaching. In 2020 and 2021, more than 180 countries worldwide have closed schools due to the pandemic. The world is also re-evaluating online learning services in response to the challenges facing the global educational environment (Unesco, 2020). Most educational institutions have changed their education from regular (face-to-face) learning to online learning, which allows for a more flexible approach to teaching and learning (Vlachopoulos, 2020).

The current educational trend applies technology to the learning process (Liu et al., 2010). Information and communication technologies, including digital and mobile technologies, are believed to be potentially powerful facilitators to improve education (Joo et al., 2014). Online learning communities are gradually changing the traditional way of learning because of the popularity of the Internet (Liu et al., 2010). With the current explosion of smartphone users,

especially among young people (Rivera & Van Der Meulen, 2014; Iqbal & Bhatti, 2015), the number of people using smartphones to study online is increasing.

Using mobile phones for learning purposes, videos are seen as the preferred type of multimedia content (Molnar & Muntean, 2015). Most educational theories suggest that videos are more effective than other media (Carter, 1996; Hastings & Tracey, 2005). Many studies have shown that videos increase learner interest (Dickinson & Summers, 2010; Park, 2010), improve learning performance (Fritsch, 2009), facilitate online learning (Dickinson & Summers, 2010; Park, 2010), and enhance learning performance (Weerakkody et al., 2014). The use of videos on mobile devices allows large numbers of students to access education conveniently (Ullrich et al., 2010), and adjust content based on learning styles (Karadimce & Davcev, 2013; Molnar & Muntean, 2015). The literature review shows that several studies demonstrate the role of technology readiness in smartphone online learning (Mahat et al., 2012; Iqbal & Bhatti, 2015; Chau, 2019). However, few studies focus on learners' intention to use mobile videos for online learning. Therefore, this study was conducted to demonstrate factors affecting the intention to use mobile videos in online learning of Vietnamese students.

The technology readiness and acceptance model (TRAM) proposed by Lin et al. (2007) is the result of combining the technology acceptance model (TAM) of Davis (1989) and the technology readiness (TR) model by Parasuraman (2000), Lin et al. (2007) extended the applicability of TAM by enhancing it with an individual-specific TR structure into TRAM. The TRAM emphasizes the impact of users/personal characteristics and their prior experiences on the intention to use. The Technology Readiness Index (TRI) is used to measure TR based on four characteristics: optimism, innovativeness, discomfort, and insecurity (Parasuraman, 2000).

Technology readiness (TR) is known as an important factor influencing the adoption and use of new technologies (Kim & Chiu, 2019). The Technology Readiness Index (TRI) is used to measure TR based on four characteristics: Optimism is related to a positive view of technology and the belief that technology gives people control, greater flexibility, and efficiency (Parasuraman, 2000). Optimists are likely to focus less on the negative aspects and thus adopt and use technology openly (Walczuch et al., 2007); Innovativeness refers to the tendency to be a pioneer in technology (Parasuraman, 2000). Innovativeness is defined as an individual tendency to try new products/services (Shih & Venkatesh, 2004); Discomfort is the perception of a lack of control over technology and a feeling of being overwhelmed by it (Parasuraman, 2000). Technology users feel uncomfortable, and they believe that technology is too complicated for ordinary people (Massey et al., 2013); Insecurity involves distrust of technology and skepticism about its ability to work properly (Parasuraman, 2000). According to Meuter et al. (2003), anxiety about new technology leads to a negative perception towards it, reducing the amount of time using new technology and even avoiding it.

Videos are used to support student professional learning and teacher professional development (Tripp & Rich, 2012; Marsh & Mitchell, 2014). Video provides a multi-sensory learning environment that can improve a learner's ability to retain information (Syed, 2001). According to Hansch et al. (2015), videos can serve as a powerful teaching tool if they are used properly. According to Thomson et al. (2014), in addition to the great advantage of flexibility, video can be an effective teaching mean. Most educational theories suggest that videos are more effective than other media (Carter, 1996; Hastings & Tracey, 2005). The use of videos in education bridges the gap between theory and practice in university settings (Gelfuso & Dennis, 2017; Charalambous et al., 2018). According to Chau (2019), online courses using mobile videos on smartphones are understood as courses using video teaching materials posted on the web and accessible to learners by devices with an Internet connection, including smartphones. Using

mobile phones for learning purposes, videos are believed the preferred type of multimedia content (Molnar & Muntean, 2015).

According to Ajzen (1991), intention is a factor used to assess the ability to perform a behavior in the future. The intention is a motivating factor that motivates individuals to be willing to perform the behavior and is directly affected by attitudes, subjective norms, and perceived behavioral control. Behavioral intention is assumed to be the mediating antecedent of behavior. Researching the intention to use is a good predictor of usage behavior (Ajzen, 1991). Intention to use can be seen as the future acceptance of the technology (Holden & Karsh, 2010). Intention is often used to understand how attitudes can influence actual behavior (Huang et al., 2004). As presented by Nikou & Economides (2017), the acceptance and intention to use mobile devices in learning is a topic that researchers focus on in the field of education. Intention to use mobile phones in learning is the intention to use mobile applications to update information about courses or watch lectures using their mobile devices (Joo et al., 2014).

Relationship between technology readiness (TR), perceived usefulness (PU), perceived ease of use (PEU), and intention to use (IU) mobile videos in online learning. Erdoğmuş & Esen (2011) pointed out the relationship between creativity and optimism toward perceived usefulness and ease of use of technology. According to Godoe & Johansen (2012), optimism and innovation significantly influence perceived usefulness and perceived ease of use of technology. Hung & Cheng (2013) stated that perceived discomfort and insecurity significantly influence the perceived usefulness of technology. Christensen & Knezek (2017) suggested that optimists rate mobile phones as easy to use for learning purposes. According to Irby (2017), students who believe in technology and enjoy innovation will find the technology useful in supporting learning. Chau (2019) demonstrated a positive relationship between technology readiness, perceived usefulness, and perceived ease of use. Therefore, the study proposes the following two hypotheses: Hypothesis H1: Technology readiness has a positive impact on students' perceived ease of use of mobile videos in online learning; Hypothesis H2: Technology readiness has a positive effect on students' perceived usefulness of mobile videos in online learning.

Many studies have demonstrated a positive correlation between technology readiness and the tendency to adopt new technologies (Parasuraman, 2000; Chang & Smith, 2008; Crosbie et al., 2018). According to Hung & Cheng (2013), optimism in the technology readiness index positively affects technology adoption. Technology readiness is known as an important factor influencing new technology adoption (Kim & Chiu, 2019). Thus, the study proposes the following hypothesis: Hypothesis H3: Technology readiness has a positive impact on the intention to use mobile videos in online learning.

Relationship between perceived ease of use (PEU), perceived usefulness (PU), and intention to use (IU) mobile videos in online learning. According to Davis (1989), perceived ease of use is the degree to which an individual believes that no effort is needed to use technology and is the expectation that the system is user-friendly and easy to use. Mohammadi (2015) showed that perceived ease of use is the main determinant of perceived usefulness. Several studies have demonstrated a positive correlation between perceived ease of use and perceived usefulness in online learning (Lee et al., 2009; Sivo et al., 2018; Chau, 2019). Thus, the following hypothesis is proposed: Hypothesis H4: Perceived ease of use positively influences the perceived usefulness of mobile videos in online learning.

Educational institutions invest in information systems to achieve benefits such as increased access to education and knowledge generation, improved cost-effectiveness, increased flexibility, and interoperability (Sinclair et al., 2016). Ease of use is a major factor influencing the adoption of new technologies (Davis, 1989; Jackson et al., 1997). Users can quickly adapt to new

technology if they perceive ease of use (Morosan, 2012). As presented by Erdoğmuş & Esen (2011), perceived ease of use and perceived usefulness positively influence the intention to use technology. In the field of education, some studies have demonstrated the positive impact of perceived usefulness and perceived ease of use on learner intention to adopt technology (Lee et al., 2009; Al-Azawei & Lundqvist, 2015; Sivo et al., 2018; Chau, 2019; Yakubu & Dasuki, 2019; Almaiah et al., 2019; Azizi et al., 2020; Abbad, 2021; Alghazi et al., 2021). Hence, the study proposes two hypotheses as follows: Hypothesis H5: Perceived ease of use has a positive impact on the intention to use mobile videos in online learning; Hypothesis H6: Perceived usefulness has a positive impact on the intention to use mobile videos in online learning.

METHOD

The study uses the Participatory rural appraisal (PRA) method with the participation of 10 students studying at universities in Vietnam (Can Tho University and FPT University) and 04 experts in education technology. The proposed research model is as follows:

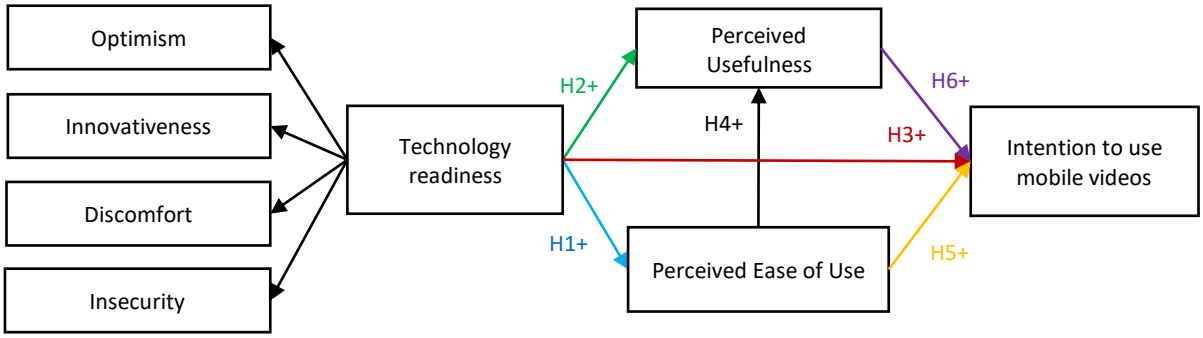

Figure 1: Proposed research model according to TRAM

Table 1: Interpretation of observed variables in the research model

Factor	Observed variable name		Scale	Reference resources
Perceived Usefulness (PU)	PU1: Mobile videos help complete learning tasks faster.		Likert 1-5	Venkatesh (2000), Ullah et al. (2017), Chau (2019), Larmuseau et al. (2019)
	PU2: Mobile videos help improve learning efficiency.		Likert 1-5	
	PU3: Mobile video makes learning easier.		Likert 1-5	
	PU4: Mobile videos are useful for learning.		Likert 1-5	
Perceived Ease of Use (PEU)	PEU1: Easy to learn how to use mobile videos.		Likert 1-5	Venkatesh (2000), Ullah et al. (2017), Chau (2019), Larmuseau et al. (2019)
	PEU2: Mobile videos are clear and easy to understand.		Likert 1-5	
	PEU3: Easy to reach proficiency in using mobile videos.		Likert 1-5	
	PEU4: The systematic problems are easy to handle.		Likert 1-5	
Technology Readiness (TR)	Optimism	OP1: I have the knowledge and skills to use and control technology.	Likert 1-5	Parasuraman (2000), Chen et al. (2013), Parasuraman & Colby (2015), Prior et al. (2016)
		OP2: Technology offers freedom and flexibility.	Likert 1-5	
		OP3: Technology helps improve learning efficiency.	Likert 1-5	
	Innovativeness	IN1: I always keep up with innovation and technological development.	Likert 1-5	

Factor		Observed variable name	Scale	Reference resources
		IN2: I love experiencing new technology.	Likert 1-5	Shih & Venkatesh, (2004), Parasuraman & Colby (2015), Prior et al. (2016)
		IN3: People come to me to share technical information.	Likert 1-5	
	Discomfort	DI1: I don't feel embarrassed when I have a technology problem while people are interacting.	Likert 1-5	Parasuraman (2000), Chen et al. (2013), Parasuraman & Colby (2015)
		DI2: The lack of control over technology and feelings of technological discomfort are rare for me.	Likert 1-5	
		DI3: I don't feel the complexity of using new technologies.	Likert 1-5	
	Insecurity	INS1: I am not too worried about my information sent over the Internet.	Likert 1-5	Parasuraman (2000), Chen et al. (2013), Parasuraman & Colby (2015)
		INS2: I don't feel insecure when using a service that interacts via technology applications only.	Likert 1-5	
		INS3: If I adopt the technology properly, I will not be negatively affected by technology.	Likert 1-5	
Intention to use	IU1: I will use mobile videos for online learning subjects at school.		Likert 1-5	Venkatesh (2000), Venkatesh et al. (2003), Lin et al. (2007), Shroff et al. (2011), Chau (2019)
	IU2: I will use mobile videos in online learning in the future.		Likert 1-5	
	IU3: I will use mobile videos for relevant learning activities.		Likert 1-5	
	IU4: I will use mobile videos in online learning more often.		Likert 1-5	

Analytical Methods

The goal of the group discussion is to identify appropriate scales for the research model. Quantitative analysis methods are used in the following order: Step 1: Test the reliability of the scale by Cronbach's Alpha coefficient; Step 2: Exploratory factor analysis (EFA); Step 3: Confirmatory factor analysis (CFA); Step 4: Structural equation modeling (SEM).

Data Collection Method

Scientists have proven that to apply structural equation modeling (SEM), the minimum research sample size from 100 to 200 is accepted (Hoyle, 1995). A pilot survey was conducted in October 2024 to examine the structure and content of the questionnaires. The study used quota sampling to collect data. The selected criteria include the university group, the number of years in university of the student, the student's major, and the student's gender. The survey subjects are students studying at universities, including the Can Tho University, Nguyen Tat Thanh University; Van Hien University; and FPT University. Online interviews using Google Forms were used to collect detailed information from students. The number of questionnaires achieved was 336, after removing unsuitable questionnaires (low reliability), a total of 330 valid questionnaires were used to test the research hypotheses.

RESEARCH RESULTS AND DISCUSSION

Analysis Results

Reliability of the research scale

To evaluate the reliability of the research scale, reliability testing through Cronbach's Alpha coefficient is applied (Nunnally & Bernstein, 1994). Based on Table 2, all research scales have Cronbach's alpha values greater than 0.8. All observed variables have corrected item-total correlation greater than 0.3. Therefore, the research scales all meet the reliability requirement.

Table 2: Test the scale reliability

Observed variable name	Corrected item-total correlation	Cronbach's Alpha if item deleted	Factor loading
Optimism (Cronbach's alpha = 0.808)			
OP1	0.662	0.738	0.738
OP2	0.678	0.714	0.823
OP3	0.639	0.759	0.688
Innovation (Cronbach's alpha = 0.870)			
IN1	0.796	0.775	0.876
IN2	0.722	0.842	0.704
IN3	0.736	0.831	0.836
Discomfort (Cronbach's alpha = 0.889)			
DI1	0.787	0.839	0.826
DI2	0.796	0.831	0.848
DI3	0.767	0.858	0.793
Insecurity (Cronbach's alpha = 0.896)			
INS1	0.789	0.857	0.885
INS2	0.797	0.849	0.779
INS3	0.799	0.847	0.813
Perceived ease of use (PEU) (Cronbach's alpha = 0.815)			
PEU1	0.573	0.797	0.647
PEU2	0.712	0.731	0.813
PEU3	0.587	0.790	0.662
PEU4	0.672	0.750	0.758
Perceived usefulness (PU) (Cronbach's alpha = 0.827)			
PU1	0.643	0.786	0.720
PU2	0.653	0.782	0.693
PU3	0.661	0.778	0.783
PU4	0.654	0.781	0.740
Intention to use (IU) (Cronbach's alpha = 0.837)			
IU1	0.662	0.798	0.785
IU2	0.673	0.792	0.684
IU3	0.706	0.778	0.749
IU4	0.642	0.809	0.710

According to the EFA result, the suitability test is guaranteed with the KMO = 0.921 and the statistical significance Sig. = 0.00. Factor loading values of observed variables > 0.5. Hence, 7 factors are created from 24 observed variables and there is no variable disturbance compared to the proposed research scale. This result has proved that the research data achieve convergent and discriminant validity.

After EFA, the above 7 factors continued to be included in the confirmatory factor analysis (CFA). Based on Table 3, statistical indicators are guaranteed as follows: Chi-square/df = 1.518 < 2 with P = 0.00 ≤ 0.05; TLI and CFI indexes reaching 0.921 and 0.966, respectively, higher than 0.9; RMSEA = 0.04 < 0.08. This proves that the model fits the research data.

Table 3: CFA and SEM analysis results

Targets Evaluate	CFA	SEM	Comparative index	Resources
χ^2/df	1.518	1.523	≤ 2	Gerbing & Anderson (1988), Hair et al. (2014)
P-value	0.000	0.000	< 0.05	
GFI	0.921	0.918	≥ 0.9	
TLI	0.966	0.966	≥ 0.9	
CFI	0.971	0.970	≥ 0.9	
RMSEA	0.040	0.040	≤ 0.08	

Based on the below table, the standardized regression weights of the scale are all > 0.5 and the unstandardized regression weights are statistically significant, so the model achieves convergent validity (Hair et al., 2010). Besides, the results of composite reliability (Pc), and average variance extracted (Pvc) were all satisfactory, Pc values (minimum 0.81) and Pvc (minimum 0.53) meet the requirements for statistical validity (Jöreskog, 1971; Fornell & Larcker, 1981). Thus, the research data is consistent with market data, convergent validity, unidimensionality, discriminant validity, and reliability.

Table 4: Testing the scales in the model

Scale	Number of observed variables	Composite Reliability (P_C)	Average Variance Extracted (P_{vc})	Resources
Optimism	3	0.81	0.59	Jöreskog (1971), Fornell & Larcker (1981)
Innovativeness	3	0.87	0.69	
Discomfort	3	0.89	0.73	
Insecurity	3	0.90	0.74	
Perceived ease of use	4	0.82	0.53	
Perceived usefulness	4	0.83	0.54	
Intention to use	4	0.84	0.57	

Test the research hypotheses

Based on the test result in Table 5, the hypotheses H1, H2, H3, H4, H5, and H6 are accepted with a 99% confidence interval. This shows that technology readiness has a positive influence on students' perceived ease of use, perceived usefulness, and intention to use mobile videos in online learning with a statistical significance of 1%. Besides, perceived ease of use positively affects students' perceived usefulness and the intention to use mobile videos in online learning with a statistical significance of 1%. At the same time, perceived usefulness positively impacts students' intention to use mobile videos in online learning with a statistical significance of 1%.

Table 5: The result of testing the research hypotheses

Relationship	Unstandardized			Standardized Estimated Value	Significance	Hypothesis
	Estimated value	Standard Error S.E.	Critical Ratio CR			
PEU <-- TR	0.710	0.140	5.065	0.364	***	H1: accepted
PU <-- TR	0.480	0.120	3.985	0.271	***	H2: accepted
IU <-- TR	0.407	0.109	3.738	0.252	***	H3: accepted

PU <-- PEU	0.432	0.064	6.787	0.476	***	H4: accepted
IU <-- PEU	0.269	0.061	4.390	0.325	***	H5: accepted
IU <-- PU	0.254	0.071	3.596	0.278	***	H6: accepted

Discussion

Hypothesis H1 and H2: Table 5 shows that technology readiness has a positive impact on the perceived ease of use and perceived usefulness of mobile videos in online learning. This means, if students like learning with online mobile videos and have a positive attitude towards mobile videos, their perceived ease of use and perceived usefulness increase. The research result is consistent with some studies proposed by Erdoğmuş & Esen (2011), Godoe & Johansen (2012), Christensen and Knezek (2017). In addition to this, if students can control technology and trust mobile videos in online learning, their perception of the ease of use and the usefulness of mobile videos in online learning will be better improved. The research result is consistent with studies by Hung & Cheng (2013), and Chau (2019). These results have confirmed a positive correlation between technology readiness with perceived ease of use and perceived usefulness (Chen et al., 2013; Irby, 2017; Chau, 2019).

Hypothesis H3: Technology readiness has a positive impact on the intention to use mobile videos in online learning. The result has demonstrated a positive relationship between students' technology readiness and intention to use mobile videos in online learning. Technology readiness always promotes the intention to explore technology (Hung & Cheng, 2013), improving student acceptance of using mobile videos in online learning. Technology readiness plays an essential role, positively influencing the intention to use technology (Kim & Chiu, 2019). The research result is similar to studies on technology acceptance proposed by Chang & Smith (2008), Parasuraman & Colby (2015), and Crosbie et al. (2018).

Hypothesis H4: Perceived ease of use positively affects the perceived usefulness of mobile videos in online learning. Table 5 indicates that perceived ease of use positively influences the perceived usefulness of mobile videos in online learning. If students find it easy to learn how to use mobile videos, and easy to handle when problems occur, their perception of the mobile video's usefulness will be enhanced. The research results continue to confirm that perceived ease of use is the main determinant of perceived usefulness (Mohammadi, 2015). The result is consistent with studies on technology acceptance in online learning proposed by Lee et al., (2009), Sivo et al. (2018), and Chau (2019).

Hypothesis H5 and H6: Table 5 shows that perceived ease of use and perceived usefulness positively affect students' intention to use mobile videos in online learning. Appreciating the usefulness and ease of use of mobile videos in online learning will increase the acceptance of mobile videos in online learning. Research results confirm the important role of ease of use (Davis, 1989; Jackson et al, 1997; Erdoğmuş & Esen, 2011) and usefulness (Erdoğmuş & Esen, 2011) for the adoption of new technologies. In the field of education, this research result is consistent with studies on technology acceptance proposed by Sivo et al. (2018), Chau (2019), Yakubu & Dasuki (2019), Almaiah et al. (2019), Azizi et al. (2020), Abbad (2021), Alghazi et al. (2021).

CONCLUSIONS

Applying the technology readiness and acceptance model (TRAM), the study has demonstrated the relationship between technology readiness and the intention to use mobile videos in online learning of Vietnamese students. Research results indicate that technology readiness positively affects students' perceived ease of use, perceived usefulness, and intention to use mobile videos in online learning. Besides, perceived ease of use and perceived usefulness positively influence students' intention to use mobile videos in online learning. These results affirm the important role of technology readiness for technology acceptance in the field of education. The study results provide a useful reference for educational administrators and researchers on technology adoption in the field of education.

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