ABAC ODI JOURNAL Vision. Action. Outcome

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

Determinants of Undergraduate Students' Continuance Intention to Use E-learning of at a Public University in Chengdu, China

Yanjing Wang

ABAC ODI JOURNAL Vision. Action. Outcome Vol 11(1) pp. 326-344

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

Determinants of Undergraduate Students' Continuance Intention to Use E-learning of at a Public University in Chengdu, China

Yanjing Wang[1]

[1]School of Science, Xihua University, China.
Email: 250828094@qq.com

Received: 30 May 2023. Revised: 17 July 2023. Accepted: 30 July 2023.

Abstract

This study aims to examine the students' continuance intention of using e-learning platforms in a public university in Chengdu, China. Based on the Technology Acceptance Model (TAM), Information System Success Model (ISSM), and Expectation-confirmation Model (ECM), this study comprises seven variables, including computer self-efficacy, system quality, information quality, service quality, perceived usefulness, satisfaction, and continuance intention. The researcher applied a quantitative survey approach with 497 undergraduates with at least one semester of e-learning experience in the School of Civil Engineering, Architecture, and Environment, School of Food and Bioengineering, School of Law and Sociology, and School of Science of Chengdu Xihua University. The index of item-objective congruence (IOC) was applied and a pilot test (n=50) was conducted to evaluate the reliability using Cronbach's Alpha coefficient. Confirmatory factor analysis and structural equation modeling were employed in this study to assess the data, the validity, reliability, factor loadings, and the path coefficient. The results of the data analysis confirmed that perceived usefulness indicated the most powerful direct impact on satisfaction. In conclusion, administrators and teachers should pay adequate attention to computer self-efficacy, system quality, information quality, service quality, perceived usefulness and satisfaction that have had a substantial effect on students' continuance intention to use e-learning platforms and consider the associated teaching reform in the future according to the findings of this research.

Keywords: E-Learning, Service Quality, Information Quality, Satisfaction, Continuance Intention

Introduction

As a teaching and learning tool, knowledge and online technologies in education are now expanding significantly. E-learning is one of the digital age's most widely used educational settings. Due to this, e-learning activities and research are currently gaining much interest on a global scale (Liaw et al., 2007). Since the introduction and widespread use of Internet technology in the middle of the 1980s, online education has shown a tendency to evolve quickly. More and more academic institutions and instructors are attempting to use "Internet plus" teaching methods. It has been discovered that online education based on the Internet has gone through rapid development during the implementation and creation process

(Sun, 2016).

For instance, in higher education, the conventional face-to-face teaching mode has given way to "Internet + education," or classroom instruction combined with the depending on internet-based online courses blend mode. The online educational innovation in the contemporary era of training for learners' mode effectively expands the educational channel and promotes the education reform process (Zhang, 2020). The environmental impact of the COVID-19 pandemic in 2020 placed learning via the Internet back into the spotlight. The industry that garnered the most investment during the pandemic was education, and investors favored online learning the most. According to (iResearch, n.d.), online education received 103.4 billion Yuan, or 89%, of the entire investment for the educational sector in 2020, totaling 116.4 billion Yuan.

The education administration department took the necessary action of "school suspension without study suspension" in response to the COVID-19 epidemic. Given this context, providing online instruction with interruption is easier, but it also presents a unique opportunity. Although major institutions have increased their efforts to develop online education, Chinese e-learning just at universities is still in its formative years and currently faces five major challenges: the performance and application effectiveness of online learning resources are unequal, the teaching quality of distance learning education is subpar, online class matching textbook construction is behind, and there are some issues in teaching.

Educators and students are keenly aware of the benefits and drawbacks of extensive online learning, despite appreciating its novelty, independence, convenience, and efficacy. Through investigation and research, we can better comprehend teachers' and students' needs, investigate the variables that influence students' online learning, make recommendations for students themselves and the development of teaching platforms, and fully enhance teaching techniques possible in order to increase teachers' and students' access to online learning, which is necessary to address the issues with online teaching. Therefore, the objective of this study is to examine influencing factors of students' continuance intention to use e-learning at a public university in Chengdu, China.

Literature Review

E-learning

E-learning, also known as electronic learning or online learning, refers to the use of digital technology and the internet to deliver educational content and facilitate learning outside of traditional classroom settings. It involves the use of various digital tools, platforms, and resources to provide learners with access to educational materials, interactive activities, assessments, and communication with instructors and peers. E-learning has become increasingly popular and widespread, offering flexible and convenient learning opportunities for students of all ages and backgrounds (Wiley & Hilton, 2018).

Technology Acceptance Model (TAM)

TAM is the name given by researchers who examine how people use and adapt technological advancements to the most common information theoretical method (Davis, 1989). Considered essential components of user adoption of an IS/IT, perceived usefulness

and perceived ease of use are experimentally confirmed in TAM (Chau, 1996). The TAM, which includes the three characteristics of perceived usefulness, ease of use, and intention to use, has been the underlying theory for many empirical investigations looking at technological utilization and customer acceptability (Lee et al., 2014). The utilization context and system-specific elements impact perceived usefulness and perceived ease of use, which can be used to predict how users will feel about using a product. Attitude affects behavioral intention to use a particular technology, predicting real use (Salloum et al., 2019).

TAM is frequently used in academics and educational research to forecast students' opinions or behavioral intentions about a certain educational technology. The conceptual framework selects continuance intention as the dependent variable and perceived usefulness as the mediator variable.

Information System Success Model (ISSM)

The ISSM, a measurable informational system with six components, was proposed by DeLone and McLean in 1992 using the net benefits of information systems as the dependent variables. The six criteria DeLone and McLean (2003) used to categorize it were information quality, system quality, service quality, system usage condition, user satisfaction, and system benefits to assess the effectiveness of a particular data system of information quality. This model shows that the factors affecting continuance intention are information quality, system quality, service quality, and satisfaction.

The ISSM, a foundational theory used in information management, has been widely adopted by academics across various disciplines and is an integral theory for developing information system evaluation. As a result, the conceptual framework used satisfaction as the mediator variable, continuance intention as the dependent variable, and system quality, information quality, and service quality as the independent factors.

Expectation-confirmation Model (ECM)

The idea that cognitive expectations and achievement anticipation have a significant impact on contentment assessments was initially put forth by Oliver (1977). Bhattacherjee (2001) developed the ECM by fusing the ECT and the TAM. The ECM paradigm states that consumers' perception of the anticipated benefits of continued use of the IS and their overall degree of enjoyment based on prior usage directly influence their intentions to continue using it (Ambalov, 2018).

In order to identify factors that affect whether plans to employ digital technology will be successful, ECM is designed to incorporate the two significant theories of ECT and TAM. The four components of ECM are the expectation, perceived usefulness, satisfaction, and behavior intended usage (Wijaya et al., 2019). As a result, the conceptual framework contains continuance intention as a dependent variable and perceived usefulness and satisfaction as mediator variables.

Computer Self-efficacy

A person's belief in his or her ability to use a computer is called computer self-efficacy. (Fokides, 2017). Computer self-efficacy is a measure of a person's computer ability. (Hayashi et al., 2004). According to Arteaga Sánchez et al. (2013), computer self-efficacy

refers to how people perceive their ability to use computers in some data technology situations. According to Yuen and Ma (2008), computer self-efficacy assessments are high or low depending on how confident one is in performing various tasks within the system. The confidence level with which a person decides to perform information technology-related tasks through a computer system is defined as having a sense of computer self-efficacy. (Kanwal & Rehman, 2017).

In an e-learning environment, a person's impression of applicability reflects their expectations or views about the outcomes, indicating that computer self-efficacy may be a major factor influencing perceived usefulness (Ong & Lai, 2006). Empirical research that indicates how computer self-efficacy impacts technology acceptance suggests that it is significant regarding its effect on perceived usefulness (Lee et al., 2014). People's perceptions of an e-learning system's value were considerably influenced by their computer self-efficacy (Salloum et al., 2019). Individuals' expectations for the effects of computer use, their emotional response to computing, such as motivation and anxiety, and their actual computer use are all significantly influenced by their level of computer self-efficacy (Nguyen et al., 2020). The degree to which people believe they can use technology is their computer self-efficacy. Hence, someone will be more inclined to use the system if they believe they have fantastic skills in using computer applications (Usman et al., 2020). Thus, a hypothesis is proposed:

Hypothesis 1: Computer self-efficacy has a significant effect on perceived usefulness.

System Quality

According to Fathema et al. (2015), System Quality refers to the Learning Management System's level of functioning, adaptability, amenities, content, and interactivity. What is meant by "system quality," according to Wang & Wang (2009), is the extent to which the features of a system enable teachers to carry out its functions and promote teaching and learning. According to Rughoobur-Seetah and Hosanoo (2021), the efficiency and user satisfaction of an e-learning platform are influenced by system quality, which includes elements like flexible interaction and maintaining optimum. According to Almazán et al. (2017), system quality is defined as the ability of an information system to be quickly understood and used, to respond appropriately, and to have a suitable level of integration. According to Chopra et al. (2019), system quality refers to the reliability of a website and the learning ecosystem that learners use to access courses or educational materials conveniently.

Many researchers assessed system quality since it is believed to affect satisfaction (Rughoobur-Seetah & Hosanoo, 2021) directly. Users' satisfaction has positive and significant coefficients on system quality (Almazán et al., 2017). According to the information system success model, system quality significantly impacts user satisfaction (Chopra et al., 2019). According to early studies on students' satisfaction in online learning environments, the system's quality may be utilized to predict students' satisfaction (Samarasinghe, 2012). System quality, known to increase users' satisfaction significantly, is crucial to a positive user experience for e-learning (Cidral et al., 2017). Hence, H2 is set:

Hypothesis 2: System quality has a significant effect on satisfaction.

Information Quality

According to Salloum et al. (2019), features of information quality include the extent to which an individual or service obtains complete, accurate, and up-to-date information in addition to the user's evaluation of the quality of the information supplied on a website. The quality of the information used in a system determines how effectively a teacher teaches because of using it (Wang & Wang, 2009). According to Almazán et al. (2017), the quality of information is determined by its accuracy, timeliness, usefulness, relevance, and suitable design. Information quality is measured by informativeness (Chopra et al., 2019). Information quality is established by system users' perceptions of the information's speed, accuracy, relevance, completeness, and order (Aldholay et al., 2018).

The researcher found a substantial relationship between information quality, perceived usefulness, and satisfaction. This relationship was derived from the Information Systems Success model (Rughoobur-Seetah & Hosanoo, 2021). The outcomes of the empirical inquiry demonstrate that information quality is the most important prerequisite for satisfaction (Almazán et al., 2017). According to research, one of the key factors that impact satisfaction is provider trustworthiness, which has been found to have high control over satisfaction (Aldholay et al., 2018). Satisfaction was substantially impacted by information quality (Samarasinghe, 2012). Numerous studies have found that an information platform's perceived usefulness and satisfaction among users are favorably influenced by the information quality (Cidral et al., 2017). Accordingly, a following hypothesis is indicated:

Hypothesis 3: Information Quality has a significant effect on satisfaction.

Service Quality

Service quality is defined as the efficacy of the support provided to the teachers to make use of such a system simpler (Wang &Wang, 2009). Efficiency, reliability, availability, and data quality are all factors that affect service quality (Rughoobur-Seetah & Hosanoo, 2021). In order to assess how hard the support team for IT is working to provide users with the appropriate materials and information services, service quality is assessed by parameters linked to response time (Almazán et al., 2017). Enhancing competitive advantage by providing special service means or substantially improving the current model is known as service quality (Chopra et al., 2019). Service quality is a general judgment or attitude about how well a service is (Samarasinghe, 2012).

The level of learner satisfaction was impacted by the service quality (Rughoobur-Seetah & Hosanoo, 2021). Service quality is essential to satisfaction in e-learning systems, and supporting workforce safety, confidence, and attention is required (Cidral et al., 2017). It is expected that if the e-learning system's help concentrate or service management can offer learners satisfactory and better support services, this will increase students' acceptance of and satisfaction with the e-learning procedure (Cheng, 2014). According to Roca et al. (2006), service quality is a solid indicator of a person's satisfaction and continuance intention when using an e-learning system. Service quality significantly impacts both the content of the e-learning context and the intention to use the e-learning system (Mohammadi, 2015). Based on previous studies, a hypothesis is suggested:

Hypothesis 4: Service quality has a significant effect on satisfaction.

Perceived Usefulness

Perceived usefulness is the inferred probability that a potential user of an application system would perform better while working in an organizational setting after using it (Gong et al., 2004). The perceived usefulness of an e-learning infrastructure will determine how positively learners view engaging in their academic activities (Vululleh, 2018). How much a person believes employing a technology would increase his or her efficiency at work is measured by perceived usefulness (Ong et al., 2004). The use of online learning to promote students' skill development and improve study efficiency is called "perceived usefulness." As a result, students will appreciate the value of the technique (Roca & Gagné, 2008, p.1587). People will use technologies when they trust their capacity to make judgments and believe it will benefit them as much as the system (Usman et al., 2020).

Although a person does have a great deal of confidence when employing a particular technology, individuals will only be ready to utilize it if they recognize its relevance effectively. How the individual perceives the innovation as useful determines their use (Nyagorme, 2018). Researchers have scientifically evaluated the beneficial relationship between perceived usefulness and continuance intention (Roca & Gagné, 2008). The ECM model states that users' perceptions of the anticipated benefits of continuance intention to use the information system and their degree of satisfaction based on prior usage directly influence their propensity to do so (Ambalov, 2018). According to Cheng (2022), user happiness and perceived utility are the major elements that contribute to a commitment to continue using the system (Ong et al., 2004). Consequently, the research concludes below hypotheses:

Hypothesis 5: Perceived usefulness has a significant effect on satisfaction.

Hypothesis 6: Perceived usefulness has a significant effect on continuance intention.

Satisfaction

Almazán et al. (2017) defined satisfaction as how the user feels about the system after using it, whether they think it was effective, and whether it met their needs. According to Samarasinghe (2012), satisfaction refers to the degree to which e-learning delivered through an e-learning system meets a learner's expectations. According to Cheng (2001), satisfaction is a mental or subjective state connected to and results from a cognitive assessment of the expectation-performance gap. Satisfaction is determined by a system's appropriateness and effectiveness (Cidral et al., 2017). According to Chang (2013), satisfaction is a broad emotion influenced by various variables, including context, individual elements, pricing, product quality, and service quality.

Chang (2013) asserts that satisfaction substantially impacts users' decisions to continue using e-learning platforms. The results of numerous studies demonstrate that student satisfaction levels affect their decision to keep using an e-learning platform (Samarasinghe, 2012). Information, system, and service quality were the important direct predictors of satisfaction (Roca et al., 2006). According to Hayashi et al. (2004), contentment, confirmation theory-based expectations, and future desire to utilize an information system are all positively correlated. According to Mouakket and Bettayeb (2015), utilizing a learning management system as an example, contentment is viewed as a crucial sign of the desire to utilize the system to promote e-learning. According to the above assumptions, a hypothesis is developed:

Hypothesis 7: Satisfaction has a significant effect on continuance intention.

Continuance Intention

One indicator of a teacher's intention to utilize web-based learning technologies is their acceptance of them (Wang & Wang, 2009). A learner's readiness to utilize e-learning shortly is referred to as having an "e-learning continuance intention" (Samarasinghe, 2012). According to Salloum et al. (2019), users' "continuance intention" refers to their constant readiness to utilize e-learning systems from the present to the foreseeable future. Continuance intention refers to a user's choice to use a platform after it has been adopted and used (Cheng, 2021). According to Chang (2013), a person's willingness to use and recommend platforms to others in the future is described as their continuance intention.

The continuance intention to use e-learning resources was significantly impacted by system, information, and service quality (Wang &Wang, 2009). The user's satisfaction heavily impacts the continuance intention of utilizing an e-learning platform (Samarasinghe, 2012). The perceived usefulness of an e-learning service has improved students' inclination to use it (Salloum et al., 2019). Users' satisfaction with an e-learning platform and perceived usefulness influence how often they use it (Cheng, 2021). Students who think the e-learning technology is effective might be more excited to use the platform (Cheng, 2012).

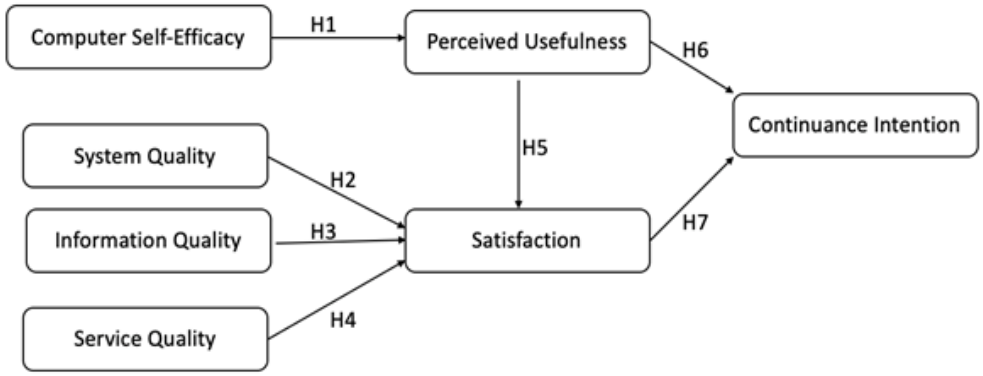
Research Methodology

Conceptual Framework

Three key theories were used in this study: The Technological Acceptance Model (TAM), the Information System Success Model (ISS), and the Expectation Confirmation Model (ECM). They served as the foundation for the proposed framework demonstrating Chinese university students in Chengdu's ongoing commitment to e-learning. The researcher's conceptual framework development required careful consideration of three important preceding theoretical frameworks. According to Ong et al. (2004), perceived usefulness and computer self-efficacy are connected. Chang further demonstrated the connections between system quality, information quality, service quality, satisfaction, and continuance intention (2013). Moreover, Cheng (2019) showed a connection between satisfaction, continued intention, and perceived utility. Figure 1 demonstrates how several theoretical frameworks produce the conceptual framework.

Figure 1

Conceptual Framework



Note. Constructed by author

Research Design

This study used a structured questionnaire as its main tool, and it contained three main components: a screening question, demographic data, and items relating to the conceptual framework's seven latent variables. Cooper and Schindler (2010) claim that screening questions helped to ascertain whether respondents had the knowledge or expertise needed to answer the questionnaire. School information, the availability of appropriate e-learning experience, and subject-specific background were the screening questions for this paper. In order to better understand the respondents' backgrounds, the demographic information elements—which included information on gender, education level, age, how frequently they used an e-learning platform every week, and which e-learning platform they used most frequently—were included in this paper (Lodico et al., 2006).

30 scale items from earlier studies were used to assess the latent variables, including 5 scale items for computer self-efficacy, 5 scale items for system quality, 5 scale items for information quality, 3 scale items for service quality, 4 scale items for perceived usefulness, 4 scale items for satisfaction, and 4 scale items for continuation intention. The Likert scale is one of the most widely used gauges of contemporary values (Salkind, 2012). It was a device used in attitude assessments that asked participants to select whether they agreed or disagreed with a series of statements using a five-point scale. A scale of 1 to 5 was used to rate favorable remarks, with 5 signifying Strongly Agree and 1 denoting Strongly Disagree. Appendix A displays a summary of the scale items for each construct, along with references.

The index of item-objective congruence (IOC)’s results were assessed by three experts and deemed acceptable when scored at 0.67 as the highest. Subsequently, a pilot test involving 50 participants was conducted to evaluate the reliability using Cronbach's Alpha coefficient, which was considered satisfactory at a score of 0.7 or higher (Taber, 2018). The results of pilot test implemented the method of Cronbach's Alpha were acceptable. Therefore, all constructs are retained in terms of instrument validation. To ascertain the measurement model's validity and reliability, confirmatory factor analysis (CFA) was employed. Additionally, the structural equation model (SEM) was utilized to assess the fitness of the structural model and conduct hypothesis testing.

Research Population and Sample

The research population are undergraduates with at least one semester of e-learning experience in the School of Civil Engineering, Architecture, and Environment, School of Food and Bioengineering, School of Law and Sociology, and School of Science of Chengdu Xihua University. Therefore, 6,738 is the total population of this study. Boomsma (1985) indicated a minimal sample size of 100 or 200 is necessary for applicable structural equation modeling. However, the researchers selected a sample size of 500 undergraduate students at the four target colleges in Xihua University.

Data Analysis

After analyses of content validity and internal consistency reliability were completed, questionnaires were delivered to 500 undergraduates from four target institutions. The researchers used the programs JAMOVI and AMOS to add up the data. The researchers employed confirmatory factor analysis (CFA) to evaluate the loading factor, t-value, composite reliability (CR), average variance extracted (AVE), and discriminant validity. The structural equation model (SEM) was then used to examine the hypotheses' findings and the specific, indirect, and overall effects of the relationships between the two latent variables.

Demographics of Participants

Detailed demographic characteristics of 497 respondents are summarized in Table 1. Of all the respondents, 31.79% were male, 68.21% were female, 78.67% were aged 17-20, 20.52% were aged 21-22, and 0.81% were aged 23-24. 47.28 percent of these respondents use online learning platforms 2-3 times a week, and the platforms they most frequently use are Tencent Conference and the Super Star platform.

Table 1

The demographic data

Demographic and General Data (n=497)	Category	Frequency	Percentage
Gender	Male	158	31.79%
	Female	339	68.21%
Age	17-20	391	78.67%
	21-22	102	20.52%
	23-24	4	0.81%
Number of e-learning sessions per week	1 time	77	15.49%
	2-3times	235	47.28%
	4-7times	70	14.09%
	More than 7times	115	23.14%
Name of the most commonly used e-learning platform	Superstar	151	30.38%
	MOOC	21	4.23%
	Wechat	15	3.02%
	Tencent Conference	196	39.44%
	Ding Talk	10	2.01%
	Rain Class	24	4.83%

Demographic and General Data (n=497)	Category	Frequency	Percentage
	Wisdom Tree	6	1.21%
	Bili Bili	51	10.26%
	Others	23	4.62%

Results and Discussion

According to Perry et al. (2015), CFA aims to evaluate a model's acceptability. The results of the factor loading analysis and the proper values for each observed variable proved the inquiry matrix's goodness of fit. Table 2 demonstrates that Cronbach's Alpha coefficient was considered satisfactory at a score of 0.7 or higher (Taber, 2018), the absolute values of the average extracted variance (AVE) were greater than 0.50 (Hair et al., 2020), the composite reliability (CR) was beyond 0.70 (Hair et al., 2021), and the factor loading values were all over 0.50 (Byrne, 2001).

Table 2

Confirmatory Factor Analysis Result, Composite Reliability (CR) and Average Variance Extracted (AVE)

Variables	Source of Questionnaire	No. of Item	CA	Factors Loading	CR	AVE
Computer Self-efficacy (CSE)	Salloum et al. (2019)	5	0.850	0.768-0.826	0.896	0.634
System Quality (SYQ)	Salloum et al. (2019)	5	0.848	0.777-0.853	0.898	0.638
Information Quality (IQ)	Salloum et al. (2019)	5	0.820	0.723-0.815	0.878	0.590
Service Quality (SQ)	Cheng (2014)	3	0.859	0.790-0.856	0.865	0.682
Perceived Usefulness (PU)	Salloum et al. (2019)	4	0.904	0.761-0.839	0.880	0.648
Satisfaction (SAT)	Cheng (2014)	4	0.866	0.762-0.810	0.862	0.610
Continuance Intention (CI)	Cheng (2014)	4	0.875	0.762-0.836	0.883	0.653

Table 3 illustrates the results of the inquiry into and display of the discriminant validity. The AVE square root of the AVE is the quantity that is marked diagonally. These numerical measurements were used to establish the discriminant validity.

Table 3

Square roots of AVEs and correlation matrix

	CSE	SYQ	IQ	SEQ	PU	SAT	CI
CSE	**0.796**						
SYQ	0.352	**0.799**					
IQ	0.284	0.337	**0.768**				
SEQ	0.147	0.255	0.315	**0.826**			

	CSE	SYQ	IQ	SEQ	PU	SAT	CI
PU	0.361	0.374	0.389	0.210	**0.805**		
SAT	0.275	0.413	0.473	0.287	0.575	**0.781**	
CI	0.359	0.318	0.402	0.298	0.542	0.522	**0.808**

Note: The diagonally listed value is the AVE square roots of the variable

Furthermore, all applicable criteria for such absolute fit indicators, including CMIN/DF, GFI, AGFI, and RMSEA, in addition to the incremental fit measurements, such as CFI, NFI, and TLI, are shown in Table 4 and meet the requirements. As a result, all of the goodness of fit metrics used in the CFA evaluation were valid.

Table 4

Goodness of Fit for Measurement Model

Fit Index	Acceptable Criteria	Statistical Values
CMIN/DF	< 3.00 (Hair et al., 2010)	1.037
GFI	≥ 0.90 (Hair et al., 2010)	0.950
AGFI	≥ 0.80 (Segars & Grover, 1993)	0.939
RMSEA	< 0.08 (Pedroso et al., 2016)	0.009
CFI	≥ 0.90 (Hu & Bentler, 1999)	0.998
NFI	≥ 0.90 (Bentler & Bonett, 1980)	0.955
TLI	≥ 0.90 (Hu & Bentler, 1999)	0.998
Model Summary		**In harmony with empirical data**

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, RMSEA = Root mean square error of approximation, CFI = Comparative fit index and NFI = Normed fit index, and TLI = Tucker–Lewis index.

Structural Equation Modeling (SEM)

This study followed the CFA assessment by the structural equation model (SEM) verification. SEM offers a flexible framework for creating and analyzing complicated interactions between numerous variables, enabling researchers to use empirical models to verify the theory's validity (Beran & Violato, 2010). Table 5 shows that the combined values of CMIN/DF, GFI, AGFI, CFI, NFI, TLI, and RMSEA were all over allowable limits after being corrected using the AMOS version. The results show that the SEM's goodness of fit was established.

Table 5

Goodness of Fit for Structural Model

Fit Index	Acceptable Criteria	Statistical Values
CMIN/ DF	< 3.00 (Hair et al., 2010)	1.721
GFI	≥ 0.90 (Hair et al., 2010)	0.910
AGFI	≥ 0.80 (Segars & Grover, 1993)	0.894
RMSEA	< 0.08 (Pedroso et al., 2016)	0.038

Fit Index	Acceptable Criteria	Statistical Values
CFI	≥ 0.90 (Hu & Bentler, 1999)	0.967
NFI	≥ 0.90 (Bentler & Bonett, 1980)	0.924
TLI	≥ 0.90 (Hu & Bentler, 1999)	0.963
Model Summary		**In harmony with empirical data**

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, RMSEA = Root mean square error of approximation, CFI = Comparative fit index and NFI = Normed fit index, and TLI = Tucker–Lewis index.

Hypothesis Outcomes

The findings presented in Table 6 indicate that perceived usefulness had a direct, meaningful impact on satisfaction. This effect was the greatest in this quantitative method, with a standardized path coefficient β of 0.530 (t-value at 10.582***). The computer self-efficacy effect on perceived usefulness provides the second-powerful significant interaction, with the β at 0.417 (t-value at 8.349***). Additionally, satisfaction significantly influenced continuance intention with the β at 0.373 (t-value at 6.591***), while perceived usefulness impacted continuance intention with the β at 0.350 (t-value at 6.489***), as well as information quality significantly impacted satisfaction with β at 0.302 (t-value at 6.619***). Moreover, system quality was also determined to substantially impact satisfaction with the β of 0.197 (t-value of 4.504***). Consequently, service quality exhibited the least significant influence on satisfaction in this quantifiable investigation, with the β of 0.132 (t-value at 3.017**).

Table 6

Summary of hypothesis tests

Hypothesis	Standardized path coefficient (β)	t-value	Testing result
H1: Computer Self-efficacy has a significant effect on user satisfaction.	0.417	8.349***	Supported
H2: System Quality has a significant effect on satisfaction.	0.197	4.504***	Supported
H3: Information Quality has a significant effect on satisfaction.	0.302	6.619***	Supported
H4: Service Quality has a significant effect on satisfaction.	0.132	3.017**	Supported
H5: Perceived Usefulness has a significant effect on satisfaction.	0.530	10.582***	Supported
H6: Perceived Usefulness has a significant effect on continuance intention.	0.350	6.489***	Supported

Hypothesis	Standardized path coefficient (β)	t-value	Testing result
H7: Satisfaction has a significant effect on continuance intention.	0.373	6.591***	Supported

Note: *** p<0.001, ** p<0.01

Discussion

According to the findings in Table 6, with a standardized path parameter threshold of 0.417 for this structural approach, H1 has indicated that computer self-efficacy is a considerable determinant of perceived usefulness. According to earlier studies, a person's computer self-efficacy considerably impacts their tendency to use technology based on perceived usefulness (Agarwal et al., 2000). According to Ong and Lai (2006), users with a reasonably high level of computer self-efficacy are more likely to have positive, important beneficial views.

In H2, the analysis shows that system quality impacts user satisfaction, and its standardized path coefficient is 0.197. System quality has been studied in numerous research, and it is assumed to affect satisfaction directly (Al-Fraihat et al., 2020; DeLone & McLean, 2003). Numerous studies have shown that system quality significantly impacts satisfaction (Petter & McLean, 2009).

The observable statistical results of H3 confirm the hypothesis that information quality significantly affects satisfaction, and the common coefficient value is 0.302. Information quality is a key factor in determining how satisfied users are and how much they utilize a product or service (Aldholay et al., 2018; Petter & McLean, 2009; Samarasinghe, 2012).

H4 demonstrated that service quality also significantly impacted users' satisfaction, with a common coefficient value of 0.132. Numerous research studies have shown that high service quality considerably increases user satisfaction with e-learning platforms (Aldholay et al., 2018; Mohammadi, 2015; Roca et al., 2006).

The observable statistics for H5 supported the hypothesis that perceived usefulness significantly influenced satisfaction, with the common coefficient value of 0.530 indicating the strongest significant impact in this quantification study. Previous studies have shown that a user's perception of an information system's usefulness positively impacted their satisfaction with it and their willingness to continue utilizing it (Mouakket & Bettayeb, 2015).

Concerning H6, it was found that perceived usefulness and continuance intention had a statistically significant association, yielding a common coefficient value of 0.350. Prior studies have shown that perceived usefulness directly impacts one's intention to use a system (Ong et al., 2004; Wang & Wang, 2009).

With a final statistical score of 0.373 on the standard coefficient of the active influence, H7 has concluded that satisfaction strongly influenced continuance intention. According to several research, student satisfaction overall impacts whether they continue using an e-learning platform (Samarasinghe, 2012). In the context of an LMS, the level of satisfaction is seen as a key indicator of future usage intention (Mouakket & Bettayeb, 2015).

Conclusion and Recommendations

Conclusion

This study examined the variables that significantly affected undergraduate students' intention to continue their e-learning at Xihua University, a public university in the Chinese province of Sichuan. The conceptual framework displayed the seven hypotheses to support how computer self-efficacy, perceived usefulness, system quality, information quality, service quality, satisfaction, and continuance intention interact. 497 undergraduate students having at least one semester of experience in e-learning engaged in answering the survey questionnaire in order to ascertain whether there was any interaction between these variables. To determine if the results fit the stipulated theory-derived measurement model, confirmatory factor analysis (CFA) was used. Similarly, to assess the connections between observable and latent variables that affect continuance intention and to test hypotheses, structural equation modeling (SEM) was used.

The results of this study show that perceived usefulness has the strongest significant impact on satisfaction. The perceived usefulness was strongly influenced by computer self-efficacy. Moreover, satisfaction was significantly impacted by system quality, information quality, and service quality, with lower standardized path coefficients. Furthermore, perceived usefulness and satisfaction both directly affect the continuance intention.

Recommendations

Based on the results of this amount of research, the researchers offer the following practical suggestions for subsequent e-learning for undergraduate students.

First, perceived usefulness has the greatest impact on students' satisfaction with e-learning. It can be seen that many students' satisfaction with the e-learning platform directly depends on whether they think the platform is useful. Therefore, school teaching units should fully clarify the teaching objectives based on improving students' ability, helping students grow and become talented through e-learning, and encouraging more students to accept the e-learning platform.

Secondly, students' computer self-efficacy directly affects perceived usefulness. According to the technical characteristics of e-learning, teachers should provide a considerable number of courses on the e-learning platform to improve students' ability to use the computer and to improve students' confidence while using the e-learning platform.

In addition, student satisfaction is also affected by three potential variables: system quality, information quality, and service quality. In future teaching practice, it is recommended that teaching units focus on optimizing the program design of the e-learning platform. Additionally, providing tutorial documents and manual assistance will help students perceive the various learning operations of the e-learning platform as simpler, clearer, and more convenient compared to traditional classroom teaching. This approach effectively improves students' satisfaction with using the e-learning platform.

Moreover, students are more likely to continue using the e-learning platform if they find it helpful for their learning and improvement while also experiencing satisfaction with the user experience. Therefore, teachers should align the learning plans, objectives, and performance assessment mechanisms with the teaching needs. By presenting suitable courses through the e-

learning platform, teachers can support students in achieving their learning goals effectively.

Lastly, teachers should emphasize the importance of computer self-efficacy, system quality, information quality, and service quality in e-learning. By addressing these factors, students' perceived usefulness and satisfaction with e-learning will be positively enhanced. This, in turn, encourages students to continue using the e-learning platform with enthusiasm.

Limitations and Further Study

The limitations of this study can be divided into two aspects. First, based on the goal, the research scope is limited to the four majors offered. It would be better if more majors could be involved. Second, only six potential variables that directly or indirectly affect the sustainable use of e-learning were included in the analysis, and some ideas that were considered significant observational value by other scholars were not included when the conceptual framework of this study was constructed.

References

Agarwal, R., Sambamurthy, V., & Stair, R. (2000). Research Report: The Evolving Relationship Between General and Specific Computer Self-Efficacy-An Empirical Assessment. *Information Systems Research, 11*(4), 418-430. https://doi.org/10.1287/isre.11.4.418.11876

Aldholay, A. H., Isaac, O., Abdullah, Z., Abdulsalam, R., & Al-Shibami, A. H. (2018). An extension of Delone and McLean IS success model with self-efficacy. *Campus-wide Information Systems, 35*(4), 285-304. https://doi.org/10.1108/ijilt-11-2017-0116

Al-Fraihat, D., Joy, M., Masa'deh, R., & Sinclair, J. (2020). Evaluating E-learning systems success: An empirical study. *Computers in Human Behavior, 102,* 67-86. https://doi.org/10.1016/j.chb.2019.08.004

Almazán, D. A., Tovar, Y. S., & Quintero, J. M. M. (2017). Influence of information systems on organizational results. *Contaduría Y Administración, 62*(2), 321-338.

Ambalov, I. A. (2018). A meta-analysis of IT continuance: An evaluation of the expectation-confirmation model. *Telematics and Informatics, 35*(6), 1561-1571. https://doi.org/10.1016/j.tele.2018.03.016

Arteaga Sánchez, R., Duarte Hueros, A., & García Ordaz, M. (2013). E-learning and the University of Huelva: a study of WebCT and the technological acceptance model. *Campus-Wide Information Systems, 30*(2), 135-160. https://doi.org/10.1108/10650741311306318

Bentler, P. M., & Bonett, D. C. (1980). Significance Tests and Goodness of Fit in the Analysis of Covariance Structures. *Psychological Bulletin, 88*(3), 588-606. https://doi.org/10.1037/0033-2909.88.3.588

Beran, T. N., & Violato, C. (2010). Structural equation modeling in medical research: a primer. *BMC research notes, 3*(1), 1-10. https://doi.org/10.1186/1756-0500-3-267

Bhattacherjee, A. (2001). Understanding Information Systems Continuance: An Expectation-Confirmation Model. *Management Information Systems Quarterly, 25*(3), 351-370. https://doi.org/10.2307/3250921

Boomsma, A. (1985). Nonconvergence, improper solutions, and starting values in LISREL maximum likelihood estimation. *Psychometrika, 50*(2), 229-242. https://doi.org/10.1007/bf02294248

Byrne, B. M. (2001). Structural Equation Modeling With AMOS, EQS, and LISREL: Comparative Approaches to Testing for the Factorial Validity of a Measuring Instrument. *International Journal of Testing, 1*(1), 55-86. https://doi.org/10.1207/s15327574ijt0101_4

Chang, C. (2013). Exploring the determinants of e-learning systems continuance intention in academic libraries. *Library Management, 34*(1/2), 40-55. https://doi.org/10.1108/01435121311298261

Chau, P. Y. K. (1996). An Empirical Assessment of a Modified Technology Acceptance Model. *Journal of Management Information Systems, 13*(2), 185-204. https://doi.org/10.1080/07421222.1996.11518128

Cheng, E. W. L. (2001). SEM Being More Effective than Multiple Regression in Parsimonious Model Testing for Management Development Research. *Journal of Management Development, 20,* 650-667. http://dx.doi.org/10.1108/02621710110400564

Cheng, Y.-M. (2012). Effects of quality antecedents on e-learning acceptance. *Internet Research, 22*(3), 361-390. https://doi.org/10.1108/10662241211235699

Cheng, Y.-M. (2014). Extending the expectation-confirmation model with quality and flow to explore nurses continued blended e-learning intention. *Information Technology & People, 27*(3), 230-258. https://doi.org/10.1108/itp-01-2013-0024

Cheng, Y.-M. (2019). How does task-technology fit influence cloud-based e-learning continuance and impact? *Education + Training, 61*(4), 480-499. https://doi.org/10.1108/et-09-2018-0203

Cheng, Y.-M. (2021). Can gamification and interface design aesthetics lead to MOOCs' success?. *Education + Training, 63*(9), 1346-1375. https://doi.org/10.1108/et-09-2020-0278

Cheng, Y.-M. (2022). Can tasks and learning be balanced? A dual-pathway model of cloud-based e-learning continuance intention and performance outcomes. *Kybernetes, 51*(1), 210-240. https://doi.org/10.1108/k-07-2020-0440

Chopra, G., Madan, P., Jaisingh, P., & Bhaskar, P. (2019). Effectiveness of e-learning portal from students' perspective: A structural equation model (SEM) approach. *Interactive Technology and Smart Education, 16*(2), 94-116. https://doi.org/10.1108/itse-05-2018-0027

Cidral, W. A., Oliveira, T., Di Felice, M., & Aparicio, M. (2017). E-learning success determinants: Brazilian empirical study. *Computers & Education, 122,* 273-290. https://doi.org/10.1016/j.compedu.2017.12.001

Cooper, D., & Schindler, P. (2010). *Business Research Methods* (11th Ed.). McGraw-Hill/Irwin.

Davis, F. D. (1989). Perceived Usefulness, Perceived Ease of Use, and User Acceptance of Information Technology. *Management Information Systems Quarterly, 13*(3), 319-340.

DeLone, W. H., & McLean, E. R. (1992). Information Systems Success: The Quest for the

Dependent Variable. *Information Systems Research, 3*(1), 60-95. https://doi.org/10.1287/isre.3.1.60

DeLone, W. H., & McLean, E. R. (2003). The DeLone and McLean Model of Information Systems Success: A Ten-Year Update. *Journal of Management Information Systems, 19*(4), 9-30.

Fathema, N., Shannon, D., & Ross, M. (2015). Expanding the Technology Acceptance Model (TAM) to examine faculty use of Learning Management Systems (LMSs) in higher education institutions. *Journal of Online Learning & Teaching, 11*(2),210-232.

Fokides, E. (2017). Greek Pre-service Teachers' Intentions to Use Computers as In-service Teachers. *Contemporary Educational Technology, 8*(1), 56-75. https://doi.org/10.30935/cedtech/6187

Gong, M., Xu, Y., & Yu, Y. (2004). An Enhanced Technology Acceptance Model for Web-Based Learning. *The Journal of Information and Systems in Education,15*(4), 365-374.

Hair, J. F., Anderson, R. E., Tatham, R. L., & Black, W. C. (2010). *Multivariate Data Analysis* (6th ed.). Prentice Hall.

Hair, J. F., Hult, G. T. M., Ringle, C. M., Sarstedt, M., Danks, N. P., & Ray, S. (2021). *Partial Least Squares Structural Equation Modeling (PLS-SEM) Using R: A Workbook.* (1st ed.)**.** Springer Nature.

Hair, J. F., Jr., Howard, M. C., & Nitzl, C. (2020). Assessing measurement model quality in PLS-SEM using confirmatory composite analysis. *Journal of Business Research, 109*, 101-110. https://doi.org/10.1016/j.jbusres.2019.11.069

Hayashi, A., Chen, C. C., Ryan, T., & Wu, J. (2004). The role of social presence and moderating role of computer self-efficacy in predicting the continuance usage of e-learning systems. *Journal of Information Systems Education, 15*(2), 139-154.

Hu, L., & Bentler, P. M. (1999). Cutoff Criteria for Fit Indexes in Covariance Structure Analysis: Conventional Criteria Versus New Alternatives. *Structural Equation Modeling, 6*(1), 1-55. https://doi.org/10.1080/10705519909540118

iResearch. (n.d.). Chinese online education industry research report 2020, Shanghai, China. https://report.iresearch.cn/report/202101/3724.shtml

Kanwal, F., & Rehman, M. (2017). Factors affecting e-learning adoption in developing countries–empirical evidence from Pakistan's higher education sector. *IEEE Access,* 5, 10968-10978. https://doi.org/10.1109/access.2017.2714379

Lee, Y.-H., Hsiao, C., & Purnomo, S. H. (2014). An empirical examination of individual and system characteristics on enhancing e-learning acceptance. *Australasian Journal of Educational Technology, 30*(5), 562-579. https://doi.org/10.14742/ajet.381

Liaw, S.-S., Huang, H.-M., & Chen, G.-D. (2007). Surveying instructor and learner attitudes toward e-learning. *Computers & Education, 49*(4), 1066-1080. https://doi.org/10.1016/j.compedu.2006.01.001

Lodico, M. G., Spaulding, D. T., & Voegtle, K. H. (2006). *Methods in educational research: From theory to practice* (2nd ed.). John Wiley & Sons.

Mohammadi, H. (2015). Investigating users' 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

Mouakket, S., & Bettayeb, A. M. (2015). Investigating the factors influencing continuance usage intention of Learning management systems by university instructors: The Blackboard system case. *International Journal of Web Information Systems, 11*(4), 491-509. https://doi.org/10.1108/ijwis-03-2015-0008

Nguyen, H. T. H., Pham, H. V., Vu, N. H., & Hoang, H. T. (2020). Factors Influencing Students' Intention to Use E-learning System: A Case Study Conducted in Vietnam. *International Journal of Emerging Technologies in Learning (iJET), 15*(18), 165. https://doi.org/10.3991/ijet.v15i18.15441

Nyagorme, P. (2018). E-learning Perceived Usefulness, Self-Efficacy and Attitude of Distance Learners and eLearning Uptake at the College of Distance Education, University of Cape Coast. *IMPACT: International Journal of Research in Engineering & Technology, 6*(1), 15-26.

Oliver, R. L. (1977). Effect of Expectation and Disconfirmation on Postexposure Product Evaluations: An Alternative Interpretation. *Journal of Applied Psychology, 62,* 480-486. https://doi.org/10.1037/0021-9010.62.4.480

Ong, C.-S., & Lai, J.-Y. (2006). Gender differences in perceptions and relationships among dominants of e-learning acceptance. *Computers in Human Behavior, 22*(5), 816-829. https://doi.org/10.1016/j.chb.2004.03.006

Ong, C.-S., Lai, J.-Y., & Wang, Y.-S. (2004). Factors affecting engineers' acceptance of asynchronous e-learning systems in high-tech companies. *Information & Management, 41*(6), 795-804. https://doi.org/10.1016/j.im.2003.08.012

Pedroso, R., Zanetello, L., Guimarães, L., Pettenon, M., Gonçalves, V., Scherer, J., Kessler, F., & Pechansky, F. (2016). Confirmatory factor analysis (CFA) of the Crack Use Relapse Scale (CURS). *Archives of Clinical Psychiatry (São Paulo), 43*(3), 37-40. https://doi.org/10.1590/0101-60830000000081

Perry, J. L., Nicholls, A. R., Clough, P. J., & Crust, L. (2015). Assessing Model Fit: Caveats and Recommendations for Confirmatory Factor Analysis and Exploratory Structural Equation Modeling. *Measurement in Physical Education and Exercise Science, 19*(1), 12-21. https://doi.org/10.1080/1091367x.2014.952370

Petter, S., & McLean, E. R. (2009). A meta-analytic assessment of the DeLone and McLean IS success model: an examination of IS success at the individual level. *Information & Management, 46*(3), *159-166. https://doi.org/10.1016/j.im.2008.12.006*

Roca, J. C., & Gagné, M. (2008). Understanding e-learning continuance intention in the workplace: A self-determination theory perspective. *Computers in Human Behavior, 24*(4), 1585-1604. https://doi.org/10.1016/j.chb.2007.06.001

Roca, J. C., Chiu, C.-M., & Martínez, F. J. (2006). Understanding e-learning continuance intention: An extension of the Technology Acceptance Model. *International Journal of Human-Computer Studies, 64*(8), 683-696. https://doi.org/10.1016/j.ijhcs.2006.01.003

Rughoobur-Seetah, S., & Hosanoo, Z. A. (2021). An evaluation of the impact of confinement on the quality of e-learning in higher education institutions. *Quality Assurance in Education, 29*(4), 422-444. https://doi.org/10.1108/qae-03-2021-0043

Salkind, N. J. (2012). *Exploring Research* (8th ed.). Pearson Press.

Salloum, S. A., AlHamad, A. Q. M., Al-Emran, M., Monem, A. A., & Shaalan, K. (2019). Exploring Students' Acceptance of E-Learning Through the Development of a Comprehensive Technology Acceptance Model. *IEEE Access, 7,* 128445-128462. https://doi.org/10.1109/access.2019.2939467

Samarasinghe, S. M. (2012). *E-Learning systems success in an organizational context* [Unpublished Doctoral Dissertation]. Massey University of New Zealand.

Segars, A. H., & Grover, V. (1993). Re-Examining Perceived Ease of Use and Usefulness: A Confirmatory Factor Analysis. *Management Information Systems Quarterly, 17*(4), 517-525. https://doi.org/10.2307/249590

Sun, S. (2016). Online Teaching 4.0: "Internet +" classroom teaching. *The Chinese Journal of ICT in Education, 14,* 17-20.

Taber, K. S. (2018). The Use of Cronbach's Alpha When Developing and Reporting Research Instruments in Science Education. *Research in Science Education, 48*(1), 1273-1296. https://doi.org/10.1007/s11165-016-9602-2

Usman, O., Septianti, A., Susita, M., & Marsofiyati, M. (2020). The effect of computer self-efficacy and subjective norm on the perceived usefulness, perceived ease of use and behavioural intention to use technology. *Journal of Southeast Asian Research, 11,* 6662-6673. https://doi.org/10.5171/2020.753259

Vululleh, P. (2018). Determinants of students' e-learning acceptance in developing countries: An approach based on Structural Equation Modeling (SEM). *International Journal of Education and Development Using ICT, 14*(1), 141-151.

Wang, W.-T., & Wang, C.-C. (2009). An empirical study of instructor adoption of web-based learning systems. *Computers & Education, 53*(3), 761-774. https://doi.org/10.1016/j.compedu.2009.02.021

Wijaya, I. W. K., Rai, A. A. G., & Hariguna, T. (2019). The impact of customer experience on customer behavior intention uses in social media commerce, an extended expectation confirmation model: An empirical study. *Management Science Letters*, *9*(12), 2009-2020. https://doi.org/10.5267/j.msl.2019.7.005

Wiley, D., & Hilton, J. L. (2018). Defining OER-enabled pedagogy. *International Review of Research in Open and Distributed Learning, 19*(4), 133-147. https://doi.org/10.19173/irrodl.v19i4.3601

Yuen, A. H. K., & Ma, W. W. K. (2008). Exploring teacher acceptance of e-learning technology. *Asia-Pacific Journal of Teacher Education, 36*(3), 229-243. https://doi.org/10.1080/13598660802232779

Zhang, C. (2020). Problems and countermeasures of online education reform in colleges and universities under the background of Internet +. *Innovation and entrepreneurship theory research and practice, 1*(19), 67-74.