Adopting Theory of Planned Behavior on the Study of Blended Learning at Higher Education Institutions in Cambodia

Sokha Norng [1], Pisith Hok [2] & Lay Sau [3]

Corresponding Author. Email: norng.sokha@acleda-aib.edu.kh
1 & 2. ACLEDA Institute of Business
3. National University of Management

ABSTRACT

The study aims to determine the factors that influence students' intention to adopt blended learning in Cambodia. The Theory of Planned Behavior (TPB), developed by Ajzen (1985), has been employed to pave the way for the study. A survey questionnaire with 46 questions, adapted from previous studies, was designed using a 9-point Likert scale to meet statistical requirements. This survey was sent to 400 students at three targeted higher education institutions; however, only 204 students who live in Phnom Penh City filled in the survey questionnaire. First, confirmatory factor analysis (CFA) was used to validate the instrument, and then a structural equation modeling (SEM) was employed to test the specified hypotheses by running path analysis in AMOS software. The study has shown that the students use their mobile phone at 50.50% and laptop at 41.70% to study online via Zoom Meeting at 50% and Microsoft Teams at 46.60%. From the path analysis, the study has found that three hypotheses were supported and one hypothesis was not supported; in other words, attitude and subjective norm have a significant positive effect on the intention to adopt blended learning at (β=0.42) and (β=0.39), respectively; however, perceived behavioral control does not impact on the intention to adopt blended learning. Moreover, behavioral intention impacts positively on the actual adoption of blended learning at (β=0.67). The findings of this study contributed significantly to the improved blended learning activities. More importantly, it benefits academic program designers and the management team of the higher education institutions as they could integrate blended learning activities into a course or a program level.

Keywords: Blended learning, Theory of Planned Behavior (TPB), Confirmatory Factor Analysis (CFA), Structural Equation Modelling (SEM)

1. Introduction

1.1 Background of the study

Over the last two years, the outbreak of COVID-19 kept people in social distancing, and postponed social activities nationwide in Cambodia. In order to protect people from the pandemic, the Ministry of Education, Youth and Sport (MoEYS) announced the postponement of the physical classroom and encouraged online learning (MoEYS, 2020). Online learning was introduced to educational institutions at all levels to ensure that the learning would remain ongoing despite the pandemic.

The term online learning was considered relatively new to be implemented in the educational sector in Cambodia; therefore, development partners have taken quick actions to provide technical support for MoEYS. For instance, under UNESCO's Capacity Development for Education (CapED), UNESCO has worked closely with MoEYS to strengthen digital and distance learning for primary and lower secondary school students. Under this program, 200 video lessons have been produced and broadcasted on MoEYS's official online and digital learning platform and Techo TV channel (UNESCO, 2020). Likewise, UNICEF has produced distance learning materials such as videos and e-lessons for primary, lower, upper secondary education; and these materials were broadcast via social media platforms, TV, and radio (UNICEF, 2020). At the same time, all higher education institutions in Cambodia have been impacted by the COVID 19 as Heng (2020) described that there was no choice for all schools and universities across the country but to switch to online learning during the pandemic. According to (Post Staff, 2020), MOEYS has encouraged blended learning, a combination of in-class and distance learning.

1.2 Statement of the problem

Blended learning, applied by many universities worldwide, consists of both pros and cons. There are several advantages of blended learning, such as pedagogical richness, access to knowledge, social interaction, personal agency, cost-effectiveness, and ease of revision (Osguthorpe & Graham, 2003). Besides the advantages, blended learning has several challenges in terms of technical, organizational, and instructional design (Kaur, 2013). In Cambodia, very few teachers have adopted both online and off-line teaching approaches (Phal et al., n.d.). Moreover, a qualitative study conducted by (Heng & Hang, 2017) on teachers' perception towards blended learning adoption at the Institute of Foreign Languages, Royal University of Phnom Penh showed that the lecturers had a fairly positive opinion toward implementing blended learning at higher education institutions. They have suggested that other stakeholders such as MoEYS, educational institutions, and students need to be considered when implementing blended learning. Besides, at ACLEDA Institute of Business, a Commission of Online Plus has been created in order to make sure that Online Plus (Blended Learning) has been effectively implemented; however, the Commission has not employed a quantitative study on the adoption of blended learning yet. Furthermore, there is a lack of previous studies on students' intention to adopt blended learning in Cambodia.

1.3 Research objective

In order to fulfill the above gap, this study aimed to determine the factors that influence students' intention to adopt blended learning in Cambodia. Furthermore, the Theory of Planned Behavior (TPB) has been employed to pave the way for the study. In this sense, the impact of attitude, subjective norm, and perceived behavior control toward the intention to adopt blended learning have been the central focus in this study.

1.4 Research question

In order to set the light for the research objective, the study raised one main research question: " Which factors of TPB influence students' intention to adopt blended learning in Cambodia?".

1.5 Significance of the study

The findings of this study contributed significantly to the key stakeholders and the existing literature. The university lecturers could select particular activities of blended learning that the students favored applying in their teaching. Moreover, academic program designers could integrate blended learning activities into a course or program level; and the management team of the higher education institutions could take advantage of blended learning by initiating the effective online academic program. Last but not least, the findings would be able to fill the gap of the existing literature of the Theory of Planned Behavior (TPB).

1.6 Scope of the study

This study employed a survey to collect a breadth of information; thus, it is limited in its nature (Schindler, 2019). Since Cambodia is still developing, some students living in the province and rural areas were not included as they could not adopt a new electronic platform yet. Last but not least, this study focused on higher education institutions only; therefore, students at primary, secondary, and high school education were not selected for this study.

2. Literature Review

2.1 Definition of blended learning

The concept of blended learning existed after the term hybrid course, yet the two terms are then used interchangeably (Graham, 2011). Blended learning is one of the top ten trends to emerge in the knowledge-based society (Rooney, 2003). There is a continuous debate on the definition of blended learning (Bonk & Graham, 2004). A group of authors, i.e. Bersin & Associates (2003), Orey (2002) and Singh & Reed (2001) refers to blended learning as "combining instructional modalities"; other authors such as Driscoll (2002) and Rossett (2002) define blended learning as the "combining instructional methods." Reay (2001), Rooney (2003), Sands (2002) and Young (2002) describe blended learning as the "combining online and face-to-face instruction." Even though the continuous debate exists, Graham et al. (2003) finally define the term "blended learning" as combining face-to-face instruction with

technology-mediated instruction. Blended learning, defined by Graham et al. (2003), is consistent with the context of Cambodia as Khoun (2020) describes blended learning as […an integration of digital learning with an offline mode of knowledge delivery through affordable technologies…]. Table 1 shows the categories of blended learning, applied at the higher education institutions in several countries.

Table 1: Blended Learning Categories

System/Institution	Themes	Author(s) & Year
Course Management System, (WebCT) Global Perspectives	- First, technology is used as a supplement to traditional course practices (technology-enhanced courses). - Second, apply computer-mediated activities to replace some of the traditional face-to-face lecture time. - Third, students can choose to take a mix of both traditional face-to-face and completely online courses.	(Ross & Gage, 2006)
University of Waikato in New Zealand	- Supported online - courses are taught in the traditional lecture/tutorial mode, with online support materials - Somewhat online - there is an online component for on campus students - Mostly online - there is a mix of online and some on campus work in the qualification - Fully online - students can complete qualifications without coming onto the campus	(Wright et al., 2006)
University of Glamorgan in Wales	- Basic ICT usage stage (PowerPoint, Word, etc.) - E-enhanced stage (use of LMS for productivity and communication) - E-focused stage (use of discussion boards, interactive materials, online assessments, etc.) - E-intensive stage (predominantly online courses with minimal face-to-face time for inductions, briefings, etc.)	(Jones et al., 2011)
Spanish public universities	- Stage1: an instructional design that integrates face-to-face and non-face-to-face spaces, - Stage2: interactive and accessible educational materials, - Stage3: a continuous support system - Stage4: a continuous assessment system	(Martín-García, A. V., Martínez-Abad, F., & Reyes-González, 2019)

2.2 The importance of blended learning

Blended learning has been applied not only in the educational sector but also in the business sector; for instance, corporations such as IBM and SUN Microsystems have adopted blended learning as a method for providing training for their employees. In higher education, blended learning exists at the institutional, program, course, and activity level (Bonk & Graham, 2004). Table 2 illustrates the application of blended learning at the course level.

Table 2: Blended Learning Activities

System/Institution	Themes	Author(s) & Year
European Maturity Model for Blended Education	-course design process (selection of blended learning activities and their sequence; selection of blended learning tools), -course flexibility, -course interaction, -course experience (student learning, study load, inclusiveness) Adapted from (Van Valkenburg et al., 2020)	(Nikiforova, 2021)
Mzumbe University, Tanzania	-Group work and online collaborative learning -Interactions -Assessments	(Machumu et al., 2018)
Open University Business School	-The first stage (access and motivation) -The second stage (online socialization) -In the third stage (information exchange) -The fourth stage (knowledge construction) -The fifth stage (development) Adapted from (Salmon, 2003)	(Astudillo, 2020)
University of Central Florida	Online activities: -Individual learning activities -Collaborative learning activities -Web based training & webcast -Online tutorial, blog & chat rooms -Discussion board activities -Recorded lecturers & videos -Online assessment & feedbacks Face-to-Face (F2F) Activities: -Class room lecturers -Individua/group discussions -Laboratory activities -Presentation activities -Student-student interaction -Student-lecturer interaction -Student assessment & feedbacks Adapted from (Graham, 2013); (Moskal et al., 2013)	(Anthony et al., 2020)

The corporations and higher education institutions choose to adopt blended learning for several reasons such as pedagogical richness, access to knowledge, social interaction, personal agency, cost-effectiveness, and ease of revision (Osguthorpe & Graham, 2003); and improved pedagogy, increase access/flexibility, and increased cost-effectiveness (Graham et al., 2003).

2.3 The adoption of Theory of Planned Behavior on blended learning

In order to confirm the connection between intention and behavior, Ajzen (1985) extended the Theory of Reasoned Action (TRA) into a Theory of Planned Behavior (TPB), which states that attitude, subject norms, and perceived behavioral control, which altogether shapes an

individual's behavioral intentions and behaviors (Ajzen, 1985). As cited in (Osman, 2020), the Theory of Planned Behavior (TPB) has been used in the study of attitudes and behaviors in the disciplines (Renko et al., 2012), namely in health care campaigns (Javadi et al., 2013), in marketing (Ferdous, 2010), and on online distance learning (Osman, 2020).

2.4 Conceptual framework of Theory of Planned Behavior (TPB) in the study about blended learning

In this study, TPB has been employed to identify the factors influencing students to adopt blended learning in Cambodia.

2.4.1 Attitude and behavioral intention

Fishbein & Ajzen (1975) define attitudes as an individual's evaluation of an object and as the individual's positive or negative feeling about performing the target behavior (Davis et al., 1989). Attitudes are influenced by behavioral beliefs and outcome evaluation, primarily through behavioral intention. Fishbein & Ajzen (1975) define intention as the agent's subjective probability whereby he or she will perform the behavior. Davis et al. (1989) confirm that attitude influences the intention to adopt a specific system. Bagozzi et al. (1992) supported that intention to adopt technology learning and usage is influenced by the attitude. Thus, the study proposed the following hypothesis.

H_1: Attitude has a significant positive effect on the intention to adopt blended learning.

2.4.2 Subjective norm and behavioral intention

In the Theory of Planned Behavior (TPB), Ajzen (1985) defines subjective norm as the perceived social pressure to engage or not to engage in a behavior. In other words, it is the belief that an important person or group of people approve and support a particular behavior (Ham et al., 2015). The group that influences the individual behavior can be family, friends, social networks, or significant others. Subjective norm has been found to have a direct effect on the behavioral intention (Fishbein & Ajzen, 1975; Ajzen, 1985), information technology usage (Taylor & Todd, 1995), and system usage (Venkatesh & Morris, 2000). As a result, the study proposed the following hypothesis.

H_2: Subjective norm has a significant positive effect on the intention to adopt blended learning.

2.4.3 Perceived behavioral control and behavioral intention

Abrahamse (2019) defines perceived behavioral control (PBC) as a person's own perceptions of his or her ability to perform the behavior. Ajzen (1985) defines PBC as the person's belief that his or her performance of a specific behavior is under his or her control, and it is assessed by a degree of ease or difficulty of the behavior. Moreover, behavioral intention is determined by a person's expectancy to control his or her behavior called PBC

(Ajzen, 1985). In other words, PBC can directly affect behavioral intention (Ajzen, 2013), on the intention at Computing Resource Center (Taylor & Todd, 1995), and on the intention to adopt online distance learning (Osman, 2020). Therefore, the study proposed the following hypothesis.

H_3: Perceived behavioral control has a significant positive effect on the intention to adopt blended learning.

2.4.4 Behavioral intention and usage behavior

Usage behavior can be defined as continuous commitment to the product (Black, 1983). Usage behavioral in this study has been operationalized as the actual adoption of blended learning. Usage behavior is found to be influenced directly by behavioral intention on technology acceptance and usage (Davis et al., 1989; Venkatesh & Davis, 2000), on technological learning and usage (Bagozzi et al., 1992), at Computing Resource Center (Taylor & Todd, 1995), and on online distance learning (Osman, 2020). In order to study the relationship between behavioral intention and actual behavior to adopt blended learning, the study proposes the hypothesis as follows:

H_4: Behavioral intention has a significantly positive effect on the actual adoption of blended learning.

2.4.5 Conceptual model and research hypotheses

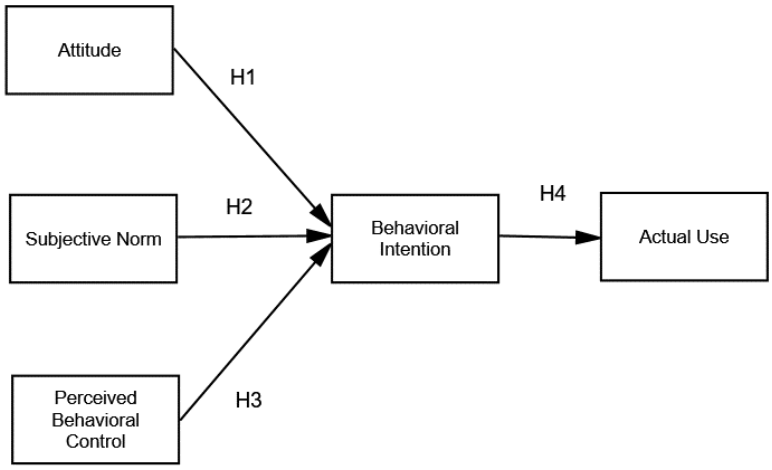

Figure 1: Conceptual model of TPB on blended learning

Therefore, the study employed the Theory of Planned Behavior (TPB) in order to study the factors influencing blended learning adoption at higher education institutions in Cambodia. Furthermore, to set the light of the study, four main hypotheses have been proposed so that the objective can be fulfilled.

H_1: Attitude has a significant positive effect on the intention to adopt blende d learning.

H_2: Subjective norm has a significant positive effect on the intention to adopt blended learning.

H_3: Perceived behavioral control has a significant positive effect on the intention to adopt blended learning.

H_4: Behavioral intention has a significant positive effect on the actual adoption of blended learning.

3. Methods

3.1 Research design

The study employed a correlational design, which provides an opportunity to predict scores and explain the relationship among variables (Cresswell, 2012). Furthermore, previous studies have been analyzed, and construct measurements have been adapted to develop research instruments for collecting data. The study employed a survey questionnaire which was made in Microsoft Form as research tool and collected data was analyzed by demographic analysis, descriptive analysis, confirmatory factor analysis, and path analysis.

3.2 Research area and target population

Since the topic of blended learning is relatively new in the context of Cambodia, the study selected students from three higher education institutions (HEIs) that have applied blended learning during the Covid-19 pandemic from October to December 2020, namely ACLEDA Institute of Business, Beltei International University, and Institute of Foreign Languages. Furthermore, the study focused on the students who live in Phnom Penh City due to Internet accessibility.

3.3 Sample size

For a practical case of regression analysis in the structural equation model (SEM), the study selected 204 students as a sample size. This study follows previous research; for instance, Knofczynski & Mundfrom (2008) recommends a 200 sample size of an excellent prediction level of four predictors variables with a level of squared population multiple correlation of 0.2. Wolf et al. (2013) state that the simple two-factor model (with three indicators per factor) requires a minimum sample of 460, 200, and 120 for factor loadings of 0.50, 0.65, and 0.80, respectively in running the SEM.

3.4 Research tools

A questionnaire comprised of three sections was developed. Section one consists of ten questions focusing on personal data, and five questions focusing on general experiences of blended learning adoption. Moreover, section two consists of six items for attitude, seven items for subjective norm, six items for perceived behavioral control, six items for behavioral intention, and four items for usage behavior. All of the items in each section were adapted from previous studies, as shown in Table 3. Finally, section three consists of one question focusing

on suggestions and comments. Furthermore, 9-point Likert Scale was used as the rating for the five variables to reduce rater errors (Schindler, 2019). Scale number 1 refers to strongly disagree, and 2, 3, 4, 5, 6, 7, 8, and 9 refer to disagree, moderately disagree, mildly disagree, neutral, mildly agree, moderately agree, agree, and strongly agree, respectively.

Table 3: Construct measurement of the five variables

Constructs	Items	References
Attitude	ATT1: Face-to-face and online learning save me time.	(Fishbein and Ajzen 1975) Bagozzi et al. (1992)
	ATT2: Face-to-face and online learning have more advantages, and they are important to me.	
	ATT3: It is a good idea to learn face-to-face and online.	
	ATT4: It is wise to learn face-to-face and online.	
	ATT5: It is pleasant and interesting to learn face-to-face and online.	
	ATT6: Overall, I have a positive opinion toward face-to-face and online learning.	
Subjective Norm	SN1: My classmates usually learn both face-to-face and online.	(Venkatesh & Davis, 2000) (Ajzen, 2013) (Taylor &Todd, 1995)
	SN2: My classmates think that I should learn both face-to-face and online.	
	SN3: Generally speaking, I want to learn both face-to-face and online like my classmates.	
	SN4: My university lecturers expect me to learn both face-to-face and online.	
	SN5: My close friends expect me to learn both face-to-face and online.	
	SN6: My family expects me to learn both face-to-face and online.	
	SN 7: My idol expects me to learn both face-to-face and online.	
Perceived Behavioral Control	PBC1: I would feel comfortable learning both face-to-face and online.	(Ajzen 2013) (Osman, 2020) (Taylor & Todd, 1995)
	PBC2: I have enough knowledge to learn both face-to-face and online.	
	PBC3: Generally speaking, I want to learn both face-to-face and online like my classmates.	
	PBV4: My university lecturers facilitate both face-to-face and online learning.	
	PBC5: I have the ability to learn both face-to-face and online.	
	PBC6: I believe I can control over face-to-face and online -learning.	
	PBC7: I have the resources to learn both face-to-face and online.	
Behavioral Intention	BI1: I plan to do both face-to-face and online learning.	(Fishbein and Ajzen, 1975) (Bagozzi et al., 1992)
	BI2: I intend to do both face-to-face and online learning.	
	BI3: I will strongly recommend both face-to-face and online learning to someone that I know.	
	BI4: Whenever I want to develop my knowledge, I will do both face-to-face and online learning.	
	BI5: I am willing to learn both face-to-face and online.	
	BI6: I would suggest my university/institution conduct learning both face-to-face and online.	

(to be continued)

Table 3: Construct measurement of the five variables(continued)

Constructs	Items	References
Usage Behavior	USE1: I have learned both in class and online during Covid 19 pandemic. USE2: I used to learn both in class and online last year. USE3: I become familiar with both in-class and online learning. USE4: Overall, I usually learn both in class and online learning during Covid 19 pandemic.	(Venkatesh & Davis, 2000) (Ajzen 2013) (Taylor & Todd, 1995)

3.5 Data collection

Due to the Covid-19 pandemic, the study sent a survey link designed in Google Form to the research participants via Telegram, Facebook Messenger, Instagram, and LinkedIn. The survey link was sent to the selected students who had experienced blended learning at the three HEIs from February to May 2021.

4. Results

This chapter analyses the responses and presents the research findings from the data collected from the survey. Since the data analysis was based on a quantitative approach, thus the data collected were presented in ordinal, quantitative, and numerical manners. The outputs were generated using the AMOS program. This survey link was sent to 400 students at three selected higher education institutions, namely ACLEDA Institute of Business, Beltei International University, and Institute of Foreign Languages. However, only 204 students who live in Phnom Penh City filled in the survey questionnaire.

4.1 Demographics analysis

Among the 204 respondents, 129 were female, accounting for about 63%, and 75 were male, comprised of about 37%. The responses indicate that the participants from age 21-22, yielding the highest response rate of 56.9%. Another distribution of the sample shows that there were 86.76% of the total sample studying the bachelor's degrees; some are studying at years 2, 3, and 4, which accounts for 25.4%, 28.9%, and 33.3%, respectively. More than half of all the students are working while studying, and some of them run their own businesses, 8.30%. Regarding blended learning, the participants use their mobile phone the most, then laptop to study online via the three popular online platforms, i.e., Zoom Meeting (50%), Ms. Teams (46.6%), and Google Meet (3.4%). At the same time, the students use Schoology at 50% and Ms. Team at 46.6% as a medium for the asynchronous learning activity, and 96.56% of them use Telegram as a means for communication with their lecturers. Most of their online activities are online surveys, accounting for 68.60%, and 46.10% stated that they learn face-to-face before learning online.

Table 4: Demographic factor of the blended learning

Demographic	Category (n=204)	Frequency	Percentage
Gender	Male	75	36.80%
	Female	129	63.20%
Age	Between 17 to 20 years old	52	25.50%
	Between 21 to 22 years old	116	56.90%
	Between 23 to 25 years old	24	11.80%
	Over 25 years old	12	5.90%
Educational Background	Associate student	14	6.86%
	Bachelor student	177	86.76%
	Master student	13	6.37%
Year of Study	Year 2	52	25.49%
	Year 3	59	28.92%
	Year 4	68	33.33%
	Others	25	12.25%
Occupational status	Company employee	104	51.00%
	Government officer	8	3.90%
	Business owner	17	8.30%
	Self-employed	7	3.40%
	Currently unemployed	68	33.30%
Types of devices used for blended learning	Computer Desktop	12	5.90%
	Laptop	85	41.70%
	Tablet	4	2.00%
	Mobile phone (smartphone)	103	50.50%
Online platform	Zoom Meeting	102	50.00%
	Microsoft Team	95	46.60%
	Google Meet	7	3.40%
Asynchronous activity platform	Schoology	102	50.00%
	Microsoft Team	95	46.60%
	Google Classroom	7	3.40%
Communication platform	Telegram Messenger	197	96.57%
	Facebook Messenger	7	3.43%
	Other	0	0%
Blended learning activities	Online Quiz	35	17.20%
	Online exercises	3	1.50%
	Online searching information	7	3.40%
	Online video	9	4.40%
	Online meeting	9	4.40%
	Online problem-solving	1	0.50%
	Online survey	140	68.60%

(to be continued)

Table 4: Demographic factor of the blended learning (continue)

Demographic	Category (n=204)	Frequency	Percentage
Blended learning mode	I learned face-to-face (F2f) and online at the same time.	31	15.20%
	First, I learned face-to-face. Then I learn online.	94	46.10%
	First, I learned online. Then I learn face-to-face.	39	19.10%
	I learned face-to-face only.	2	1.00%
	I learned online only.	38	18.60%

4.2 Descriptive analysis

❖ Level of agreement

The mean of each variable ranges from the lowest one of 5.936, which is a subjective norm with a standard deviation of 1.903, to the highest of 6.475, which is a usage behavior with a standard deviation of 1.856. Moreover, the following data analysis shows the respondents' level of agreement towards the adoption of blended learning. Below is the nine-point Likert scale and its classification. The table 5 illustrates the respondents' level of agreement on the measurement of each factor that inspires students' attitude and perceived behavioral control towards adopting blended learning. According to (Armstrong, 1987), all the variables are classified as Mildly agree, except the actual use, which is Moderately agreed.

8.20 - 9.00 were classified as Strongly Agree
7.30 - 8.19 were classified as Agree
6.40 - 7.29 were classified as Moderately Agree
5.50 - 6.39 were classified as Mildly Agree
4.60 - 5.49 were classified as Neutral or Neither Agree nor Disagree
3.70 - 4.59 were classified as Mildly Disagree
2.80 - 3.69 were classified as Moderately Disagree
1.90 - 2.79 were classified as Disagree
1.00 - 1.89 were classified as Strongly Disagree

Table 5: Level of Agreement

Variable	Min	Max	Mean*	SD	Level of Agreement
Attitude (ATT)	2	9	6.351	1.582	Mildly Agree
Subjective Norm (SN)	1	9	5.936	1.903	Mildly Agree
Perceived Behavioral Control (PBC)	1	9	6.264	1.938	Mildly Agree
Behavioral Intention (BI)	1	9	6.333	1.84	Mildly Agree
Actual Adoption (USE)	1	9	6.475	1.856	Moderately Agree

4.3 Measurement model analysis

The conceptual model of TPB consists of three exogenous variables (attitude, subjective norm, and perceived behavioral control), one endogenous variable (actual adoption), and one mediating variable (behavioral intention). After running Confirmatory Factor Analysis (CFA), the study dropped three, four, four, three, and two indicators of the factors such as attitude, subjective norm, perceived behavioral control, behavioral intention, and actual adoption, respectively.

4.3.1 Factor loading

Figure 2 shows that the factor loadings of all items are highly adequate. The standardized regression weights range from 0.747 to 0.924, above 0.50 as suggested by Hair et al. (2010). Thus, most of the constructs confirm the convergent validity test, and those factor loadings can be used to estimate construct reliabilities (CR) and average variance extracted (AVE).

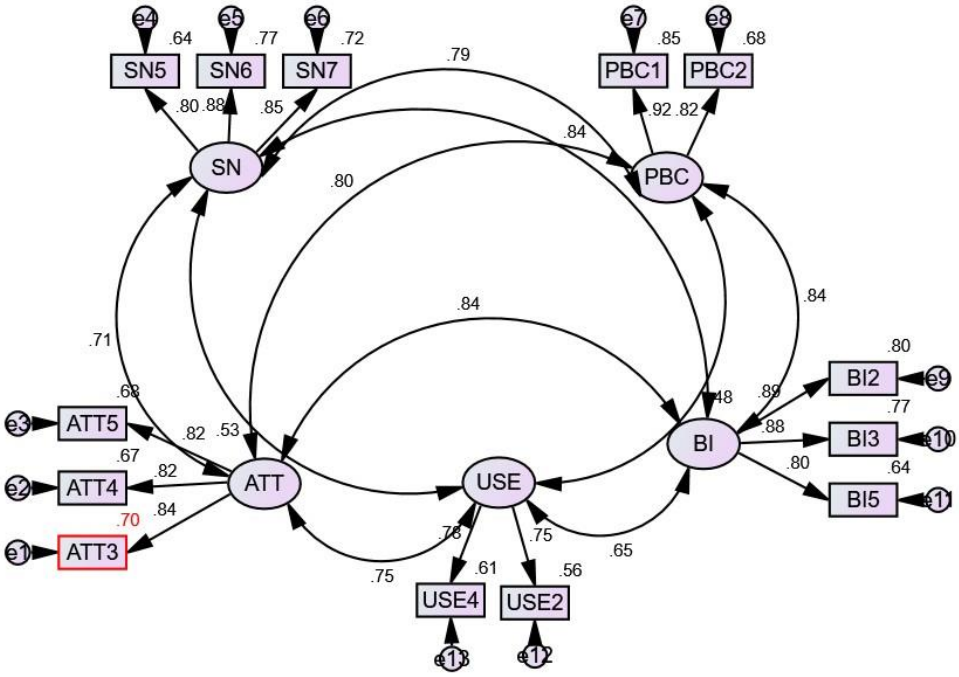

Figure 2: Factor loading analysis

4.3.2 Cronbach alpha and construct reliabilities

Table 6 shows that each construct consists of composite reliability reaching an acceptable value of 0.60 (Haruna, 2014). The behavioral intention has the highest Cronbach's alpha of 0.889, but the actual adoption has the lowest Cronbach's alpha of 0.738; moreover, the subjective norm has the highest construct reliability (CR) of 0.878, while actual adoption has the lowest reliability (CR) of 0.649.

Table 6: Cronbach's Alpha and Construct Reliabilities

Variable Types	Variable Names	Items	Cronbach's alpha	CR
Exo1	Attitude (ATT)	3	0.866	0.8674
Exo2	Subjective Norm (SN)	3	0.875	0.878
Exo3	Perceived behavioral control (PBC)	2	0.863	0.788
Mediating Variable	Behavioral Intention (BI)	3	0.889	0.764
Endo	Actual Adoption (USE)	2	0.738	0.649

4.3.3 Discriminant validity of constructs

Table 7 illustrates the result of variance extracted (VE), which is calculated into average variance extracted (AVE). The VE for attitude, subjective norm, perceived behavioral control, behavioral intention, and actual adoption is 0.685, 0.707, 0.765, 0.735, and 0.586, respectively.

Table 7: Final CFA of the Five Variables

Variable	Code	Factor Loading	SFL	Error	Variance Extracted
	ATT3	0.839	0.703	0.296	
ATT	ATT4	0.821	0.674	0.325	0.685
	ATT5	0.824	0.678	0.321	
	SN5	0.799	0.638	0.361	
SN	SN6	0.877	0.769	0.230	0.707
	SN7	0.846	0.715	0.284	
	PBC1	0.924	0.853	0.146	0.765
PBC	PBC2	0.823	0.677	0.322	
	BI2	0.893	0.797	0.202	
BI	BI3	0.875	0.765	0.234	0.735
	BI5	0.802	0.643	0.356	
USE	USE2	0.747	0.558	0.441	0.586
	USE4	0.784	0.614	0.385	

Table 8 illustrates the average variance extracted (AVE) for two variables. Phang (2016) cited "the AVE should be more than the squared inter-construct correlation (SIC) of the two constructs to support discriminant validity. If AVE is less than CS, the problem of multicollinearity would exist" (Fornell & Larcker, 1981). According to the Table, the highest AVE is between Perceived Behavioral Control and Behavioral Intention, equal to 0.750, and the lowest AVE is between Attitude and Usage Behavior, equal to 0.635.

Table 8: Average Variance Extracted (AVE) Matrix of Variables

Variable Name	ATT	SN	PBC	BI	USE
ATT	1				
SN	0.696	1			
PBC	0.725	0.736	1		
BI	0.710	0.721	0.750	1	
USE	0.635	0.647	0.675	0.660	1

Table 9 reveals that each AVE value is more than the squared inter-construct correlation (SIC) as the comparison between the AVE value in Table 8 and the SIC value in Table 9. The highest difference is between Perceived Behavioral Control and Usage Behavior at 0.450, and the lowest difference is between Attitude and Behavioral Intention at 0.004. Thus, "discriminant validity theory is accepted, or multicollinearity is absent. In other words, each construct could be considered distinctively from one to another." (Phang, 2016).

Table 9: Squared Inter-Construct Correlation Estimates (SIC)

Variable Name	ATT	SN	PBC	BI	USE
ATT	1				
	0.508				
SN	(0.188)	1			
	0.643	0.617			
PBC	(0.082)	(0.118)	1		
	0.705	0.712	0.714		
BI	(0.004)	(0.009)	(0.036)	1	
	0.567	0.284	0.225	0.417	
USE	(0.068)	(0.362)	(0.450)	(0.243)	1

*Note: value in parentheses indicated the comparison between the AVE value in Table 8 and the SIC value in Table (9)

4.3.4 Model fit indices

CFA confirmed that the TPB model is really fit in the study of blended learning adoption as the fit indices are acceptable, namely CMIN/DF=1.974<2 (good fit), RMSEA=0.069 (acceptable fit), NFI=0.946>0.90 (acceptable fit), CFI=0.972>0.97 (good fit), GFI=0.927>0.90 (acceptable fit), and AGFI=0.879> 0.85 (not great but tolerable).

Table 10: Fit indices and their acceptable thresholds

Fit Measures	Good Fit	Acceptable Fit
CMIN/DF(χ2 /df)	$0 \leq \chi 2/df \leq 2$	$2 < \chi 2 \leq 3$
RMSEA	$0 \leq$ RMSEA ≤ 0.05	$0.05 <$ RMSEA ≤ 0.08
NFI	$0.95 \leq$ NFI ≤ 1.00	$0.90 \leq$ NFI < 0.95
CFI	$0.97 \leq$ CFI ≤ 1.00	$0.95 \leq$ CFI < 0.97
GFI	$0.95 \leq$ GFI ≤ 1.00	$0.90 \leq$ GFI < 0.95
AGFI	$0.90 \leq$ AGFI ≤ 1.00	$0.85 \leq$ AGFI < 0.90

Note: CMIN/DF= Chi square divided by degrees of freedom, RMSEA=Root Mean Square Error of Approximation, NFI=Normed Fit Index, CFI=Comparative Fit Index, GFI=Goodness-of-Fit Index, AGFI=Adjusted Good-of-Fit Index

4.4 Path analysis

Figure 3 shows the standardized regression weight of path analysis. Factors such as Attitude (ATT), Subjective Norm (SN), and Perceived Behavioral Control (PBC) are the predictors of Behavioral Intention and the behavioral Intention is the predictor of actual adoption of blended learning.

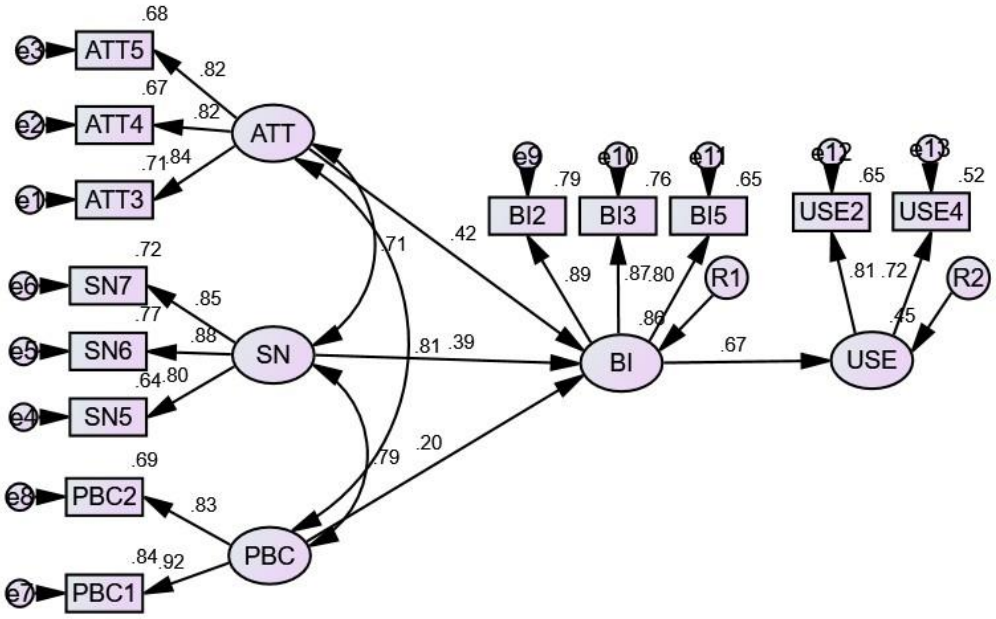

Figure 3: Results Path Analysis

Table 11 shows a regression analysis of path analysis 1 with Behavioral Intention as the dependent variable. The result suggests that the model is statistically significant in explaining that at least one predictor impacts the Behavioral Intention to adopt blended learning. It showed that there is a positive impact of Attitude (β=0.42) at level significance (0.001) and Subjective Norm (β=0.39) at level (0.001) on Behavioral Intention. However, Perceived Behavioral Control was not significant on Behavioral Intention to adopt blended learning.

Table 11: Path Analysis 1 (Behavioral Intention as Dependent Variable)

Exo.	Endo.	Unstandardized Estimates		Standardized Estimates		Sig.
		B	S.E.	Beta	C.R.	(P-value)
ATT	BI	0.48	0.103	0.42	4.648	0.001**
SN	BI	0.43	0.092	0.39	4.701	0.001**
PBC	BI	0.18	0.095	0.20	1.924	0.054

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

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

Note: Exo= Exogenous, Endo=Endogenous, B=direct effect, S.E.=standard Error, C.R.=Critical Ratio, Sig.=Significance, ATT=Attitude, SN=Subjective Norm, PBC=Perceived Behavioral Control, BI=Behavioral Intention

The following table is the result of regression analysis in path 2 for the relationship between Behavioral Intention as the independent variable and Actual Adoption as the dependent variable. It shows a significant positive impact of the Behavioral Intention (β=0.67) at 0.001 on the Actual Adoption of blended learning.

Table 12: Path Analysis 2 (Actual Adoption as Dependent Variable)

Exo.	Endo.	Unstandardized Estimates		Standardized Estimates		Sig.
		B	S.E.	Beta	C.R.	(P-value)
BI	USE	0.63	0.075	0.67	8.348	0.001**

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

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

Note: Exo.=Exogenous, Endo.=Endogenous, B=direct effect, S.E.=standard Error, C.R.=Critical Ratio, Sig.=Significance, BI=Behavioral Intention, USE=Actual Adoption

4.5 Results of hypothesis testing

The following table shows that H1, H2, and H4 were supported at the significance level of (0.001), but H3 was not supported at the significance level of 0.054.

Table 13: Hypothesis Testing

	Hypotheses	Significance	Statistical
H1:	Attitude has a significantly positive effect on the Behavioral Intention to adopt blended learning.	0.001**	Supported
H2:	Subjective Norm has a significantly positive effect on the Behavioral Intention to adopt blended learning.	0.001**	Supported
H3:	Perceived Behavioral Control has a significantly positive Behavioral effect on the Intention to adopt blended learning.	0.054*	Not Supported
H4:	Behavioral Intention has a significantly positive effect on the Actual Adoption of blended learning.	0.001**	Supported

4.6 Discussions

First of all, the impact of attitude factor on the behavioral intention at (β=0.42) is undeniable since this relationship strongly supports the TPB theory of (Ajzen,1985), adoption intention of a particular system of (Davis et al., 1989), and intention to adopt technology learning and usage (Bagozzi et al., 1992).

Secondly, the effect of subjective norm factor on the behavioral intention at (β=0.39) is inconsistent with the study of (Davis et al., 1989) and (Mathieson, 1991), which do not prove this relationship. However, this study supports previous findings that have a direct effect on behavior intention in TRA and TPB (Fishbein & Ajzen 1975; Ajzen 1985), on information technology

usage (Taylor & Todd 1995), and system usage (Venkatesh & Davis 2000).

Thirdly, perceived behavioral control does not influence behavior intention to adopt blended learning, so this study contradicts the theory of TPB (Ajzen 1985), the study at Computing Resource Center (Taylor & Todd, 1995), and research on the adoption of online distance learning (Osman, 2020). The reason may come from the students' capability to adopt blended learning. In other words, this mode of learning is rather new to them.

Last but not least, a positive impact of the Behavioral Intention on actual adoption of blended learning at (β=0.67) is in line with the study technology acceptance and usage (Davis et al., 1989; Venkatesh & Davis, 2000), on technological learning and usage (Bagozzi et al., 1992), at Computing Resource Center (Taylor & Todd, 1995), and on online distance learning (Osman, 2020).

5. Conclusion and implication of the study

5.1 Conclusion

Due to the outbreak of Covid 19, many higher education institutions (HEIs) in Cambodia have applied different modes of teaching and learning. Thus, to understand the students' behavior, this study attempts to identify the factors influencing students' intention to adopt blended, which is a combination of face-to-face and online learning. By adopting the Theory of Planned Behavior (TPB), this study employs the correlational study of the quantitative approach. The questionnaire, adapted from previous studies, has been designed using a 9-point Likert scale. The survey link has been sent to 400 students from three different HEIs, and 204 of them have filled in the questionnaires. The study has shown that the students use their mobile phone at 50.50%, laptops at 41.70% to study online via Zoom Meeting at 50%, and Microsoft Teams at 46.60%.

The study has found that three hypotheses were supported and one hypothesis was not supported; in other words, attitude and subjective norm have a significantly positive effect on the intention to adopt blended learning at (β=0.42) and (β=0.39), respectively; however, perceived behavioral control does not impact on the intention to adopt blended learning. Moreover, behavioral intention impacts positively on the actual adoption of blended learning at (β=0.67).

5.2 Implication of the study

The analysis of the Theory of Planned Behavior (TPB) on the study of students' behavior towards blended learning adoption is relatively new in the context of HEIs in Cambodia. Furthermore, the study has found that the students are willing to adopt blended learning because they have a favorable opinion on this mode of study, and their behaviors are influenced by their close friends, family, and especially the current situation of COVID-19. Therefore, the study suggests the following:

- **TPB Model**: TPB is worth in adopting in investigating the behavioral intention and the behavior of students, teachers, and staff in the academic setting in order to adopt a

certain technological system.

- **The Management of HEIs**: The management of HEIs should take lead in introducing blended learning to their academic and professional programs. Moreover, they should decide which online platform and communication channel to adopt such as Zoom, Microsoft Team, Schoology, and Telegram Messenger. Moreover, HEIs should develop a robust support mechanism since perceived behavioral control partially influences behavioral intention to adopt blended learning.
- **Program designers and lecturers**: Blended learning can also be integrated at the course level. Program designers at HEIs, namely the provosts, faculty deans or department heads should apply blended learning to particular courses, especially the implementation of synchronous and asynchronous learning. They should conduct a study thoroughly on which courses can be integrated with blended learning, and how to integrate them. Face-to-face learning should be introduced before online learning. Likewise, the lecturers of HEIs should consider including blended learning activities such as online survey, online quiz, online video, and online meeting.

5.3 Limitations and further study

When conducting path analysis in SEM, this study deletes three items of Attitudes. The next study may extract these items and form them into a new external variable, which is so-called perceived usefulness. After that, the next study can rerun the path analysis of the TPB in order predict the behavior to adopt a new technological system.

This study investigates the influence of TPB factors toward blended learning at the higher education levels only. They study suggests that future researchers replicate this model in order to investigate students' behavioral intention and usage behavior at K-12 education. Moreover, experimental design is encouraged in the future study on blended learning. The study suggests applying the activities of blended learning in several classes, and compare the different outcomes of these classes to the other classes in which blended learning is not applied.

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