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## **ABAC ODI JOURNAL Vision. Action. Outcome**

ISSN: 2351-0617 (print), ISSN: 2408-2058 (electronic)

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ABAC ODI Journal. Vision. Action. Outcome Vol 9(3) pp. 123 - 143

www. <http://www.assumptionjournal.au.edu/index.php/odijournal>

Published by the  
Organization Development Institute  
Graduate School of Business and Advanced Technology Management  
Assumption University Thailand

ABAC ODI JOURNAL. Vision. Action. Outcome.  
is indexed by the Thai Citation Index and ASEAN Citation Index

## **Factors Influencing Online Learning System Usage Among Fourth-Year Students in Higher Education in Sichuan, China**

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**Received: 23 January 2022**

**Revised: 4 March 2022**

**Accepted: 17 March 2022**

### **Abstract**

This research aims to determine factors influencing online learning usage of students in higher education in Sichuan, China. The conceptual framework presents key constructs, including perceived ease of use, perceived usefulness, information quality, system quality, service quality, attitude toward use, satisfaction, behavioral intention, and actual use. The researcher applied a quantitative approach to collect data by distributing online questionnaires to 500 fourth-year students in three private universities. The sampling method used was nonprobability sampling, including judgmental sampling, quota sampling, and convenience sampling. Before the data collection, an index of item objective congruence (IOC) was used to validate items in the questionnaire, and Cronbach's Alpha Coefficient reliability test was used to measure the reliability of the questionnaire by conducting a pilot test with 40 participants. Afterward, data analysis was carried out employing descriptive analysis, confirmation factor analysis (CFA), and structural equation modeling (SEM). The findings revealed that the strongest significant relationship was the attitude toward use and behavioral intention, followed by behavioral intention and actual use, system quality and behavioral intention, and perceived ease of use and attitude toward use. Conversely, there were no supported relationships of service quality and behavioral intention, followed by information quality and behavioral intention, perceived usefulness and attitude toward use, and satisfaction and behavioral intention. Henceforth, academic practitioners and universities are recommended to provide an effective system, high service support standard, and promote the benefits of the online learning system to students.

**Keywords:** perceived ease of use, perceived usefulness, information quality, system quality, service quality

### **Introduction**

Online learning or e-learning incorporates a series of technologies such as the world wide web, email, chat, social networks, audio, and video conferencing distributed over the internet as a part of education. Online learning integrates instructors, learners, and content with unlimited boundaries and accessibility (Dhull & Arora, 2019). The rise of smartphones has influenced the growth of high-speed internet connectivity, which tremendously impacts the

online learning industry worldwide. The online learning market has been growing fast, and the continuation of the COVID-19 pandemic has accelerated online learning adoption even more exponentially. The COVID-19 pandemic has impacted global higher education since 2020 (Bouchrika, 2020). Students in ASEAN countries had the same experience of rapid change to adopt online learning (Ferdiansyah et al., 2020; Imsa-ard, 2020). Thus, the change to online learning is a regional phenomenon. China has been the leading country in the e-learning market in Asia since 2016, followed by Australia, South Korea, Japan, India, and Singapore. In China, the government has forced universities and other learning institutions to cease in-person teaching activities, with most students not allowed to return to campus during the COVID-19 outbreak (Zhu & Liu, 2020). Nevertheless, 17.75 million Chinese college students participated in online learning, with a total of 1.07 million new online courses launched during the pandemic (Xue et al., 2020).

### **Research Objectives**

1. To investigate factors influencing online learning usage among students in higher education.
2. To examine which factors significantly impact online learning usage among students in higher education.

### **Research Questions**

1. What are the factors influencing online learning usage among students in higher education?
2. Which factor has the strongest impact on online learning usage among students in higher education?

### **Significance of the Study**

This study provides academic significance in two ways. Firstly, the study integrates the Technology Acceptance Model (TAM), the Information Systems (IS) Success Model, and the Unified Theory of Acceptance and Use of Technology (UTAUT) which are three leading theories of technology adoption to measure different kinds of attitudes and perceptions about an information system usage. Secondly, online learning is projected to be used in long-term after the COVID-19 or future pandemic waves. Hence, academic practitioners and universities can learn from the study's findings for better improvement of their online offerings to remain competitive.

### **Literature Review**

Numerous literatures were reviewed to explain related theories, which include the Technology Acceptance Model (TAM), the Information Systems (IS) Success Model, and the Unified Theory of Acceptance and Use of Technology (UTAUT). Furthermore, terminologies of each variable were conceptualized, including perceived ease of use, perceived usefulness, information quality, system quality, service quality, attitude toward use, satisfaction, behavioral intention, and actual use.

## **Related Theories**

### ***Technology Acceptance Model (TAM)***

The Technology Acceptance Model (TAM) is a general model of technology adoption (Davis et al., 1989). The original model contains key constructs: perceived usefulness, perceived ease of use, attitude toward using, behavioral intention, and actual use of the technology. TAM is derived from the theory of reasoned action (TRA), which describes the intentional use of technology (Ajzen & Fishbein, 1980). TAM has been widely used in many studies examining user acceptance of information technology. Most studies focus on system usage for achieving knowledge delivery and students' interaction via a computer, tablet, or mobile interface (Masrom, 2007).

### ***Information Systems (IS) Success Model***

DeLone and McLean (2003) proposed that system quality and information quality directly impact technology usage and user satisfaction, representing the success model of the information systems (IS). The study focused on implementing and utilizing information technology in small and medium-sized enterprises. Later, Ramayah et al. (2010) modified the framework to include the effect of service quality on behavioral intention, included in this study's conceptual framework.

### ***Unified Theory of Acceptance and Use of Technology (UTAUT)***

The unified theory of acceptance and use of technology (UTAUT) was developed by Venkatesh et al. (2003), incorporating performance expectancy, effort expectancy, social influence, and facilitating conditions that directly impact behavioral intention toward actual use. The model explains key factors contributing to a full loop of technology adoption widely applied in organizational and educational research. Chao (2019) examined mobile learning adoption based on UTAUT with additional variables such as Satisfaction, self-efficacy, perceived enjoyment, and trust.

## **Definition of Terms**

### ***Perceived Ease of Use***

The user's perception that the information system does not require effort to use is explained as perceived ease of use (Davis et al., 1989). Perceived ease of use is a primary construct in the original model of TAM and has been widely investigated in many studies on technology adoption (Davis et al., 1989). Perceived ease of use used in this study is the degree to which a student believes that using an online learning platform is easy and tends to use it regularly

### ***Perceived Usefulness***

The user's perception that the information system can improve their performance or achieve a goal is perceived usefulness. TAM notes perceived usefulness as a key variable to examine users' acceptance of technology (Davis, 1989). It also describes the degree to which a

student believes that the benefits of using an online learning system would enhance his or her learning performance

### ***Information Quality***

Information quality explains the quality of a communication system that is complete, accurate, up-to-date, and useful (Petter et al., 2008). Information quality is also generalized as content provided by the system that enhances the user's knowledge (DeLone & McLean, 2003). Students evaluate the quality of content whether the institutions provide valuable information per their needs and expectations (Adeyinka & Mutula, 2010).

### ***System Quality***

System quality is defined as the technical quality of the information system, including its reliability, flexibility, response time, and other system features (Petter et al., 2008). The system quality involves the platform selected by the university to utilize online learning, which can provide ease of use, convenience, and reliability.

### ***Service Quality***

The perceived quality of support from support personnel, such as reliability and technical knowledge, can enhance users' acceptance of technology (Petter et al., 2008). In addition, students perceive the service quality on how the university provides technical support through using the online learning system.

### ***Satisfaction***

Satisfaction is the user's perception of the system and their evaluation of the user experience and how well it met their expectations (Chiu et al., 2007). In this study, satisfaction means students in using online learning as it achieves their expectation which can be easy-to-use system, useful for acquiring learning and improve their learning performance.

### ***Attitude Toward Using***

Attitude toward using technology is the individual's evaluation and feelings about using the system (Davis et al., 1989). The attitude toward using among students is the favorable or unfavorable response to online learning, leading to system adoption (Ajzen, 2005). A positive attitude toward using an online system can repeatedly drive students to achieve their learning efficiency.

### ***Behavioral Intention***

Behavioral intention is the strength of the intention formed to complete a specific action or undertake a specific behavior (Davis et al., 1989). In this research, behavioral intention explains students' willingness to use an online learning system or the probability of a student performing a behavior of online platform usage (Venkatesh & Davis, 2000).

### ***Actual System Use***

Actual system use is whether and how much the individual uses the information system. In this research, the actual system use is the choice to use the online learning system among

students. Actual use also explains the frequency or degree of the use of the system (Efiloğlu Kurt, 2019).

## **Relationship Between Variables and Research Hypotheses**

### ***Perceived Ease of Use and Attitude toward Use***

Perceived ease of use interacts with the user's motivations for using technology (Fagan et al., 2008). The easy-to-use system encourages students' positive attitude to use online learning in the online learning platform. On the other hand, a negative attitude affects its complete usage. Numerous studies confirmed the causal relationship between perceived ease of use and attitude toward using online learning and other information systems (Al-Adwan et al., 2013; Farahat, 2012; Granić & Marangunić, 2019; Hanif et al., 2018; Siti et al., 2021; Sivo et al., 2018; Šumak et al., 2011). Therefore, Hypothesis 1 is stated for this study as follows:

Hypothesis 1: Perceived ease of use has a significant impact on attitude toward using online learning.

### ***Perceived Usefulness and Attitude toward Use***

Perceived usefulness was the primary determinant of attitude toward using online learning as most studies reviewed a significant and positive relationship between these two variables (Farahat, 2012; Granić & Marangunić, 2019; Siti et al., 2021; Sivo et al., 2018; Šumak et al., 2011). Furthermore, perceived usefulness can increase confidence among individuals and nurture positive feelings and attitudes toward use (Davis, 1989). As has been found out in this study, when students acknowledged that an online learning system could improve their learning efficiency; they will surely use it. Hence, hypothesis 2 is stated as:

Hypothesis 2: Perceived usefulness has a significant impact on attitude toward using online learning.

### ***Information Quality and Behavioral Intention***

Information quality was examined in the IS success model to positively affect behavioral intention (DeLone & McLean, 2003; Ramayah et al., 2010). Many studies supported the significant relationship among these two variables (Efiloğlu Kurt, 2019; Freeze et al., 2010; Hsu, 2021; Lin, 2007; Thongsri et al., 2019). The quality of information conceptualizes students' judgment of whether the online learning system meets their expectations (Jiang et al., 2021). In the online learning context, the higher the quality of content is, the more likely students intend to use the system (Park & Lee, 2008), as stated in the following hypothesis:

Hypothesis 3: Information quality has a significant impact on behavioral intention.

### ***System Quality and Behavioral Intention***

System quality relates to the technological system in use, including characteristics of ease of use, functionality, reliability, flexibility, data quality, portability, integration, and importance (DeLone & McLean, 2003). System quality is incorporated in the IS success model. Many studies explained that system quality is the technical communication that significantly affects behavioral intention (Efiloğlu Kurt, 2019; Hsu, 2021; Lin, 2007; Thongsri et al., 2019).

In this research, the system quality of the platform is selected by the university to provide online learning to students, which can enhance their behavior intention as stated in the following hypothesis:

Hypothesis 4: System quality has a significant impact on behavioral intention.

### ***Service Quality and Behavioral Intention***

Students assess the service quality on the technical support that the university provides in using the online learning system. Service quality is one of the controversial dimensions of the IS success model (Urbach & Müller, 2012). It was not included in the initial model but was added by the authors after a decade of the model in use to reflect the organizational service context (DeLone & McLean, 2003). The relationship between service quality and behavioral intention was significant (Daghan & Akkoyunlu, 2016; Ramayah et al., 2010). Accordingly, the following hypothesis is set:

Hypothesis 5: Service quality has a significant impact on behavioral intention.

### ***Attitude Toward Using Online Learning and Behavioral Intention***

Empirical studies supported that attitude toward using the technology significantly impacts intentional behavior. (Chuttur, 2009; King & He, 2006; Marangunić & Granić, 2015; Yousafzai et al., 2007). For example, in online learning adoption, positive or negative attitude toward using online learning among students has a greater impact on the behavioral intention to use the system (Ajzen, 2005; Al-Adwan et al., 2013; Farahat, 2012; Granić & Marangunić, 2019; Hanif et al., 2018; Siti et al., 2021; Sivo et al., 2018; Šumak et al., 2011). Therefore, H6 is stated as follows:

Hypothesis 6: Attitude toward using online learning has a significant impact on behavioral intention.

### ***Satisfaction and Behavioral Intention***

In the research model of Chao (2019), it stated that satisfaction positively affected behavioral intention. The extended IS success model includes Satisfaction which contributes to intentional behavior (Chiu et al., 2007; Lin, 2007). Satisfaction is the user's perception of the system and their evaluation of the experience, which directly impacts behavior intention to use. This research proposes that student satisfaction directly impacts online learning acceptance. Thus, the following hypothesis is set:

Hypothesis 7: Satisfaction has a significant impact on behavioral intention.

### ***Behavioral Intention and Actual Use***

The direct relationship between behavioral intention and actual system use was evidenced by many scholars (King & He, 2006; Marangunić & Granić, 2015; Petter & McLean, 2009; Yousafzai et al., 2007). The relationship between behavioral intention and actual usage is the final variable of the structural pathway of the TAM and UTAUT model. (Venkatesh & Davis, 2000). This study supported that the willingness of students to use online learning will directly affect the actual usage of the system. Based on this evidence, the final hypothesis of the study is:

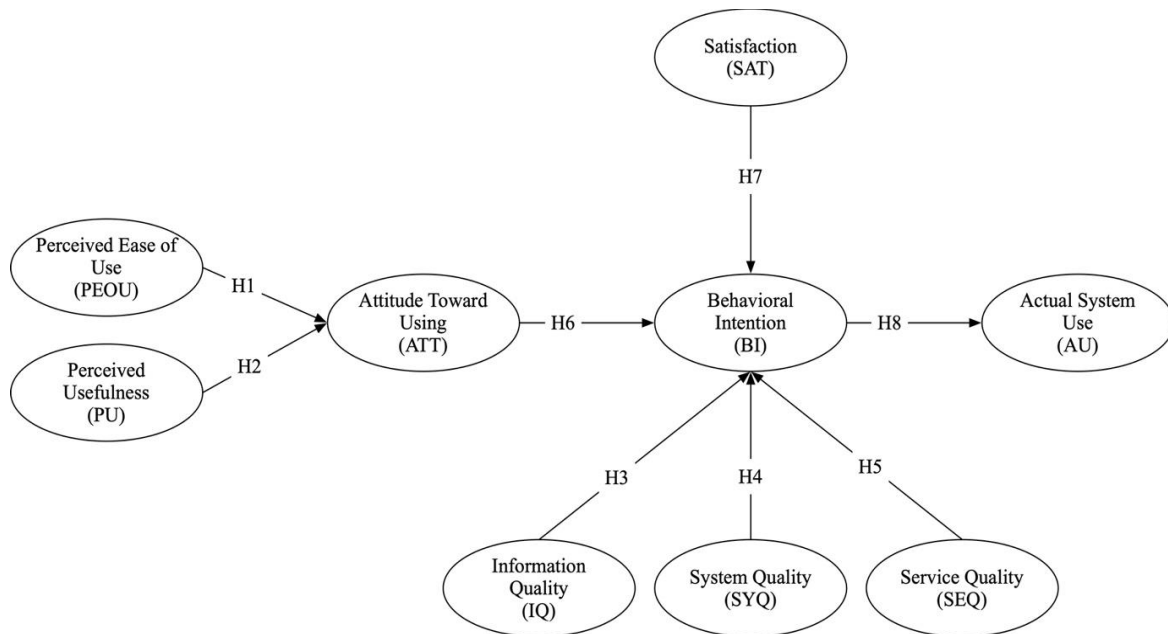
Hypothesis 8: Behavioral intention has a significant impact on actual use.

### Conceptual Framework

The conceptual framework was developed based on three theoretical models, which are TAM (Davis, 1989), IS Success model (Ramayah et al., 2010), and UTAUT (Chao, 2019), incorporating perceived ease of use (PEOU), perceived usefulness (PU), information quality (IQ), system quality (SYQ), service quality (SEQ), attitude toward use (ATT), satisfaction (SAT), behavioral intention (BI), and actual system use (AU). Nine variables and eight hypotheses were proposed. Subsequently, the conceptual framework is illustrated in Figure 1.

**Figure 1**

*Conceptual Framework of Online Learning Adoption*



Note. Constructed by the author (2022).

### Research Methodology

#### Research Design

This research applied a quantitative method by distributing an online questionnaire to 500 participants. The questionnaire design included screening questions, demographic characteristics, and constructs with a 5-point Likert scale. In a preliminary analysis, the index of item objective congruence (IOC) was done by three experts holding Ph.D. titles to validate the content. Later, Cronbach's Alpha reliability test was used to measure reliability of the research items by conducting a pilot study with 40 respondents. The Cronbach's alpha of all items were at an acceptable value of over or equal to 0.60 (Nunnally & Bernstein, 1994). The sampling techniques employed were judgmental sampling, quota sampling, and convenience



sampling. Afterward, the data was collected and analyzed in SPSS statistical software, using descriptive statistics, confirmatory factor analysis (CFA), and structural equation modeling (SEM).

### Research Population and Sample

The population of this study was fourth-year students at three private universities in Sichuan, China, namely, Sichuan Normal University Fine Arts College, Sichuan University of Arts and Sciences Academy of Art and Design Dazhou Vocational and Technical College Art Department. The sample size was based on the total number of students, derived directly from schools and employed quota sampling to calculate percentage of each group per a school. The minimum sample size was calculated by the statistical software of Soper (2022) with the expected effect size (0.2), the expected level of statistical power (0.8), the number of latent variables (8), the number of observed variables (27), and the probability scale (0.05). Therefore, 460 was the recommended sample size. However, to avoid the data issues, the researcher considered acquiring 500 respondents for this study. Table 1 shows the population of three private universities with 8,900 students.

**Table 1**

*Population and Sample Size by Universities*

University	Estimated Students	Sample Size	Percentage
Sichuan Normal University Fine Arts College	2,400	136	27.2%
Sichuan University of Arts and Sciences Academy of Art and Design	6,000	336	67.2%
Dazhou Vocational and Technical College Art Department	500	28	5.6%
<b>Total</b>	<b>8,900</b>	<b>500</b>	<b>100%</b>

Note. Constructed by the author (2021).

### Research Instrument

An online questionnaire was distributed to 500 fourth-year students in three private universities in Sichuan. Three parts of a questionnaire consist of screening questions, demographic questions, and a 5-Likert scale to measure variables. The screening questions include "Which university do you attend?", "What is your undergraduate student's year?" and "Have you taken at least one class using the Tencent Classroom (First-Rank) Platform?" Demographic questions are age, hometown, and other occupations or activities besides study (Aristovnik et al., 2016). 5-point Likert scale (strongly disagree to strongly agree) was used to measure nine (9) latent variables, and twenty-seven (27) observed variables which include perceived ease of use (3), perceived usefulness (3), information quality (3), system quality (3), service quality (3), attitude toward use (3), Satisfaction (3), behavioral intention (3), and actual system use (3).

## Results and Discussion

### Demographic Information

Most respondents were male representing 53.6% (268), while females were 46.4% (232). Participants who live in Sichuan were 71.8% (359) and outside Sichuan 28.2% (141). Majority of respondents have other occupation or activities besides studying up to 2 hours per day representing 27.0% (135), and few participants had no activities of 3.6% (18). The summary of demographic information is presented in Table 2.

**Table 2**

*Demographic Information*

Demographic and Behavior Data (N=500)		Frequency	Percentage
Gender	Male	268	53.6%
	Female	232	46.4%
Hometown	In Sichuan	359	71.8%
	Outside Sichuan	141	28.2%
Occupation and Other Activities	No activities	18	3.6%
	Less than 2 h per week	99	19.8%
	Between 2 and 6 h per week	127	25.4%
	Up to 2 h per day	135	27.0%
	Between 2 and 6 h per day	64	12.8%
	More than 6 h per day	57	11.4%

Note. Constructed by the author (2021).

### Confirmatory Factor Analysis (CFA)

A measurement model was used for CFA analysis. As guided by Hair et al. (2006), the factor loadings of each item were significant and acceptable in determining the goodness of fit. Factor loadings were higher than 0.50 and p-value lower than 0.05. Cronbach's Alpha reliability results were accepted at the value of over or equal to 0.60 (Nunnally & Bernstein, 1994). Furthermore, the Composite Reliability (CR) is greater than the cut-off point of 0.7, and the Average Variance Extracted (AVE) is higher than the cut-off point of 0.4 (Fornell & Larcker, 1981), as shown in Table 3.

**Table 3***Convergent Validity*

Variables	Source of Questionnaire (Measurement Indicator)	No. of Item	Cronbach's Alpha	Factors Loading	CR	AVE
Perceived Ease of Use	Sivo (2018)	3	0.766	0.688 - 0.798	0.769	0.528
Perceived Usefulness	Sivo (2018)	3	0.782	0.680 - 0.782	0.782	0.546
Information Quality	Lin (2007)	3	0.739	0.647 - 0.746	0.742	0.490
System Quality	Lin (2007)	3	0.780	0.726 - 0.747	0.781	0.544
Service Quality	Lin (2007)	3	0.777	0.688 - 0.791	0.783	0.547
Attitude Toward Using	Sivo (2018)	3	0.734	0.675 - 0.731	0.748	0.497
Satisfaction	Calli et al. (2013)	3	0.759	0.705 - 0.738	0.760	0.514
Behavioral Intention	Calli et al. (2013), Sivo (2018)	3	0.750	0.648 - 0.776	0.753	0.505
Actual Use	Sivo (2018)	3	0.789	0.742 - 0.748	0.789	0.555

Note. CR = Composite Reliability, AVE = Average Variance Extracted, \*=p-value<0.05.

Table 4 shows the discriminant validity which was tested by computing the square root of each AVE (Fornell & Larcker, 1981). Based on this research, the value of discriminant validity is larger than all inter-construct/factor correlations, therefore, the discriminant validity is supported. The convergent and discriminant validity were acceptable. Consequently, the evidence is sufficient for establishing construct validity.

**Table 4***Discriminant Validity*

	SAT	ATT	BI	IQ	SYQ	SEQ	AU	PU	PEOU
SAT	<b>0.717</b>								
ATT	-0.130	<b>0.705</b>							
BI	-0.107	0.593	<b>0.711</b>						
IQ	0.389	-0.084	-0.033	<b>0.700</b>					
SYQ	-0.071	0.588	0.588	-0.023	<b>0.737</b>				
SEQ	-0.075	0.578	0.532	-0.040	0.657	<b>0.740</b>			
AU	-0.120	0.606	0.573	-0.027	0.555	0.535	<b>0.745</b>		
PU	0.223	-0.051	-0.030	0.128	-0.052	-0.051	-0.062	<b>0.739</b>	
PEOU	-0.049	0.235	0.297	0.013	0.234	0.183	0.187	-0.040	<b>0.727</b>

Note. The diagonally listed value is the AVE square roots of the variables.

CFA or measurement model was evaluated by the fit model including CMIN/DF = 1.421, GFI = 0.943, AGFI = 0.926, NFI = 0.922, CFI = 0.975, TLI = 0.970, and RMSEA = 0.029. All estimates were acceptable with no model adjustment required. Therefore, the convergence validity and discriminant validity were confirmed. All results are shown in Table 5.

**Table 5**

*Goodness of Fit for Confirmatory Factor Analysis (CFA)*

Index	Acceptable Values	Values
CMIN/DF	< 3.00 (Hair et al., 2006)	1.421
GFI	$\geq 0.85$ (Sica & Ghisi, 2007)	0.943
AGFI	$\geq 0.80$ (Sica & Ghisi, 2007)	0.926
NFI	$\geq 0.80$ (Wu & Wang, 2006)	0.922
CFI	$\geq 0.80$ (Bentler, 1990)	0.975
TLI	$\geq 0.80$ (Sharma et al., 2005)	0.970
RMSEA	< 0.08 (Pedroso et. al., 2016)	0.029

Remark: CMIN/DF = The ratio of the chi-square value to degree of freedom, GFI = goodness-of-fit index, AGFI = adjusted goodness-of-fit index, NFI, normalized fit index, TLI = Tucker-Lewis index, CFI = comparative fit index, RMSEA = root mean square error of approximation, and RMR = root mean square residual

### Structural Equation Model (SEM)

According to Jöreskog and Sörbom (1993), the application of SEM determines the significance among constructs for hypotheses testing in this study. The goodness of fit indices was measured by SPSS AMOS statistical software for the structural model. The results were Chi – Square ( $\chi^2/df$ ) = 2.751, Goodness-of-fit statistic (GFI) = 0.896, Adjusted Goodness-of-fit statistic (AGFI) = 0.872, Normed Fit Index (NFI) = 0.837, Comparative Fit Index (CFI) = 0.889, Tucker-Lewis index (TLI) = 0.874, and Root Mean Square Error of Approximation (RMSEA) = 0.059 as summarized in Table 6.

**Table 6**

*Goodness of Fit for Structural Equation Model (SEM)*

Index	Acceptable Values	Values
CMIN/DF	< 3.00 (Hair et al., 2006)	2.751
GFI	$\geq 0.85$ (Sica & Ghisi, 2007)	0.896
AGFI	$\geq 0.80$ (Sica & Ghisi, 2007)	0.872
NFI	$\geq 0.80$ (Wu & Wang, 2006)	0.837
CFI	$\geq 0.80$ (Bentler, 1990)	0.889
TLI	$\geq 0.80$ (Sharma et al., 2005)	0.874
RMSEA	< 0.08 (Pedroso et. al., 2016)	0.059

Remark: CMIN/DF = The ratio of the chi-square value to degree of freedom, GFI = goodness-of-fit index, AGFI = adjusted goodness-of-fit index, NFI, normalized fit index, TLI = Tucker-Lewis index, CFI = comparative fit index, RMSEA = root mean square error of approximation, and RMR = root mean square residual

### Research Hypothesis Testing Result

The regression weights and R<sup>2</sup> variance validated the significant degree of relationship between variables as shown in Table 7 when p is equal to 0.05. The strongest significant relationship was attitude toward use and behavioral intention at the value of  $\beta = 0.812$  and t-value = 10.002\*, followed by behavioral intention and actual use at the level of  $\beta = 0.806$  and t-value = 10.366\*, system quality and behavioral intention at the value of  $\beta = 0.348$  and t-value = 6.502\*, and perceived ease of use and attitude toward use at the value of  $\beta = 0.206$  and t-value = 4.291\*. Conversely, there were no supported relationships between service quality and behavioral intention at the value of  $\beta = 0.065$  and t-value = 1.443, information quality and behavioral intention at the value of  $\beta = 0.049$  and t-value = 1.084, perceived usefulness and attitude toward use at the value of  $\beta = -0.017$  and t-value = -0.377, and satisfaction and behavioral intention at the value of  $\beta = -0.081$  and t-value = -1.783. In summary, H1, H4, H6 and H8 were supported, whereas H2, H3, H5 and H7 were not supported.

**Table 7**

*Hypotheses Testing Result of the Structural Model*

Hypotheses	Paths	Standardized Path Coefficients ( $\beta$ )	t-value	Tests Result
H1	PEOU $\rightarrow$ ATT	0.206	4.291*	Supported
H2	PU $\rightarrow$ ATT	-0.017	-0.377	Not Supported
H3	IQ $\rightarrow$ BI	0.049	1.084	Not Supported
H4	SYQ $\rightarrow$ BI	0.348	6.502*	Supported
H5	SEQ $\rightarrow$ BI	0.065	1.443	Not Supported
H6	ATT $\rightarrow$ BI	0.812	10.002*	Supported
H7	SAT $\rightarrow$ BI	-0.081	-1.783	Not Supported
H8	BI $\rightarrow$ AU	0.806	10.366*	Supported

Note: \*= $p$ -value<0.05

The results from Table 7 indicated that:

H1: The standardized path coefficient between perceived ease of use and attitude toward use was 0.206 (t-value = 4.291\*). Thus, H1 was supported.

H2: Perceived usefulness had no significant impact on attitude toward use as the standardized path coefficient was -0.017 (t-value = -0.377). Thereby, H2 was not supported.

H3: The standardized path coefficient between information quality and behavioral intention was not supported with the value of 0.049 (t-value = 1.084).

H4: There was a significant relationship between system quality and behavioral intention with the standardized path coefficient of 0.348 (t-value = 6.502\*).

H5: Service quality and behavioral intention was significant at the standardized path coefficient of 0.065 ( $t$ -value = 1.443). Hence, H5 was not supported.

H6: The standardized path coefficient between attitude toward use and behavioral intention was 0.812 ( $t$ -value = 10.002\*). Therefore, H6 was strongly supported.

H7: The standardized path coefficient between student satisfaction and behavioral intention was -0.081 ( $t$ -value = -1.783). As a result, H7 was not supported.

H8: Behavioral intention and actual use had the standardized path coefficient of 0.806 ( $t$ -value = 10.366\*). Consequently, H8 was supported.

As shown in Figure 2, H1 was supported, indicating a relationship between perceived ease of use and attitude toward use with a standard coefficient value of 0.206. This result was aligned with previous literature (Al-Adwan et al., 2013; Farahat, 2012; Granić & Marangunić, 2019; Hanif et al., 2018; Siti et al., 2021; Sivo et al., 2018; Šumak et al., 2011), which confirmed that the ease-of-use of online learning system could motivate positive attitude among students to use the system. Nevertheless, H2 was not supported which was in a relationship between perceived usefulness and attitude toward use as the structural pathway showed the value of -0.017, which contradicted with many researchers that they previously confirmed the significance (Farahat, 2012; Granić & Marangunić, 2019; Siti et al., 2021; Sivo et al., 2018; Šumak et al., 2011). Therefore, it can be assumed that students would only continue their study during the pandemic and accept the online learning platforms provided by the university because they have no other choices.

H3 presented a standard coefficient value of 0.049, which means information quality had no significant impact on behavioral intention. Many researchers supported the significant relationship between these two variables (Efiloğlu Kurt, 2019; Freeze et al., 2010; Hsu, 2021; Lin, 2007; Thongsri et al., 2019) which contradicts the results of previous literatures as they found its significance. H4 showed a significant relationship between system quality and behavioral intention (Efiloğlu Kurt, 2019; Hsu, 2021; Lin, 2007; Thongsri et al., 2019) with the standardized path coefficient of 0.348, which explained the quality of the system could enhance the intention to use online learning system among students as they believe it can improve their leaning performance.

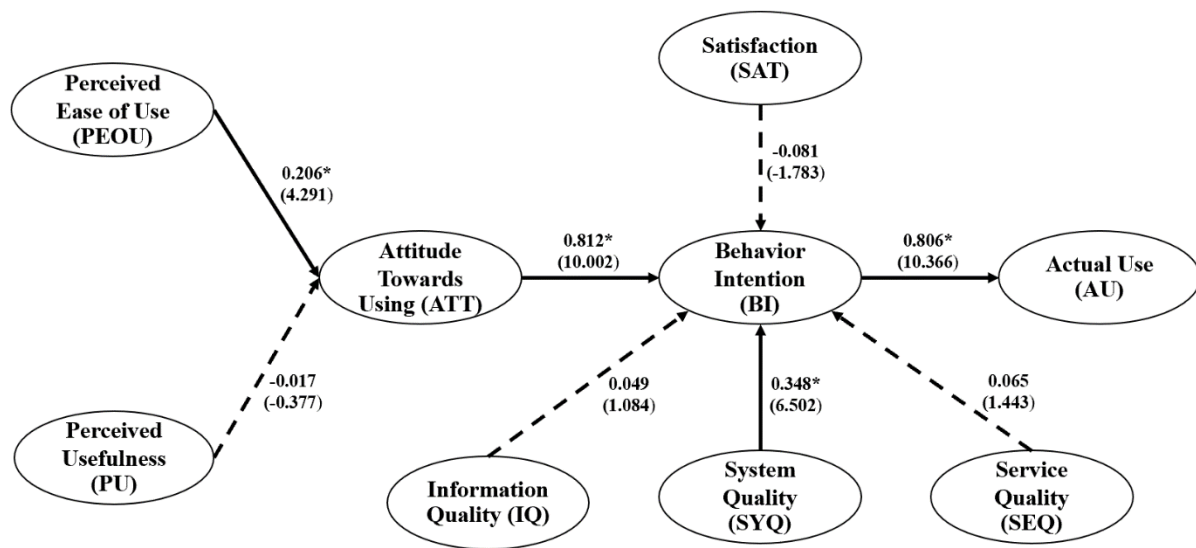
As for H5, it showed the significant relationship between service quality and behavioral intention at the standardized path coefficient of 0.065 was not supported and was opposed to many studies (Urbach & Müller, 2012; DeLone & McLean, 2003; Daghan & Akkoyunlu, 2016; Ramayah et al., 2010). It signifies students have different perspectives about technical support provided by the institutions. H6 reflected the strongest relationship between attitude toward use and behavioral intention with 0.812 of a standard coefficient value. The positive or negative attitude toward using online learning among students has a great impact on the behavioral intention to use the system (Ajzen, 2005; Al-Adwan et al., 2013; Farahat, 2012; Granić & Marangunić, 2019; Hanif et al., 2018; Siti et al., 2021; Sivo et al., 2018; Šumak et al., 2011).

H7 was not supported by the standardized path coefficient value of -0.081 which was the relationship between student satisfaction, and behavioral intention. It was argued by numerous researchers (Chao, 2019; Chiu et al., 2007; Lin, 2007) that satisfaction directly impacted behavioral intention because students would feel positive to use online learning. However, this study implied that students were forced to use online learning to continue

learning, and satisfaction was not relevant to behavioral intention. H8 supported the relationship between behavioral intention and actual use with the standardized path coefficient of 0.806. (King & He, 2006; Marangunić & Granić, 2015; Petter & McLean, 2009; Yousafzai et al., 2007). The relationship between behavioral intention and actual usage is the final variable of the structural pathway of the TAM and UTAUT model. (Venkatesh & Davis, 2000), which explained that the behavioral intention to use online learning significantly impacted the actual usage of the system due to the intention to use can drive students to perform behavior of using online learning.

**Figure 2**

*The Results of Structural Equation Modeling Analysis*



Note: Solid line indicates the Standardized Coefficient with \* as  $p < 0.05$ , and t-value in Parentheses; Dash line signifies Not Significant

### Direct and Indirect Effects of Relationships

The cut-off point for direct and indirect effects of the relationship is showed in Table 8. Satisfaction directly affects behavioral intention at 0.081 and indirectly affects actual use at 0.065. Service quality directly affects behavioral intention at 0.065 and indirectly affects actual use at 0.052. System quality directly affects behavioral intention at 0.348 and indirectly affects actual use at 0.280. Information quality directly affects behavioral intention at 0.049 and indirectly affects actual use at 0.040, and attitude toward use directly affects behavioral intention at 0.812 and indirectly affects actual use at 0.655.

Perceived usefulness directly affects attitude toward use at -0.017 and indirectly affects behavioral intention at 0.014 and actual use at 0.011. Perceived ease of use directly affects attitude toward use at 0.206 and indirectly affects behavioral intention at 0.167 and actual use at 0.135. Finally, behavioral intention has a direct effect on actual use at 0.806.

**Table 8***Direct, Indirect and Total Effects of Relationships*

Independent Variable	Dependent Variables											
	Attitude Towards Using (ATT)				Behavior Intention (BI)				Actual Use (AU)			
	DE	IE	TE	R <sup>2</sup>	DE	IE	TE	R <sup>2</sup>	DE	IE	TE	R <sup>2</sup>
<b>SAT</b>	-	-	-	.043	-	-	-	.794	-	-	-	.650
<b>SEQ</b>	-	-	-		.081	-	.081		-	.065	.065	
<b>SYQ</b>	-	-	-		.065	-	.065		-	.052	.052	
<b>IQ</b>	-	-	-		.348	-	.348		-	.280	.280	
<b>PU</b>	-	-	-		.049	-	.049		-	.040	.040	
<b>PEOU</b>	-.017	-	-.017		-	.014	.014		-	.011	.011	
<b>ATT</b>	.206	-	.206		-	.167	.167		-	.135	.135	
<b>BI</b>	-	-	-		.812	-	.812		-	.655	.655	
	-	-	-		-	-	-		.806	-	.806	

Note. Constructed by the author (2021).

## Conclusion

This research accomplished its objectives by examining the factors influencing online learning usage among fourth-year students in Sichuan private universities, China. The technology adoption models, TAM, IS success model, and UTAUT, were adapted in this research framework involving perceived ease of use, usefulness, information quality, system quality, service quality, attitude towards use, satisfaction, behavioral intention and actual use.

The findings incurred both significant and non-significant relationship between variables. For the supported relationships, the strongest significant relationship was attitude toward use and behavioral intention which explained that positive attitude of students can drive them to use an online learning system (Ajzen, 2005, p. 3; Al-Adwan et al., 2013; Farahat, 2012; Granić & Marangunić, 2019; Hanif et al., 2018; Siti et al., 2021; Sivo et al., 2018; Šumak et al., 2011). Behavioral intention significantly impacted actual use as students who have high satisfaction will have a willingness to use the online learning system (King & He, 2006; Marangunić & Granić, 2015; Petter & McLean, 2009; Yousafzai et al., 2007). The relationship between system quality and behavioral intention was supported which signified that the quality of online learning system can enhance students' behavioral intention (Efiloğlu Kurt, 2019; Hsu, 2021; Lin, 2007; Thongsri et al., 2019). Perceived ease of use had a significant impact on attitude toward use which confirmed that the easy-to-use online learning system creates positive attitude toward using it among students (Al-Adwan et al., 2013; Farahat, 2012; Granić & Marangunić, 2019; Hanif et al., 2018; Siti et al., 2021; Sivo et al., 2018; Šumak et al., 2011).

For non-supported relationships, this study found that the relationship between service quality and behavioral intention was not significant and was opposed to many studies (Urbach & Müller, 2012; DeLone & McLean, 2003; Daghan & Akkoyunlu, 2016; Ramayah et al., 2010). The quality of service from technical support staff cannot determine the level of intention to use online learning system among students. Information quality had no significant



impact on behavioral intention, thus perceived content quality was not a factor enforcing the students' intention to use online learning system. Many researchers supported the significant relationship between these two variables (Efiloğlu Kurt, 2019; Freeze et al., 2010; Hsu, 2021; Lin, 2007; Thongsri et al., 2019) which contradicts opposite to the results of previous literatures as they found its significance. Even though the benefits of using online learning system were many, it cannot determine the attitude of students toward using it, thus, perceived usefulness and attitude toward use were not significant which contradicted with many researchers that they previously confirmed the significance (Farahat, 2012; Granić & Marangunić, 2019; Siti et al., 2021; Sivo et al., 2018; Šumak et al., 2011). Also, satisfaction was not a factor influencing behavioral intention. The level of student satisfaction, therefore, did not motivate student's intention to use an online learning system. It was argued by numerous researchers (Chao, 2019; Chiu et al., 2007; Lin, 2007) that satisfaction directly impacted behavioral intention because students would feel positive to use online learning.

### **Recommendations**

The recommendations were implied from theories into practices for academic practitioners to enhance online learning adoption among students in higher education. Academic practitioners and universities are required to provide effective system, high service support standard and well promote the benefits to students in order to encourage their online learning behavioral intention and actual usage. In addition, institution management should create satisfaction and positive attitude toward using the online learning system by providing software installment, usage guidelines, trainings and technical support as well as developing efficient and engaging content (i.e., games, quizzes, competitions etc.), relating to online learning system.

### **Limitations and Further Study**

There are several limitations to the study's coverage and generalizability. The study only addresses the e-learning system, and does not address factors like curriculum design, course content, teaching style or course interaction which could also affect the student's attitude toward online learning, behavioral intentions and actual system use. Moreover, this study merely focused on the quantitative methodology. Therefore, it lacked of insight or in-depth views on how universities can improve online learning for better adoption rate.

The suggestions for future research include the extension of variables such as curriculum design, course content, teaching style or course interaction. Other level of education or geographical area in China can be further examined such as secondary school in other provinces or countries. Furthermore, the qualitative methodology can provide greater interpretation, using in-depth interview or focus group.

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