Factors Affecting the Students' Re-Use of the Electronic Learning System (ELS)

Reynaldo Bautista Jr.
De La Salle University, Manila, Philippines

Luz Suplico Jeong
De La Salle University, Manila, Philippines, luz.suplico@dlsu.edu.ph

Carlo Saavedra
De La Salle University, Manila, Philippines

Joseph Sy-Changco
University of Macau, Macau SAR, China

Follow this and additional works at: https://animorepository.dlsu.edu.ph/apssr

Factors Affecting the Students' Re-Use of the Electronic Learning System (ELS)

Reynaldo Bautista, Jr.,[1] Luz Suplico Jeong,[1]* Carlo Saavedra,[1] and Joseph Sy-Changco[2]
[1]De La Salle University, Manila, Philippines
[2]University of Macau, Macau SAR, China
*luz.suplico@dlsu.edu.ph

Abstract: The COVID-19 pandemic has challenged higher education worldwide. From face-to-face sessions between teachers and students, teaching and learning have to be done online to allow students to continue learning while preventing the spread of this infectious disease. Faced with a wide range of electronic learning systems (ELS) to choose from, this study examined the factors that could affect the students' intent to re-use the ELS. There were 135 college students in a private university in Manila, Philippines, and 177 college students from a public university in Macau, China, who were surveyed to find out the factors that would influence their intent to re-use ELS. Using structural equation modeling (SMART-PLS), this study showed that there was a significant relationship between perceived ease of use (PE) and perceived usefulness (PU), which were the constructs of the technology acceptance model (TAM). This implies that those who find the ELS easy to use will also find it useful. This study also extended TAM to include intrinsic motivation (IM) and extrinsic motivation (EM) as moderating variables between satisfaction (ST) and intent to re-use the ELS (INT). The result showed that IM and EM did not moderate the relationship between ST and INT. This suggests that Chinese and Filipino students are not motivated to use the ELS. This may be because there is a need to make the ELS enjoyable and engaging. Perceived convenience (PC) was significant to PE and PU. This shows that those who find the ELS convenient find it easy to use and useful. The overall results showed that user training (UT) was significant to PE and PU. This implies that training can stress the usefulness and ease of adopting the ELS. Satisfaction (ST) was significant to INT. The results validate existing literature that those who find the technology easy to use and those who are satisfied with the learning systems are likely to re-use it. This study is one of the few studies in the Philippines that examined the factors that affected students' re-use of the ELS. It has significant implications for educational institutions in terms of designing an ELS that would encourage students to re-use it, especially during this time when educational institutions have developed courses to be taught in an online environment even if there are vaccines for COVID-19.

Keywords: electronic learning system, behavioral intention, motivation, TAM

COVID-19 has affected higher educational institutions in 188 countries as of April 6, 2020 (Toquero, 2020). To continue educating the students despite the pandemic, electronic learning systems (ELS) has become the choice to teach and learn while adhering to COVID-19 guidelines of staying at home and allowing flexible learner-centered education (Crawford et al., 2020; Del Barrio-García et al., 2015; Joo et al., 2016; Lee et al., 2013; Mohammadi, 2015; Toquero, 2020). There are, however, barriers to the use of an ELS, especially in developing countries where the infrastructure is not as sophisticated as in developed countries (Acharya & Lee, 2018; Andersson & Gronlund, 2017). According to Acharya and Lee (2018), these challenges include the slow internet penetration and insufficient bandwidth, reliability and affordability of internet connection, and access to the internet in developing countries. Internet costs and access and technical problems are the substantial barriers to ELS in the Philippines (Marcial et al., 2015).

E-learning enables the students and teachers to be in the "engaged phase" (Acharya & Lee, 2018; dela Pena-Bandalaria, 2007). Electronic learning empowers the student to assert more control over the learning environment (Del Barrio-García et al., 2015). Further, teachers are empowered with the use of technology in electronic learning because it will enhance their skills and knowledge. New technologies used in schools can replace chalkboards with interactive digital whiteboards, using students' own smartphones or laptops to access electronic books, or using an ELS such as Canvas or the publisher's learning management system that can be integrated with the school's learning management system. This engaged phase is very new as ELS is recent in the Philippines.

Although the Philippine government has made hardware and software available to public universities, private universities can also source funds to obtain the hardware and software needed to introduce E-learning. In 2011, the Philippine government embarked on a national strategy for improving internet access, which identified education as a key area that would benefit from technological development (Garcia, 2016).

In the Chinese mainland, Hongkong and Macau, e-learning and Massive Open Online Courses are supported politically with social media visibility. These are normally targeted to professionals and the adult population (Zheng et al., 2018).

Theoretical Framework

College students in the Philippines were encouraged to use an ELS to access course materials of marketing classes. Likewise, college students in a public university in Macau were encouraged to use an ELS to access marketing lessons. This study aims to determine the factors that will influence the students in the Philippines and Macau to re-use the ELS in their future marketing classes. A theoretical framework based on the technology acceptance model (TAM) was used to explore the students' intent to re-use the ELS. Not only will the TAM variables of perceived ease of use (PE) and perceived usefulness (PU) be used, but the TAM model has been extended to include perceived convenience (PC), user training (UT), intrinsic motivation (IM), extrinsic motivation (EM), satisfaction (ST) and intent (INT).

Technology Acceptance Model (TAM)

TAM is a popular model used to explain the adoption of ELS (Acharya & Lee, 2018; Park, 2009). It states that PE and PU will affect the behavioral intent (INT) to use an ELS (Mohammadi, 2015 & Park, 2009). TAM has also been extended to include end-user training (UT) in technology acceptance (Marshal et al., 2008) and perceived convenience (PC) in adopting an ELS (Chang et al., 2012). Park's (2009) study showed that E-learning self-efficacy served as an intrinsic motivator (IM), whereas the subjective norm was an extrinsic motivator (EM) for college students to self-regulate their motivation on E-learning. Park (2009) stressed that in South Korea, IM could be that E-learning can be beneficial in finding a job, whereas recognition from others can be an EM. Other types of IM that can encourage adoption are feelings of interest, pleasantness, fun, and feeling good, whereas EM can be high grades and praise.

Studies show that user satisfaction has a positive effect on E-learning adoption (Boateng et al., 2016; del Barrio et al., 2015; Mohammadi, 2015; Ramadiani et al., 2017).

Perceived Convenience (PC)

In the literature about the adoption of new technology, PC has been shown to have a positive relationship with e-commerce activities (Eastin, 2002). Convenience has also been found by Yoon and Kim (2007) to be a determinant of user's adoption and use of

information technology. Convenience was also a major quality trait in perceived usefulness (Liao & Cheung, 2002). Another study by Hayashi (2012) found that convenience and ease of use were the main drivers for consumers to use a particular mode of payment.

According to Yoon and Kim (2007), a product or service is convenient when it saves time for the user. Based on Yoon and Kim's definition (2007), Yoon and Kim state that the ease towards time, place and execution that the user feels in using a computer technology refers to PC (2007). They also point out that the ease towards time that the user feels when performing a task using computer technology refers to time convenience (Yoon & Kim, 2007). This means that if one can perform a task at any time, then one feels more convenient towards time. The level of ease towards place when a user performs a task involving computer technology is known as place convenience (Yoon & Kim, 2007). In other words, a user who feels that it is easy to perform a task involving computer technology at any place feels at ease towards place. Yoon and Kim (2007) pointed out that execution convenience refers to a level of ease towards implementing a task using a computer technology.

Chang et al. (2012) found that PC, along with PE and PU, were antecedent factors that affected the acceptance of the English mobile system. Likewise, Yoon and Kim (2007) stressed that PC affected the acceptance of the wireless local area network. These studies show that PC can affect the intention to re-use an ELS. As the users' attitude towards ELS is determined by PE, PC, as an external variable, will affect PE (Yoon & Kim, 2007). The user's PC will affect PE, which is a cognitive belief. Consequently, PE will affect PU (Davis & Venkatesh, 2000).

The following hypotheses are made:

H1: There is a positive relationship between PC and PE.

H2: There is a positive relationship between PE and PU.

User Training (UT)

Igbaria and Iivari (1995) found that training and educational programs led to feelings of self-efficacy. The feeling of self-efficacy encourages the person to use the technology effectively. Igbaria and Iivari (1995) further added that training emphasized the user-friendly system and its ease of use. It has also been suggested that users without adequate training are more likely to experience problems while using the technology and will be more reluctant to adopt it (Igbaria et al., 1997).

UT is an external variable that affected technology acceptance (Marshall et al., 2008). It is hypothesized that UT will affect the intention to re-use the ELS, but this will be mediated by PE.

H3: There is a positive relationship between UT and PE.

According to Bhattacherjee (2001) and Davis and Ventakesh (2000), the users' expectation of technology could change after their experience. It validates the marketing perspective that a customer will repurchase a product or service if they are satisfied with it. If the user's experience was better than his initial expectation after using the ELS, the user would likely use the ELS again (Joo et al., 2016). If the observed actual performance of the ELS was worse than the customer's initial expectation, the user would not use it again (Joo et al., 2016). This is supported by studies that user's satisfaction has a positive effect on E-learning adoption (Boateng et al., 2016; del Barrio et al., 2015; Mohammadi, 2015; Ramadiani et al., 2017). Satisfaction will mediate the relationship between PE and intent to re-use the ELS. The following hypothesis is made:

H4: There is a positive relationship between PE and ST.

The study on the adoption of cellular phones to provide e-learning showed that PC was an important antecedent for users to accept mobile English learning and to continue using it (Chang et al., 2012). This study also showed that the convenience of using cellular phones to learn English affected the user's perceived usefulness. Yoon and Kim (2007) also found that PC positively affected PU. The following hypothesis is made:

H5: There is a positive relationship between PC and PU.

PU will mediate the relationship between ST and INT to re-use the ELS (Boateng et al., 2016; del Barrio et al., 2015; Mohammadi, 2015; Ramadiani et al., 2017). When the adoption of new technology is useful, the user will be satisfied based on the first-hand experience. Thus, there is a tendency for users to relate usefulness with satisfaction (Bhattacharjee, 2001). If using a piece of technology is perceived to be useful, then it will more likely be accepted as satisfactory (Liaw, 2008). According to Liaw (2008), university students found the use of Blackboard useful were satisfied with adopting it as an electronic learning management system. The following hypothesis is made:

H6: There is a positive relationship between PU and ST.

Users may find the adoption of technology useful due to the savings in processes and time. Once users find a positive experience in using the ELS, they become satisfied. This satisfaction will have a positive effect on INT to re-use it (Joo et al., 2016). This finding is validated in a study of college students who used Blackboard as a learning management system. Students who were satisfied with using Blackboard continued to use it (Liaw, 2008). This leads to the following hypothesis:

H7: There is a positive relationship between ST and INT.

End-users have received training in the use of new technology to make adoption and implementation possible. After having been trained, end-users tend to find the adoption of the new technology useful (Marshall et al., 2008). According to research conducted on the American surgeons' use of new technology, user- training is positively correlated with both performance expectancy and effort expectancy (Marshall et al., 2008). This study showed that end-user training was an important and understudied factor in technology acceptance and can be useful to new technology users. PU will mediate between UT and re-use of the ELS. The following hypothesis is made:

H8: There is a positive relationship between UT and PU.

Motivation can be extrinsic or intrinsic (Deci & Ryan, 1985). Deci and Ryan (1985) defined EM as a non-autonomous motivation because the amount of volitional control that the individual has in performing the activity is low, and the reason for performing the activity has not been fully internalized by the individual. Thus, an extrinsically motivated individual will perform a behavior because of a reward or to avoid punishments. An example of this is when a student studies in class because he wants to get a high grade. In contrast, IM occurs when a student uses an e-learning system because he enjoys it.

Behavior resulting from higher levels of external controls will be less constant, of lower quality, and less enjoyed than acts that are performed for more autonomous reasons (Ryan, 1995). Data across many areas of studies clearly show that higher levels of autonomous acts can lead to increases in behavioral effectiveness, greater perseverance, and better social integration of an individual (Deci & Ryan, 2008; Roth et al., 2009; Ryan et al., 1993; Williams & Deci, 1996).

Findings from Dholakia's (2006) study about the effects of marketing actions on controlled and autonomous customers showed that the more self-determined customers had higher levels of purchase motivation and relational behaviors. In areas of education and physical education, studies have shown that rewards positively affected controlled behaviors but negatively affected autonomous behaviors (Deci et al., 1999).

Park's (2009) study on university students and adoption of ELS showed that E-learning self-efficacy served as an IM, whereas the subjective norm was an EM for students to self-regulate their motivation on E-learning. Park (2009) stressed that in South Korea, an IM could be that E-learning can be beneficial in finding a job, whereas recognition from others can be an EM. Other types of IM that can encourage adoption can be feelings of interest, pleasantness, fun, and feeling good, whereas EM can be high grades and praise. The following hypothesis is made:

H9: Motivation will moderate the relationship between ST and INT.

Digital Natives, Digital Immigrants

The technological advancements in the 20th century have ushered students who have been using computers, cellular phones, and other digital tools (Prensky, 2001).

Surrounded by computer games, email, the Internet, and instant messaging throughout their lives, these students are very computer-literate. According to Prensky (2001), these students are very conversant with the language of computers, video games and the Internet. Prensky states that their teachers have been exposed to technology at some later point and may not be as conversant as their students (2001). The only way to motivate them to learn is to use their digital language in an entertaining manner (Chang et al., 2017). This means that learning should be fun and enjoyable for them (Chang et al., 2017, Prensky, 2001). Thus, there is a need to use digital games to make learning entertaining, fun, and motivating (Prensksy, 2001). In this context, any ELS should be fun to motivate them to re-use it.

WeChat, a popular social media application developed in China and used for cellular phones, allowed Macau students to inject fun and laughter into their messages (Sandel et al., 2019). Unlike Moodle, which was used as a Learning Management System, WeChat affords novel and creative ways to construct messages and interactions as users can write messages with Chinese characters in standard or non-standard form, including vernacular Cantonese (Sandel et al., 2019). Unlike Moodle, WeChat is perceived to be easier to use as it does not need a password (Sandel et al., 2019). Further, this is a very popular communication tool as the Chinese students' family and friends are also using it.

In the Philippines, social network penetration is incredibly high with Facebook as the country's most popular website (Carvajal, 2014). According to Carvajal (2014), nine out of 10 Filipinos who are online are on Facebook, and most of them belong to Generation Y, which includes college students. Facebook is the social media tool used by Filipinos to communicate, socialize, and share their experiences (Carvajal, 2014).

Definition of Variables

Table 1 shows the definition of variables used in this study (Acharya & Lee, 2018; Davis & Venkatesh, 2000; Marshall et al., 2008; Mohammadi, 2015; Park, 2009; Ramadiani et al., 2017).
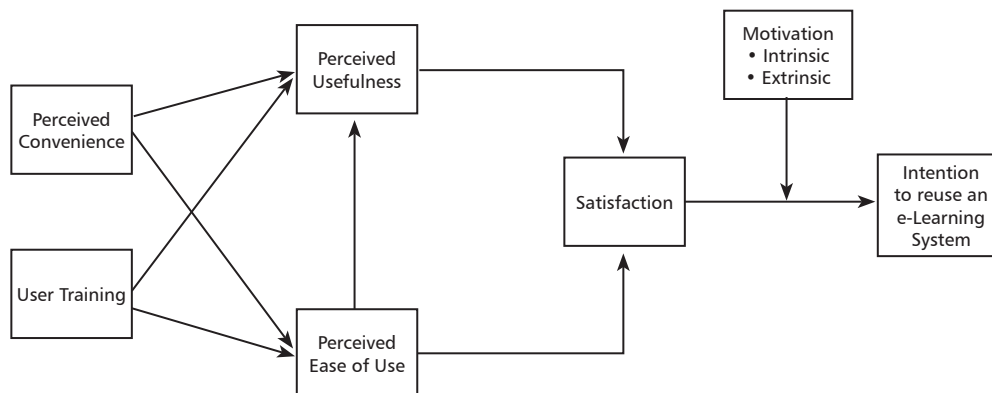
Conceptual Framework

Figure 1 shows that PC will affect PU and PE, whereas UT can affect PU and PE (Chang et al., 2012; Marshall et al., 2008). PU and PE can affect ST, whereas ST can affect INT the ELS (Park, 2009; Ramadiani et al., 2017). According to Park (2009), the relationship between ST and INT can be affected by IM or EM.

Table 1

Definitions of Variables

Acronym	Variable	Definition
PU	Perceived Usefulness	Extent to which a person believes that using the system will enhance his job performance
PE	Perceive Ease of Use	Extent to which a person believes that using the system will be free of effort
PC	Perceived Convenience	Perceived expenditures of time and effort to affect usage
UT	User Training	Shows the availability of training in using the system
ST	Satisfaction	Perceived consumer satisfaction in using the service
INT	Intent To Re-Use	Readiness to re-use
IM	Intrinsic Motivation	Drive to perform a behavior arises from within the individual
EM	Extrinsic Motivation	Drive to perform a behavior because of a reward or to avoid punishment

Figure 1. Conceptual Framework on Factors Affecting the Students' Intent to Re-Use the ELS

Methods

To achieve a robust external validity, the respondents were college students from a private university in Manila, Philippines and a public university in Macau, China. Even if the respondents were from a private university in Manila and a public university in Macau, the Philippines and China are highly similar in power distance, collectivism, masculinity, and uncertainty avoidance (Hofstede Insights, n.d). As for long-term orientation, China has a high long-term orientation, whereas the Philippines has a short-term orientation. This is the only cultural dimension where the two countries are different.

Students in Manila were encouraged to use an ELS known as Connect in basic marketing classes. Connect is an internet-based learning platform by McGraw Hill, which makes available course-work and assignments. Of the 170 Connect users, 135 college students were surveyed to collect data on the students' intent to re-use the ELS. Of the 135 respondents, 86 were females, and 49 were males. The students were in the age range of 18–20 years old. The survey was conducted from November 27–28, 2018. The Likert five-point scale (1 – Strongly disagree, 2 – Disagree, 3 – Neutral, 4 – Agree, and 5 – Strongly agree) was used to measure students' intent to re-use the ELS.

In Macau, college students had the chance to use an ELS platform called Moodle, a free and open-source learning management system. It is similar to McGraw Hill's Connect. Similar criteria were used in selecting the students surveyed in Macau. The survey was conducted from April to June 2019. There were 177 students who were sampled. Of the 177 students, 101 were females, while 76 were males. The students' ages ranged from 18–49 years of age.

Even if the data collection was done on Term 1, AY 2018–2019, in the Philippines and data collection was done on T3, AY 2018–2019 in Macau, the data collection was done on the same academic year. The conditions faced by the respondents in the Philippines and Macau were the same throughout the academic year (2018–2019). The data collection in Macau was done later because of the long New Year break of Chinese schools. The data collection in Macau and the Philippines used the same self-administered questionnaire; thus, the survey results were useful.

SMART/PLS was used to analyze the respondents' data. Reliability tests were carried out to secure accuracy and consistency.

Results

To test the model of the students' intent to re-use the ELS, t-tests, correlation, and path analysis were conducted using SMARTPLS 3.0 (Ringle et al., 2015).

Reliability and Validity of Research Constructs

The questionnaire was pretested with 15 students with the age range 18–20 years old in the Philippines and Macau. Pretest results were used to improve the questionnaire (Churchill & Iacobucci, 2002).

Cronbach's alpha was used to ensure scale reliability and consistency (Cronbach, 1951). According to Peterson (1994), an adequate Cronbach alpha value is at least 0.70, although at least 0.60 is still acceptable in social psychology research (Robinson et al., 1991). Table 2 shows that the constructs show internal consistency because they are all higher than the set target of >0.70 (Ketchen, 2013).

The average variance extracted (AVE) is the proportion of variance in the items that are explained by the construct. Table 2 shows that the AVE of the items explained by the constructs is less than 0.50. According to Kock (2015), the recommended AVE threshold for validity is 0.50. In order to do a multi-group analysis based on the two countries, convergent validity and discriminant validity for Macau and the Philippines

Table 2

Overall Convergent Reliabilities, Discriminant Validities, and Correlations Among Latent Constructs of the Measurement Model

	Cronbach's Alpha	rho_A	Composite Reliability	Average Variance Extracted (AVE)	EM	IM	INT	PC	PE	PU	ST	UT
EM	0.697	0.837	0.861	0.757	0.870							
IM	0.895	0.895	0.927	0.760	0.162	0.860						
INT	0.823	0.827	0.895	0.739	0.215	0.825	0.872					
PC	0.825	0.827	0.896	0.741	0.227	0.734	0.731	0.861				
PE	0.808	0.821	0.875	0.637	0.322	0.726	0.749	0.711	0.798			
PU	0.821	0.837	0.893	0.736	0.230	0.693	0.711	0.718	0.704	0.858		
ST	0.901	0.901	0.931	0.771	0.235	0.790	0.853	0.738	0.798	0.705	0.878	
UT	0.827	0.827	0.885	0.659	0.225	0.700	0.785	0.704	0.677	0.684	0.785	0.812

Table 3

Pearson's Correlation Coefficients Between Study Variables

1	Country	PU	PC	UT	ST	IT	IM	EM	PE
PU	Philippines	—							
	Macau	—							
PC	Philippines	.754**	—						
	Macau	.665**	—						
UT	Philippines	.717**	.699**	—					
	Macau	.631**	.726**	—					
ST	Philippines	.793**	.766**	.762**	—				
	Macau	.601**	.699**	.768**	—				
IT	Philippines	.727**	.773**	.664**	.777**	—			
	Macau	.641**	.671**	.690**	.761**	—			
IM	Philippines	.774**	.801**	.799**	.854**	.828**	—		
	Macau	.643**	.663**	.687**	.821**	.789**	—		
EM	Philippines	−.089	−.150	−.046	−.154	−.193*	−.149	—	
	Macau	.509**	.627**	.595**	.738**	.695**	.755**	—	
PE	Philippines	.845**	.778**	.758**	.845**	.746**	.808**	−.031	—
	Macau	.556**	.606**	.616**	.739**	.696**	.713**	.797**	—

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

*. Correlation is significant at the 0.05 level (2-tailed).

were tested. The results have shown that the criteria pertaining to AVE and CR are likewise satisfied.

Pearson's correlation coefficients were calculated to find out the possible relationships among the study's variables. Table 3 shows that all correlation coefficients were significantly different from zero. Except for the relationship of UT to PE in the Philippine group, all the relationships between each pair of the variables were significant. Further, the correlation coefficients were shown to be positive, which would suggest a positive relationship between the variables.

Table 4 compares the means of each of the variables between the Philippines and Macau. The results show that all are significantly different except for PE. This suggests that the two groups are different from each other in many respects, which is likewise validated in the succeeding analysis.

The standardized root mean square or SRMR was analyzed to check the model fit. According to Hu and Bentler (1999), an SRMR value of less than 0.10 is acceptable. The model yielded an SRMR of 0.058. This value is within the acceptable range. The relationships among the constructs were analyzed using SMARTPLS 3.0.

Table 5 shows that all predictors of intention to re-use such as PC, PE, PU, UT, and ST are significant at p-value < 0.01. However, the hypothesized moderating effect of motivation between ST and INT was not supported.

Except for H9, Figure 2 shows that hypotheses H1 to H8 were supported. Significant relationships exist with the following constructs: PC to PE, PE to PU, UT to PE, UT to PU, PE to ST, PC to PU, PU to ST, and ST to INT.

Moreover, Figure 2 shows that the IM and EM did not moderate the relationship between ST and INT. This implies that students from the Philippines and Macau were indifferent to the use of the ELS. There was no intrinsic and extrinsic motivator for them to re-use the ELS.

On the other hand, Table 5 also shows that for the Macau group, all predictors were significant except for the moderating effect of motivation at p-value < 0.05. On the other hand, for the Philippine group, all predictors were significant except for user training at p-value < 0.05. Further, the results for the Philippines group showed that motivation dampens the effects of satisfaction on intention to re-use.

The results also showed that at the group level, Macau and the Philippines differ significantly in terms of the effect of perceived ease of use and the moderating effect of motivation at p-value < 0.05.

Given the nature of this study, which contains multiple indicators and variables, PLS-SEM is the appropriate technique in testing the relationships. A multi-group parametric test was conducted to compare the relative strengths of the direct and indirect paths between the Chinese and Filipino students. The results show that only the indirect paths of PC to PU (p-value

Table 4

T-test Analysis for Each of the Variables

| Variables	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
				Lower	Upper
PU	0.002**	-.312	.099	-.506	-.118
PC	0.012**	-.260	.103	-.462	-.058
UT	0.000**	-.631	.088	-.803	-.458
ST	0.000**	-.471	.091	-.650	-.293
IT	0.000**	-.442	.093	-.624	-.260
IM	0.000**	-.686	.092	-.867	-.505
EM	0.000**	-.350	.079	-.194	-.507
PE	0.069	-.151	.083	-.314	-.012

**t-test is significant at the 0.01 level (2-tailed)

Table 5

Path Coefficients for Overall Model – Macau and Philippines

Country	Relationships	Path Coefficients	Std. Dev.	t-value	Decision
Overall	PC → PE	0.466	0.055	8.482**	H_1: Supported
	PE → PU	0.303	0.074	4.125**	H_2: Supported
	UT → PE	0.349	0.056	6.243**	H_3: Supported
	PE → ST	0.598	0.063	9.547**	H_4: Supported
	PC → PU	0.328	0.72	4.572**	H_5: Supported
	PU → ST	0.284	0.068	4.171**	H_6: Supported
	ST → INT	0.336	0.065	5.147**	H_7: Supported
	UT → PU	0.248	0.061	4.084**	H_8: Supported
	MT → INT	-0.029	0.024	1.219	H_9: Not Supported
Macau	MT → INT	0.016	0.027	0.592	
	PC → PE	0.377	0.086	4.371**	
	PC → PU	0.367	0.115	3.176**	
	PE → PU	0.188	0.095	1.971*	
	PE → ST	0.620	0.102	6.084**	
	PU → ST	0.244	0.107	2.272*	
	ST → INT	0.318	0.117	2.709**	
	UT → PE	0.348	0.091	3.834**	
	UT → PU	0.263	0.096	2.740**	
Philippines	MT → INT	-0.078	0.033	2.366*	
	PC → PE	0.484	0.070	6.901**	
	PC → PU	0224	0.071	3.155**	
	PE → PU	0.567	0.088	6.437**	
	PE → ST	0.604	0.094	6.454**	
	PU → ST	0.286	0.100	2.847**	
	ST → INT	0.252	0.089	2.821**	
	UT → PE	0.422	0.069	6.108**	
	UT → PU	0.135	0.071	1.895	

Note. * $p < 0.05$, ** $p < 0.01$
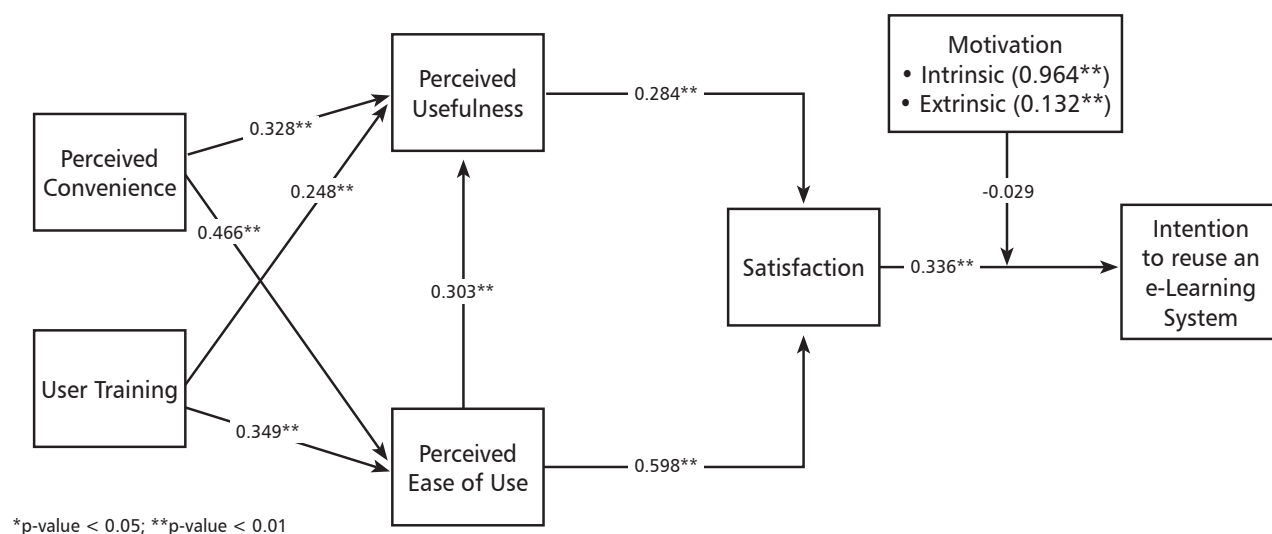
Figure 2. Over-all Path Analysis of Macau and Philippine Respondents

= 0.001), PE to SAT (p-value = 0.015), and UT to PU (p-value = 0.001) between the Chinese and Filipino students are significant from each other; thus, the relative strengths are similar.

Discussion

The overall path analysis for the Macau and Philippine groups showed that all predictors of intent to re-use the ELS were significant p-value < 0.01. This validates existing studies that show that cognitive beliefs of PE and PU of TAM can affect an ELS (Joo et al., 2016; Lee et al., 2013; Park, 2007). It also supports earlier findings that user training, perceived convenience, and satisfaction can affect the intent to re-use the ELS (Hayashi, 2012; Marshall et al., 2008; Ramadiani et al., 2017). This suggests that the ELS should be convenient, easy to use, useful, and satisfying for the user to re-use it (Boateng et al., 2016; Joo et al., 2016; Mohammadi, 2015; Ramadiani et al., 2017). User training can also assist in the re-use of the ELS as it can familiarize the user with how it can be effectively used (Marshall et al., 2008).

Motivation did not moderate the relationship between ST and INT. A possible reason for this was that the ELS was not required to be used in class in the Philippines, as respondents were given an option to use the ELS or use a hard copy of a textbook. Given this

scenario, there was no stimulus (intrinsic and extrinsic) that will encourage them to re-use the ELS. Further, they tend to use Facebook to get classroom information and exercises (Carvajal, 2014). Likewise, students from Macau were more motivated to use WeChat to communicate with their teachers and peers (Sandel et al., 2019). The result does not validate existing studies that show that intrinsic or extrinsic motivation can affect intent to re-use the ELS (Park, 2007). An important motivator for students to use the ELS would be to introduce digital games or make them enjoy their ELS (Chang. et al., 2017; Prensky, 2001).

Except for H9, which hypothesized IM and EM as moderating variables between ST and INT, all predictors for the Macau group were significant at a p-value < 0.05. On the other hand, for the Philippine group, all predictors were significant except for user training at a p-value < 0.05. This result does not support earlier findings that user training can affect technology adoption (Marshal et al., 2008). The possible explanation is that these young Filipino college students are digital natives who tend to dispense with user training to adopt a technology as they were born with it, unlike digital immigrants who need to be trained before they can adopt a technology (Prensky, 2001).

Because the Filipino and Chinese respondents are highly similar in power distance, collectivism, masculinity, and uncertainty avoidance (Bissessar,

2018; Hofstede Insights, n.d.), the overall results and the country-level results are similar (except for UT to PU, which was not significant for the Philippine group).

Conclusion

Providing students with an ELS for academic use does not guarantee that they will re-use it, especially if it is optional. This is because there are ELS competitors, such as Facebook and WeChat, that students use as alternative ways of communicating with their teachers and their classmates. Students are more likely to adopt an ELS if it can be integrated with popular forms of communication such as Facebook and WeChat (Carvajal, 2014; Sandel et al., 2019). Further, the ELS can explore the use of digital-game-based learning to motivate students to re-use it (Chang et al., 2017; Prensky, 2001).

The study's results showed that students are indirectly affected by PE and PU in their intent to re-use an ELS. This implies that students should view the ELS as easy to use and useful before they will adopt it. Further, students will use it if it is convenient and satisfying. There should be more efforts from teachers to promote students' confidence in successfully in handling an ELS and to point out the usefulness of an ELS.

Satisfaction is significant to behavioral intention. Students are likely to re-use an ELS if they find that it gives them more benefits than costs. In spite of the challenges brought by COVID-19 to higher education, it has also opened an opportunity to upgrade its educational mode of delivery and focus on an ELS that students find easy to use, useful, motivating, and satisfying (Toquero, 2020). These are the factors that will motivate college students to re-use an ELS.

This study contributed to scant cross-cultural studies that compared the behavior of Filipino college students as consumers to their counterparts in the U.S., Japan, and India (Bautista et al., 2020; Pandey et al., 2020).

Limitation and Areas for Future Research

Most of the Chinese and Filipino respondents were females. The study's results may model the behavior of females rather than the student who will re-use the ELS. There are studies that show that gender differences can affect behavioral intention (Armitage & Conner, 2001). Future studies can use an equal number of male and female students so that gender bias can be eliminated.

Most respondents in this study accessed ELS using their laptops and personal computers as most of them could not access the ELS using their mobile phones. Because mobile devices make learning portable and spontaneous, future studies can research on students' satisfaction with the accessibility of the ELS on their mobile phones (Joo et al., 2016).

The respondents from the Philippines and Macau, China are found to be highly similar in power distance, collectivism, masculinity, and uncertainty avoidance (Hofstede Insights, n.d.). Thus, the overall results and the country-level results are similar (except for UT to PU, which was not significant for the Philippine group). Future studies can use respondents from two countries that are different in Hofstede's cultural dimensions to determine if the results will be different.

The Filipino respondents were surveyed in November 2018, whereas the Macau respondents were surveyed from April to June 2019. The surveys were done when classes were still held face-to-face. Because universities have to resort to online learning during COVID-19, which started in December 2019, the perceptions of college students to re-use the ELS may have changed. Another study to determine the changes in college students' perceptions can be undertaken.

Declaration of ownership:

This report is our original work.

Conflict of interest:

None.

Ethical clearance:

This study was approved by the institution.

References

Acharya, B., & Lee, J. (2018). Users' perspective on the adoption of e-learning in developing countries: The case of Nepal with a conjoint-based discrete choice approach. *Telematics and Informatics, 35*(6), 1733–1743. https://doi.org/10.1016/j.tele.2018.05.002

Armitage, C., & Conner, M. (2001). Efficacy of the theory of planned behaviour: A meta-analytic review. *British Journal of Social Psychology*, *40*(4), 471–499. https://doi.org/10.1348/014466601164939

Andersson, A., & Gronlund, A. (2017). A conceptual framework for e-learning in developing countries: A critical review of research challenges. *Journal of Information Systems in Developing Countries*, *38*(8), 1–16. https://doi.org/10.1002/j.1681-4835.2009.tb00271.x

Bautista, R., Osaki, T., & Suplico-Jeong, L. (2020). Japanese and Filipino college students as consumers: Does country of origin affect their purchase intent? *DLSU Business & Economics Review, 29*(2), 1–18.

Bhattacherjee, A. (2001). Understanding information system continuance: An expectation-confirmation model. *MIS Quarterly*, *25*(3), 351–370. http://doi.org/10.2307/3250921

Bissessar, C. (2018). An application of Hofstede's cultural dimension among female educational leaders. *Education Sciences, 8*(77), 1–15. http://doi.org/10.3390/educsci8020077

Boateng, R., Mbrokoh, A.S., Boateng, L., Senyo, P. K., & Ansong, E. (2016). Determinants of e-learning adoption among students of developing countries. *International Journal of Information and Learning Technology 33*(4), 248–262.https://doi.org/10.1108/IJILT-02-2016-0008

Carvajal, A. (2014). Social transformations facilitated by Facebook on the Filipino generation Y. *International Journal of Education and Research, 2*(10), 77–90.

Chang, C., Yan, C., & Tseng, J. (2012). Perceived convenience in an extended technology acceptance model: Mobile technology and English learning for college students. *Australasian Journal of Educational Technology*, *28*(5), 809–826. https://doi.org/10.14742/ajet.818

Chang, C., Hajiyev, J., & Su, C. (2017). Examining the students' behavioral intention to use e-learning in Azerbaijan? The general extended technology acceptance model for E-learning approach. *Computers & Education, 111*, 128–143. https://doi.org/10.1016/j.compedu.2017.04.010

Churchill, G., & Iacobucci, D. (2002). *Marketing research: Methodological foundations* (8th ed.). Harcourt College Publishers.

Crawford, J., Butler-Henderson, K., Rudolp, J., Malkawi, B., Glowatz, M., Burton, R., Magni, P., & Lam, S. (2020). COVID-19: 20 countries' higher education intra-period digital pedagogy responses. *Journal of Applied Learning & Teaching, 3*(1). 9–28. https://doi.org/10.37074/jalt.2020.3.1.7

Cronbach, L. (1951). Coefficient alpha and the internal structure of tests. *Psychometrika, 16*, 297–355.

Davis, F., & Venkatesh, V. (2000). A theoretical extension of the technology acceptance model: Four longitudinal field studies. *Management Science, 46*(2), 186–204. https://doi.org/10.1287/mnsc.46.2.186.11926

Deci, E., Koestner, R., & Ryan, R. (1999). A meta-analytic review of experiments examining the effects of extrinsic rewards on intrinsic motivation. *Psychological Bulletin*, *125*(6), 627–668. https://psycnet.apa.org/doi/10.1037/0033-2909.125.6.627

Deci, E., & Ryan, R. (2008). Facilitating optimal motivation and psychological well-being across life's domains. *Canadian Psychology/Psychologie Canadienne*, *49*(1), 14–23. https://psycnet.apa.org/doi/10.1037/0708-5591.49.1.14

Deci, E., & Ryan, R. (1985). The general causality orientations scale: Self-determination in personality. *Journal of Research in Personality*, *19*(2), 109–134. https://doi.org/10.1016/0092-6566(85)90023-6

Del Barrio-García, S., Arquero, J., & Romero-Frías, E. (2015). Personal learning environments acceptance model: the role of need for cognition, e-Learning satisfaction and students' perceptions. *Educational Technology & Society*, *18*(3), 129–141.

Dela Pena-Bandalaria, M. (2007). Impact of ICTs on open and distance learning in a developing country setting: The Philippine experience. *International Review of Research in Open and Distance Learning, 8*(1), 1–15.

Dholakia, U. (2006). How customer self-determination influences relational marketing outcomes: Evidence from longitudinal field studies. *Journal of Marketing Research*, *43*(1), 109–120. https://doi.org/10.1509%2Fjmkr.43.1.109

Eastin, M. (2002). Diffusion of e-commerce: An analysis of the adoption of four e-commerce activities. *Telematics and Informatics*, *19*(3), 251–267. http://dx.doi.org/10.1016/S0736-5853(01)00005-3

Garcia, K. (2016, March 21). Education and the internet for a sustainable PH. *Rappler.* https://www.rappler.com/brandrap/tech-and-innovation/126587-education-internet-sustainable-ph

Hayashi, F. (2012). Mobile payments: What's in it for consumers? *Economic Review, Federal Reserve Bank of Kansas City, 97*(QI), 35–66.

Hofstede Insights. (n.d.). *Country comparison.* Retrieved July 5, 2019 from https://www.hofstede-insights.com/country-comparison/china,the-philippines/

Hu, L., & Bentler, P. (1999). Cut-off criteria for fit indexes in covariance structure analysis: Conventional criteria

versus new alternatives. *Structural Equation Modeling: A Multidisciplinary Journal*, *6*(1), 1–55. https://doi.org/10.1080/10705519909540118

Igbaria, M., & Iivari, J. (1995). The effects of self-efficacy on computer usage. *Omega*, *23*(6), 587–605. https://doi.org/10.1016/0305-0483(95)00035-6

Igbaria, M., Zinatelli, N., Cragg, P., & Cavaye, A. L. M. (1997). Personal computing acceptance factors in small firms a structural equation model. *MIS Quarterly, 21*(3), 279–305. http://doi.org/10.2307/249498

Joo, Y., Kim, N., & Kim, N. (2016). Factors predicting online university students' use of a mobile learning management system (m-LMS). *Educational Technology Research and Development, 64*(4), 611–630. https://doi.org/10.1007/s11423-016-9436-7

Ketchen, D. (2013). A primer on partial least squares structural equation modeling. *Long Range Planning, 46*(1-2), 184–185.

Kock, N. (2015). Common method bias in PLS-SEM: A full collinearity assessment approach. *International Journal of e-Collaboration*, *11*(4), 1–10. http://doi.org/10.4018/ijec.2015100101

Lee, Y., Hsieh, Y., & Chen, Y. (2013). An investigation of employees' use of e-learning systems: Applying the technology acceptance model. *Behaviour & Information, 32*(2), 173–189. https://doi.org/10.1080/0144929X.2011.577190

Liao, Z., & Cheung, M. (2002). Internet-based e-banking and consumer attitudes: An empirical study. *Information & Management, 39*(4), 283–295. https://doi.org/10.1016/S0378-7206(01)00097-0

Liaw, S. (2008). Investigating students' perceived satisfaction, behavioral intention, and effectiveness of e-learning: A case study of the Blackboard system. *Computers & Education, 51*(2), 864–873. https://doi.org/10.1016/j.compedu.2007.09.005

Marcial, D., Caballero, D., Rendal, J., & Patrimonio, G. (2015). I am offline: Measuring barriers to open online learning in the Philippines. *Information Technologies and Learning Tools*, *45*(1), 28–40. https://doi.org/10.33407/itlt.v45i1.1170

Marshall, B., Mills, R., & Olsen, D. (2008). The role of end-user training in technology acceptance. *Review of Business Information System*, *12*(2), 151–162. https://doi.org/10.19030/rbis.v12i2.4384

Mohammadi, H. (2015). Investigating user's perspectives on e-learning: an integration of TAM and IS success model. *Computers in Human Behavior, 45*, 359–374. https://doi.org/10.1016/j.chb.2014.07.044

Pandey, S., Chawla, D., Suplico-Jeong, L., Bautista, R., & Santos, J. (2020). An experimental approach to examine the antecedents of attitude, intention, and loyalty towards cause-related marketing: The case of India and the Philippines. *Global Business Review, 21*(1), 1–20. https://doi.org/10.1177/0972150919901186

Park, S. (2009). An analysis of the technology acceptance model in understanding university students' behavioral intention to use e-learning. *Educational Technology & Society*, *12*(3), 150–162.

Peterson, R. (1994). A meta-analysis of Cronbach's coefficient alpha. *Journal of Consumer Research* 21(2), 381–391. https://doi.org/10.1086/209405

Prensky, M. (2001). Digital natives, digital immigrants Part 1. *On the Horizon, 9*(5) 1–6. https://doi.org/10.1108/10748120110424816

Ramadiani, A., R., Haryaka, U., Agus, F., & Kridalaksana, A. H. (2017). User satisfaction model for e-learning using smartphone. *Procedia Computer Science, 116*, 373–380. https://doi.org/10.1016/j.procs.2017.10.070

Ringle, C., Wende, S., & Becker, J. (2015). *SMARTPLS3*. Retrieved from http://www.smartpls.com.

Robinson, J. P., Shaver, P. R., & Wrightsman, L. S. (1991). Criteria for scale selection and evaluation. In J. P. Robinson, P. R. Shaver, & L. S. Wrightsman (Eds.), *Measures of personality and social psychological attitudes* (pp. 1–15). Academic Press. https://doi.org/10.1016/B978-0-12-590241-0.50005-8

Roth, G., Assor, A., Niemiec, C., Ryan, R., & Deci, E. (2009). The emotional and academic consequences of parental conditional regard: Comparing conditional positive regard, conditional negative regard, and autonomy support as parenting practices. *Developmental Psychology*, *45*(4), 1119–1142. https://psycnet.apa.org/doi/10.1037/a0015272

Ryan, R. (1995).Psychological needs and the facilitation of integrative processes. *Journal of Personality* 63 (3).397-427.

Ryan, R., Rigby, S., & King, K. (1993). Two types of religious internalization and their relations to religious orientations and mental health. *Journal of Personality and Social Psychology*, *65*(3), 586–596. https://psycnet.apa.org/doi/10.1037/0022-3514.65.3.586

Sandel, T., Ou, C., Wangchuk, D., Ju, B., & Duque, M. (2019). Unpacking and describing interaction on Chinese WeChat: A methodological approach. *Journal of Pragmatics, 143*, 228–241. http://dx.doi.org/10.1016/j.pragma.2018.08.011

Toquero, C. M. (2020). Challenges and opportunities for higher education amid the COVID-19 pandemic: The Philippine context. *Pedagogical Research*, 5(4). https://doi.org/10.29333/pr/7947

Williams, G., & Deci, E. (1996). Internalization of biopsychosocial values by medical students: A test of self-determination theory. *Journal of Personality and Social Psychology*, *70*(4), 767–779. https://doi.org/10.1037//0022-3514.70.4.767

Yoon, C., & Kim, S. (2007). Convenience and TAM in a ubiquitous computing environment: The case of wireless LAN. *Electronic Commerce Research and Applications*, *6*(1), 102–112. https://doi.org/10.1016/j.elerap.2006.06.009

Zheng, Q., Chen, L., & Burgos, D. (2018). *The development of MOOCs in China.* Springer Singapore. https://doi.org/10.1007/978-981-10-6586-6