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Investigating Factors Influencing Undergraduate Students' E-learning Satisfaction, and Continuance Intention in Chengdu, China

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Abstract

Purpose: The purpose of this study is to explore factors influencing undergraduate students' e-learning satisfaction and continuance intention in Chengdu, China. **Research design, data, and methodology:** Sample data was collected using quantitative method and questionnaire. Item-objective congruence and pilot tests were adopted to test the content validity and reliability of the questionnaire before distribution. Data was analyzed by utilizing Confirmatory Factor Analysis (CFA) and Structural Equation Modeling (SEM) to validate the model's goodness of fit and confirm the causal relationship among variables for hypothesis testing. **Results:** The results reveal that this conceptual model could predict which factors influence undergraduate students' e-learning satisfaction and continuance intention in Chengdu, China. The students' e-learning satisfaction was the strongest predictor of continuance intention to use both directly and indirectly, which students' e-learning satisfaction was driven significantly by system quality, confirmation, and perceived usefulness. However, the relationship between service quality, information quality and satisfaction are not supported. **Conclusions:** This study suggested that developers of the cloud-based e-learning systems of higher education institutions should focus on improving the quality factors of the cloud-based e-learning systems for students to perceive the system as useful and would further enhance continuance intention toward using the cloud-based e-learning systems.

Keywords: E-Learning, Satisfaction, Perceived Usefulness, Continuance Intention, China

JEL Classification Code: E44, F31, F37, G15

1. Introduction

With the continuous development of network technology, online learning has undermined traditional offline learning with its advantages, such as sporadic learning time, unlimited learning locations, highly targeted content, high efficiency of online interaction, and repeatable learning, thus triggering explosive growth. The COVID-19 pandemic since 2020 has accelerated this process of change. According to CNNIC's 48th Statistical Report on Internet Development in China, the number of online learning users in China reached 325 million as of June 2021, accounting for 32.1% of the total Internet users (CNNIC, 2021). Compared with traditional electronic learning (e-learning), cloud-based e-learning can enable users to access, store, retrieve and share all kinds of teaching materials and learning resources in the cloud anytime, anywhere, without any restrictions (Wang et al., 2016). Hence, introducing cloud-based e-learning systems may become a more flexible and scalable solution for organizations without the huge overhead of expensive devices, low network transmission rate, and limited storage capacity associated with traditional e-learning systems. This is why many educational institutions have implemented cloud-based e-learning to enable students to learn from anywhere and at any time (Shiau & Chau, 2015). Surely, increasing attention is paid to cloud-based e-learning as a

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flexible and scalable way of developing education programs for users in educational settings, and it has been accepted by its intended users (Chang et al., 2016). Further, to better explain undergraduate students' cloud-based e-learning continuance intention, the paper starts with a review of the literature, and then the conceptual framework is proposed. After that, the research methodology is discussed, and then data analysis and results are presented.

2. Literature Review

2.1 System Quality

DeLone and McLean (2003) proposed an information systems improvement and management model. As an interpretation model for the use of the later stage, DeLone and McLean's model has attracted great attention from scholars in the field of IS. It can measure the good and bad of the three dimensions of information quality, system quality, and service quality to have a greater impact on learners' satisfaction degree and continuous desire. Some scholars have applied the DeLone and McLean models to information systems, and the results show a positive effect between user usage and system quality (Cidral et al., 2020). Many scholars connect this model with various teaching models or theories in the original literature. The results show that in the information technology environment when users are satisfied with the interaction of the user system, they will feel very happy and will be involved and immersed in the ocean of information technology (Alsabawy et al., 2016; Cheng, 2014a; Lin & Chen, 2012). Gao et al. (2015) believe that the quality of financial service system can be felt in the services provided by customers, and the quality of financial service IS/IT can directly bring positive effects on users' participation and immersion, and at the same time bring users a pleasant experience. Many researches on electronization have confirmed that system quality has a significant positive effect on user satisfaction (Alsabawy et al., 2016). In the context of an e-learning system, it has been demonstrated that system quality is closely related to its application (Marjanovic et al., 2015). Thus, a hypothesis is suggested:
H1: System quality has a significant influence on students' satisfaction.

2.2 Information Quality

For example, students can use the system to generate the necessary knowledge. It is generally believed that the information quality of a system determines whether users are satisfied with the system and want to use it again (Cheng, 2012). Zhou (2011) concludes that as long as the financial information system/information technology can provide high-quality information, information is very accurate, complete, and timely update, such high-quality information can meet the user's expectations, make the user more easily feel the availability of information technology, and thus feel satisfied. Information quality also greatly impacts user satisfaction (Cidral et al., 2018). On the contrary, a piece of bad information will greatly reduce the satisfaction of consumption because customers want to obtain reliable and timely information from the mobile payment system (Gao et al., 2015). When users use IS, they start with high expectations, which can rise or fall throughout use. The quality of information is directly related to the size of the expected value. According to Aparicio et al. (2016), information quality is decisive in explaining consumers' satisfaction with mobile payments. Zhang et al. (2017) argued that high-quality information can improve users' satisfaction with virtual community services. Thus, a hypothesis is suggested:
H2: Information quality has a significant influence on students' satisfaction.

2.3 Service Quality

The service quality of the platform itself will have a strong positive impact on users' expected sense of identity and cognitive usefulness. The level of platform service quality has a great impact on users. The better the quality is, the higher the user's expectation of the platform will be, and the more users can realize its effect on themselves. Alali and Salim (2013) surveyed a health forum, and the results showed that service quality greatly impacted user satisfaction. Rahi et al. (2019) believes that if the high-quality service of financial service system (IS) / information technology (IT) is likely to generate a strong sense of usefulness among users, thus driving more other users to use it, provided that it can provide users with high quality and satisfactory quality services. When consumers feel that mobile payment service providers can ensure service quality, customer satisfaction, and credibility can be improved, they will continue using mobile payment to integrate into such IS/IT interaction fully (Gao et al., 2015). In terms of information systems, it has been found that quality of service in an e-learning environment has a clear positive effect on student satisfaction (Poulova & Simonova, 2014), with some surveys showing that most students have a desire to use e-learning systems (Cheng, 2012; Hassanzadeh et al., 2012). Yang (2015) Based on the characteristics of mobile reading, this article integrated the extensional ECM-IT model and successful DM ISSM model, constructed the continuance intention research model of mobile reading users, and then empirically researched these models. Therefore, the relevant functions in the reading service can have an impact on users to a large extent, including the service content, the overall

interface, personalized service, and so on. Service quality focuses on the impact of personalized reading and socialized interactive services on user satisfaction. Targeted reading services can increase user satisfaction and have a significant positive impact, indicating that user subscription and personalized recommendation services provided by content aggregation APP service providers have been recognized by users and improved user satisfaction. Thus, a hypothesis is suggested:

H3: Service quality has a significant influence on students' satisfaction.

2.4 Confirmation

In the field of information systems, as to empirical results for expectation-confirmation model (ECM) Some scholars have proved after research that expectation confirmation can improve the level of consumer satisfaction, in other words, when the user's expectation confirmation is high, It shows that users have certain expectations and good sense of use experience in the process of making the system, which can enhance their recognition of the platform and improve their satisfaction with the system. If users have high expectations for the system, reach their expectations after using the system, and have a good sense of experience, the system will give users a high degree of satisfaction. Lin and Wang (2012) used the IS success model as well as the fitting (TTF) model and the anticipation confirmation (ECM) model to investigate students' continued willingness to engage in blended teaching. The results showed that after students used the relevant learning system, the perceptual fitting of the system confirmed the system use. Yang (2015) takes MOOCs users as the object and constructs a research model related to internal motivators, basic psychological needs, and MOOCs design factors from the perspective of sustainable use and autonomy in the information system. The results show that anticipatory identification plays a significant role in cognitive effectiveness, satisfaction, and intrinsic motivation. And it will indirectly affect how much users of MOOCs want to keep spending. Lin and Wang (2012) is on the basis of anticipatory verification (ECT), combines the two variables in social networks, interest and interaction, and puts them into the research environment for research. A conceptual model of continuous learning based on network is established using structural equation. Through the empirical test of this model, curriculum content, experience and other factors have a significant effect on students' perceived satisfaction. The traditional effect of perceived satisfaction on continued use intention still exists, which again verifies the significant influence of utility and expectation confirmation on the perceived satisfaction. Thus, below hypotheses are suggested:

H4: Confirmation has a significant influence on students' satisfaction.

H5: Confirmation has a significant influence on perceived usefulness.

2.5 Perceived Usefulness

The effect of expectation confirmation degree on perceived usefulness (directly or indirectly) is fully verified in the expectation validation model (Bhattacherjee, 2001), where perceived usefulness refers to the improvement of learning efficiency and the degree of learning effect when users use e-learning platforms. The usefulness and ease of perception are very important indicators in the technology acceptance model. Cheng et al. (2019) said that users' confirmation experience can greatly help their understanding of information technology, which can be adjusted in time. Users' expectations of information technology will certainly have a certain impact on their perceived usefulness. Wang et al. (2017) confirmed that if users believe that cloud services can improve their work performance, they will be more willing to continue providing them. They will continue providing cloud computing services and positively promote the perception of cloud computing. Cheng (2014b) believe that users' perceived value of information technology makes it possible to improve their satisfaction with information technology. People generally agree that they are satisfied with various functions of cloud computing and are full of dependence on it because people feel that the stronger the function of cloud computing is, the more satisfied they will be. Cai and Wang (2022) introduced the technology acceptance model (TAM) into the international research field of Chinese teaching. They established a theoretical model about Chinese students' willingness to participate in online teaching to test Chinese students' satisfaction with online courses and verify their appropriateness. The empirical study found that learners' willingness to learn is acceptable, while their persistent desire is low. In terms of perceived usefulness and ease of use, they will positively affect learners' usage tendencies. The interaction of these two things can benefit each other, cognitive style, and technical support. Thus, a hypothesis is suggested:

H6: Perceived usefulness has a significant influence on students' satisfaction

2.6 Students' Satisfaction

We already know from much previous research that the content of online education is very broad, can be used specifically for online teaching, has a strong ease of use, and the timeliness of the information are all important factors that affect user satisfaction (DeLone & McLean, 1992). Moreover, many studies show that system quality, usage, and

user attitude and behavior are the main factors in satisfaction. This will affect whether the online learning system can be used consistently. Students' satisfaction with the learning system depends on their expectations, and their satisfaction with the system will prompt them to use the system continuously (Lee et al., 2018). According to Cheng (2021), if users are satisfied with the e-learning system, they will be willing to continue to use it. In other words, if users are satisfied with the system internally, they will be encouraged to continue using it. Tan and Kim (2015) believe that users' satisfaction with information systems (IS) / information technology (IT) depends on users' expectations of IT. When customers obtain expected benefits from cloud business, their satisfaction with cloud business depends on their expectations of cloud business. To better understand how satisfied online teaching is with college students, Chow and Shi (2014) surveyed on how satisfied online teaching is with students. They believe the more satisfied students are with the system, the more willing they will be to use it consistently. The researchers also found that the positive experiences of users can influence their perceived personal outcomes. The researchers also noted that the belief that e-learning can improve one's performance is why many people continue to use it (Lin & Wang, 2012). Thus, a hypothesis is suggested:
H7: Students' satisfaction has a significant influence on continuance intention.

2.7 Continuance Intention

In MOOC, willingness to continue using a MOOC is a learner's willingness to continue learning without the course completely ending (Joo et al., 2018). Relevant studies show that users' continuous use intention can positively affect their behavior change. According to the research of Zhang et al. (2016), students' perceptual activity experience and learning satisfaction can significantly promote students' interest in learning. Cui et al. (2017) found that satisfaction, perceived effectiveness, inter-psychological experience, and expectation significantly positively affect students' willingness to use learning continuously. Based on the technology acceptance model. Chen et al. (2018) analyzed the sustainable use of open teaching on large network platforms using autonomy and psychological flow theories. According to the relevant teaching theory, Yang (2016) introduced basic psychological needs elements, service platform design elements, and subjective factors of learners and studied the criteria of MOOC platforms for learners' willingness to continue learning. Zhang et al. (2016) incorporates perceived interactivity and "perceived happiness" into the technology acceptance model's theoretical framework and explores MOOC learners' impact on their desire to continue learning. The results show an obvious correlation between students' learning attitude and continuous learning intention. Students' desire to continue learning depends mainly on perceived availability and the ease of use of the web platform.

3. Research Methods and Materials

3.1 Research Framework

The researcher has proposed the research model based on adopting the extended Technology Acceptance Model (TAM) and the updated DeLone and McLean successful models. TAM explains the acceptance and adoption of Information Systems (IS) and analyzes the factors affecting users' adoption. It supports a theoretical foundation to understand the external factors that affect users' attitudes and intentions, which have been widely used to predict the usage of information technology. Drennan et al. (2005) mention that TAM was created to research technology acceptance in business environments. It has been proved to be a simple model applicable to education. The research model is also adopted from three theoretical frameworks of previous studies.

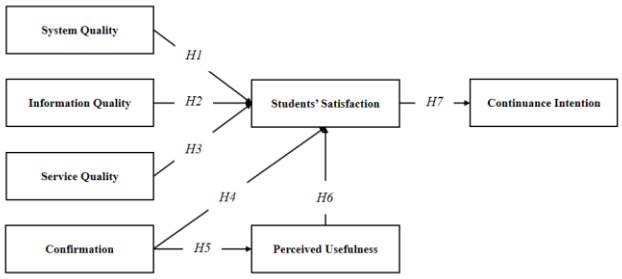

Figure 1: Conceptual Framework

H1: System quality has a significant influence on students' satisfaction.
H2: Information quality has a significant influence on students' satisfaction.
H3: Service quality has a significant influence on students' satisfaction.
H4: Confirmation has a significant influence on students' satisfaction.
H5: Confirmation has a significant influence on perceived usefulness.
H6: Perceived usefulness has a significant influence on students' satisfaction
H7: Students' satisfaction has a significant influence on continuance intention.

3.2 Research Methodology

In this study, empirical analysis and quantitative methods were adopted. Sample data were collected from the target population by using a questionnaire as a tool. Before large-scale data collection, the content validity and reliability of the questionnaire were verified through the Item-Objective Congruence (IOC) test and a pilot test (n=50) of Cronbach's Alpha. After the reliability test, the questionnaires were distributed online to undergraduates. Four (Art et al. and Education) subjects are the core majors of Chengdu University. Many students are studying in these subjects. The respondents are required to have more than one year of e-learning experience.

The evaluation of item-objective congruence (IOC) indicated that every scale item received a rating of 0.6 or greater, as assessed by three expert raters. Following this, the pilot test, which involved 50 participants, showcased strong internal consistency for all items, with Cronbach's alpha coefficients surpassing or equaling 0.7, as reported by Hair et al. (2010).

Anderson and Gerbing (1988) proposed two steps of the Structural Equation Model (SEM) method, which were adopted in this study to analyze the sample data. The first step was using SPSS and AMOS for Confirmatory Factor Analysis (CFA) to examine convergent validity, and the second step was to conduct SEM to explore causal relationships between all constructs in the conceptual model to test the significance of influences and proposed hypotheses. SEM can explore a range of dependencies synchronously, especially when the model consists of direct and indirect influences between structures (Hair et al., 2010).

3.3 Population and Sample Size

In the research, the sample data for this study were collected from a convenience sample of 500 undergraduates of four main subjects who were 18 to 25 years old. All of whom had experience using e-learning systems at Chengdu University in China. The study data from a structural equation modeling (SEM) technique was conducted to identify causal relationships. This is to ensure that participants are familiar with LMS and have interactive experience with LMS. Based on the A-priori Sample Size Calculator for SEM by Soper (2006), the recommended minimum sample size was 425 from the parameters of 7 latent variables and 26 observed variables at the probability level 0.05. Therefore, the questionnaires are distributed and screened for valid responses at 500.

3.4 Sampling Technique

The sample was scoped and selected using the multistage sampling techniques of judgment, stratified random, and convenience sampling. Judgment sampling was adopted to select four main subjects of Chengdu University in China, and then stratified random sampling to determine sample size from each institution or sample stratum as shown in Table 1. Convenience sampling is employed by online survey distribution to reachable student group.

Table 1: Sample Units and Sample Size

Subjects	Population Size	Proportional Sample Size
Art	894	153
Management	816	140
Economics	444	76
Education	765	131
Total	**2919**	**500**

Source: Constructed by author

4. Results and Discussion

4.1 Demographic Information

The demographic profile of 500 respondents is presented in Table 2. The respondents are 359 females and 141 males, representing 71.8% and 28.20%, respectively. For the age under 18, 18-23, and above 23, which represents 0.80%, 98.40%, and 0.80%, respectively. For the frequency of using the cloud-based e-learning system, several times a month, once a week, several times a week, once a day, several times a day, which represents 58.80%, 11.20%, 21.80%, 3.00%, and 5.20%, respectively.

Table 2: Demographic Profile

Demographic and General Data (N=500)		Frequency	Percentage
Gender	Male	141	28.20%
	Female	359	71.80%
Age	under 18	4	0.80%
	18-23	492	98.40%
	above 23	4	0.80%
Frequency of using the cloud-based e-learning system	Several times a month	294	58.80%
	Once a week	56	11.20%
	Several times a week	109	21.80%
	Once a day	15	3.00%
	Several times a day	26	5.20%

Source: Constructed by author

4.2 Confirmatory Factor Analysis (CFA)

Confirmatory Factor Analysis (CFA) is a key starting in the SEM (Hair et al., 2010). Both variables' reliability and validity can be measured with CFA (Byrne, 2010).

Convergent validity can be statistically measured by Cronbach's Alpha reliability, factor loading, average variance extracted (AVE), and composite reliability (CR) (Fornell & Larcker, 1981). Factor loading above 0.50 is significant (Hair et al., 1998). In this study, the factor loading of all individual items was greater than 0.50 and mostly was above 0.75, ranging from 0.564 to 0.884, as presented in Table 3. Composite reliability (CR) was recommended at the value of 0.8 or above, and average variance extracted (AVE) was recommended at greater than or at 0.5 (Fornell & Larcker, 1981; Hair et al., 1998). In Table 3, almost all estimates were significant as CR values exceeded the level of 0.7 and AVE values exceeded 0.5.

Table 3: Confirmatory Factor Analysis Result, Composite Reliability (CR) and Average Variance Extracted (AVE)

Variables	Source of Questionnaire (Measurement Indicator)	No. of Item	Cronbach's Alpha	Factors Loading	CR	AVE
System Quality (SYSQ)	DeLone and McLean (2003)	3	0.794	0.616-0.884	0.813	0.597
Information Quality (IQ)	DeLone and McLean (2003)	4	0.825	0.564-0.868	0.830	0.557
Service Quality (SERQ)	DeLone and McLean (2003)	4	0.771	0.578-0.752	0.775	0.465
Confirmation (CONf)	Bhattacherjee (2001)	3	0.824	0.732-0.817	0.828	0.616
Perceived Usefulness (PU)	Davis (1989)	4	0.864	0.653-0.876	0.866	0.620
Students' Satisfaction (SATISf)	Bhattacherjee (2001)	4	0.848	0.568-0.862	0.855	0.602
Continuance intention (CI)	Bhattacherjee (2001)	4	0.860	0.736-0.835	0.861	0.608

All variables were significant from the greater value of AVE square roots compared to the factor correlations. Indicators of Goodness of fit were measured in Table 4. In Table 4, the indices used for measurement were CMIN/DF, GFI, AGFI, NFI, CFI, TLI, and RMSEA, which all statistical values from CFA were greater than acceptable and proven goodness of fit for the measurement model.

Table 4: Goodness of Fit for Measurement Model

Fit Index	Acceptable Criteria	Statistical Values
CMIN/DF	< 5.00 (Al-Mamary & Shamsuddin, 2015; Awang, 2012)	718.215/278 or 2.584
GFI	≥ 0.85 (Sica & Ghisi, 2007)	0.903
AGFI	≥ 0.80 (Sica & Ghisi, 2007)	0.877
NFI	≥ 0.80 (Wu & Wang, 2006)	0.884
CFI	≥ 0.80 (Bentler, 1990))	0.925
TLI	≥ 0.80 (Sharma et al., 2005)	0.912
RMSEA	< 0.08 (Pedroso et al., 2016)	0.056
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,, NFI = Normed fit index, CFI = Comparative fit index, TLI = Tucker-Lewis index and RMSEA = Root mean square error of approximation.

Discriminant validity appeared satisfactory in Table 4. All variables were significant from the greater value of AVE square roots compared to the factor correlations.

Table 5: Discriminant Validity

	SYSQ	IQ	SERQ	CONF	PU	SATISF	CI
SYSQ	**0.773**						
IQ	0.266	**0.746**					
SERQ	0.255	0.270	**0.682**				
CONF	0.253	0.185	0.224	**0.785**			
PU	0.278	0.200	0.228	0.376	**0.787**		
SATISF	0.302	0.175	0.162	0.279	0.257	**0.776**	
CI	0.270	0.040	0.047	0.173	0.166	0.237	**0.780**

Note: The diagonally listed value is the AVE square roots of the variables
Source: Created by the author.

4.3 Structural Equation Model (SEM)

This study adopted a Structural Equation Model (SEM) to analyze the collected data. The strengths of SEM include various aspects. SEM could explore dependent relationships (Hair et al., 2010). Secondly, SEM examined the causal relationships among latent and observed variables. Third, random error in the observed variables was used to provide more accurate measurement results. Fourth, it used multiple indicators to measure latent variables. Lastly, it could test hypotheses at the construct level, not only at the item level (Hoyle, 2011). The goodness of fit for the structural model was measured and demonstrated in Table 6. The statistical values were CMIN/DF = 3.036, GFI = 0.874, AGFI = 0.848, NFI=0.857, CFI = 0.899, TLI = 0.887, and RMSEA = 0.064. All values from fit indices were greater than the acceptable values, so they affirmed the model fitness.

Table 6: Goodness of Fit for Structural Model

Index	Acceptable	Statistical Values
CMIN/DF	< 5.00 (Al-Mamary & Shamsuddin, 2015; Awang, 2012)	886.645/292 or 3.036
GFI	≥ 0.85 (Sica & Ghisi, 2007)	0.874
AGFI	≥ 0.80 (Sica & Ghisi, 2007)	0.848
NFI	≥ 0.80 (Wu & Wang, 2006)	0.857
CFI	≥ 0.80 (Bentler, 1990))	0.899
TLI	≥ 0.80 (Sharma et al., 2005)	0.887
RMSEA	< 0.08 (Pedroso et al., 2016)	0.064

Index	Acceptable	Statistical Values
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,, NFI = Normed fit index, CFI = Comparative fit index, TLI = Tucker-Lewis index and RMSEA = Root mean square error of approximation.

4.4 Research Hypothesis Testing Result

The correlation magnitude among the independent and dependent variables proposed in the hypothesis is measured by regression coefficients or standardized path coefficients.

Table 7: Hypothesis Results of the Structural Equation Modeling

Hypothesis	(β)	t-Value	Result
H1: SYSQ→SATISF	0.165	3.318*	Supported
H2: IQ→SATISF	0.058	1.181	Not Supported
H3: SERQ→SATISF	0.065	1.260	Not Supported
H4: CONF→SATISF	0.231	3.892*	Supported
H5: CONF→PU	0.417	7.341*	Supported
H6: PU→SATISF	0.140	2.493*	Supported
H7: SATISF→CI	0.259	4.789*	Supported

Note: * p<0.05
Source: Created by the author

As presented in Table 7, five proposed hypotheses were supported. Students' satisfaction strongly impacted the continuance intention. Students' satisfaction was significantly driven by system quality, confirmation, and perceived usefulness, respectively. The path relationship of system quality and students' satisfaction has a standardized path coefficient of 0.165 and a t value of 3.318 in **H1.** The path relationship of information quality and students' satisfaction has a standardized path coefficient of 0.058 and a t value of 1.181 in **H2.** The path relationship of service quality and students' satisfaction has a standardized path coefficient of 0.065 and a t value of 1.260 in **H3.** The path relationship of confirmation and students' satisfaction has a standardized path coefficient of 0.231 and a t value of 3.892 in **H4.** Path relationship of confirmation and perceived usefulness has a standardized path coefficient of 0.417 and a t value of 7.341 in **H5.** The path relationship of perceived usefulness and students' satisfaction has a standardized path coefficient of 0.140 and a t value of 2.493 in **H6.** The path relationship of students' satisfaction and continuance intention has a standardized path coefficient of 0.259 and a t value of 4.789 in **H7.**

5. Conclusion and Recommendation

5.1 Conclusion and Discussion

This study comprehensively analyzed factors influencing undergraduate students' e-learning satisfaction, perceived usefulness, and continuance intention in Chengdu, China. The researcher proposed seven hypotheses in the conceptual framework to investigate the factors that impact undergraduate students' e-learning satisfaction, perceived usefulness, and continuance intention. After the questionnaire was prepared and verified reliable, it was distributed online to undergraduates, including four (Art et al., and Education) core majors of Chengdu University. Many students' studies in these subjects, and these four subjects have undergraduate and postgraduate students.

With the collected data, CFA was adopted to measure and test the validity and reliability of the research conceptual model. SEM was also employed to analyze and discuss the factors influencing undergraduate students' e-learning satisfaction, perceived usefulness, and continuance intention in Chengdu, China. Five out of seven hypotheses proposed were supported and proven to fulfill research objectives.

The findings of this research can be summarized as follows: The results reveal that this conceptual model was able to predict which factors influence undergraduate students' e-learning satisfaction, perceived usefulness, and continuance intention in Chengdu, China. The results reveal that system quality, confirmation, and perceived usefulness are the most significant factors in students' e-learning satisfaction and continuance intention. The students' e-learning satisfaction was the strongest predictor of continuance intention to use both directly and indirectly, and students' e-learning satisfaction was driven significantly by system quality and confirmation. Therefore, this study suggested that developers of the cloud-based e-learning systems of higher education institutions should focus on improving the quality factors of the cloud-based e-learning systems for students to perceive the system as useful and would further enhance the cloud-based e-learning systems, perceived usefulness, and continuance intention toward using the cloud-based e-learning systems.

5.2 Recommendation

On the one hand, in this study, the students' e-learning satisfaction was the strongest predictor of continuance intention to use both directly and indirectly, and students' e-learning satisfaction was driven significantly by system quality and confirmation. Many students choose e-learning because the system quality and confirmation influence them. Therefore, the teaching unit of the university should fully enhance the e-learning system quality and confirmation to

encourage more students to accept this e-learning platform.

On the other hand, the students' e-learning satisfaction was the strongest predictor of continuance intention to use both directly and indirectly. In this research, students' satisfaction is affected by five latent variables, of which the most influential is confirmation. Therefore, in future teaching practice, the teaching units should focus on confirmation of e-learning as some scholars' research on the relationship between confirmation and satisfaction proves that students' expectation of the learning system will determine their learning satisfaction (Lee, 2010; Lin & Wang, 2012). Therefore, this recommendation shall effectively enhance students' positive attitudes toward college students' e-learning satisfaction, perceived usefulness, and continuance intention.

5.3 Limitation and Further Study

A limitation of this study is that the target population included only students at Chengdu University. Moreover, only a few popular majors were selected for quantitative analysis. Further exploration can take place in two parts.

On the one hand, the scope of research can be extended to other representative science and technology majors, such as mechanical or civil engineering. It can also be extended to other universities in Sichuan Province or other regions of China.

On the other hand, the investigation can consider other latent variables, such as behavioral intention, social influence, self-efficacy, effort expectancy, trust, perceived interaction, learning motivation, performance expectancy, and facilitating conditions, in order to extend the research framework on the conceptual structure of student satisfaction with e-learning.

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