Learning Satisfaction of Online Art Education: A Case of Undergraduates in Public Colleges in Sichuan

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Abstract

Purpose: Online education is destined to become the development trend of education due to the rise of the COVID-19 epidemic. Therefore, this study aims to determine influencing factors of learning satisfaction of undergraduate students, majoring in online art education in public colleges in Sichuan Province, China. A conceptual framework proposes the causal relationship between system quality, information quality, service quality, perceived usability, perceived ease of use, self-efficacy, and learning satisfaction. **Research design, data, and methodology:** 494 undergraduates were surveyed as part of the study using a project questionnaire using both online and offline approaches. The sampling methods are judgmental sampling, stratified random and convenience sampling. Before the data collection, content validity was reserved by index of item objective congruence (IOC). Pilot test of 30 samples was approved by Cronbach's Alpha reliability test. In order to quantify the causal link and conduct a hypothesis test between the variables, the researcher utilized confirmatory factor analysis and a structural equation model. **Results:** The results demonstrate that all hypotheses are supported. Furthermore, self-efficacy has the strongest significant effect on perceived ease of use. **Conclusion:** This research can guide the relevant departments of art majors in public universities in Sichuan Province to integrate online learning and increase the effectiveness of that learning by enhancing students' performance.

Keywords: Online Education, System Quality, Information Quality, Service Quality, Learning Satisfaction.

JEL Classification Code: E44, F31, F37, G15

1. Introduction

Online education has advanced due to China's fast growth in Internet technology. According to data from the

China Internet Information Center, there were 23.246 million students enrolled in online courses as of June 2019,

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up from 110.14 million in 2015. The number of online education users also climbed by about 100 million after stabilizing between June 2019 and the end of March 2021 due to the pandemic causing nearly 200 million users. This demonstrates that the influence of the coronavirus outbreak has played a significant role in encouraging online education, as well as the rate of Internet usage with the growth of modern society.

Online education has advanced significantly in China due to the country's fast growth of telecommunications infrastructure (Huang & Zhao, 2016). China has doubled its investment in online learning each year, although the field of art education online is still in its infancy (Xie, 2020). Although many institutions have achieved significant advancements in offering education services to groups and private via online education modes, their communication effectiveness, and service quality are still unequal (Chen & Bao, 2014). Art education and other fields differ in their strong operability and demonstration. Appropriate teaching strategies should be used for different teaching objects. However, according to Clark and Button (2011), the Internet and effective art education will undoubtedly promote the development of Art Education. In order to raise the bar for art education, we need not only look for innovations within the field of study but also adjust to how society is changing (Guan & Li, 2014).

According to the research, it is important to focus on how college students learn through networks. There are few study findings on online art education, although higher education is currently adjusting to the changing times and moving toward online learning (Hannigan & Raphael, 2020). According to Lv (2018), more kinds of art education may be realized online format, and a flexible education mode is a crucial component of integrating art education with the Internet. The researcher identifies the components impacting online art education and categorized them into objective and subjective aspects in conjunction with the relevant studies (Aldholay et al., 2018; Chughtai, 2018; Masrek & Gaskin, 2016). Learning satisfaction is the epitome of the quality of online art education. It can be seen that researching the aspects that influence online education is a crucial step in raising its teaching standards. Therefore, it is crucial to research the aspects influencing online art education in this country, learning pleasure, and their interactions

2. Literature Review

2.1 System Quality

"System quality" is described as the degree to which the system promotes users' learning, including the ease of understanding, learning, and using of the system, as well as the pleasure and convenience of such formats (Aldholay et al., 2019). The system quality is related to the innovation degree of the platform provided by the system for users, and the technical success degree of the system is used to measure its quality. Eom (2012) proposed that system quality indicates the usefulness, effectiveness, and dependability of users accessing the system, enhancing users' learning and productivity. According to Yuce et al. (2019), system quality is a critical element that influenced the user's real usage experience as well as the usefulness and effectiveness of the system. User satisfaction and performance are greatly influenced by system quality to arouse users continue to use a system. System quality can give users a positive user experience and utilize that experience to gauge the system's technical performance (Wang et al., 2014). Therefore, this research hypothesizes that:

H1: System quality has a significant effect on learning satisfaction.

2.2 Information Quality

Information quality (IQ) is the term for the accuracy, reliability, and consistency with which information is transmitted, the standard at which the information is presented, and its setting (Eom, 2012). The quality of information is determined by whether the knowledge acquired by users through online learning is pertinent, accurate, thorough, current, and comprehensive (Aldholay et al., 2019). The users acknowledged that the most critical IQ indicator is clear, accurate, and extensive. The correctness, completeness, universality, effectiveness, relevance, extent, and timeliness of the information and formats offered by the information system are also associated with IQ (Cheng, 2014). In other words, the platform's knowledge is assessed for efficacy, relevance, comprehensibility, relevance, and integrity to determine IQ. One of the most fundamental criteria to forecast the pleasure of e-learning systems is IQ, which directly impacts the systems' well-being (Masrek & Gaskin, 2016). Eom (2012) asserted that IQ significantly affects the actual usage experience, perceived usefulness, and results experienced by customers. Accuracy, efficacy, honesty, and timeliness of information may all be improved to raise IQ. High-quality content increases students' satisfaction with their learning, motivates them to keep using the online learning system, and increases its usefulness (Chang, 2013). The following conclusions may be taken from this:

H2: Information quality has a significant effect on learning satisfaction.

2.3 Service Quality

The term "service quality" (SEQ) refers to how efficiently computer users can execute activities utilizing the system. According to Chang (2013), SEQ is a characteristic that affects the perceived value and user satisfaction, and is also crucial for users to increase the likelihood of reuse in actual use. SEQ involves how users perceive system services' dependability, assurance, interactivity, and responsiveness. According to Wang et al. (2014), the effectiveness of the service and the system creator's support for the computer learning system are reflected in the service's quality. According to Masrek and Gaskin (2016), there was a significant correlation between SEQ and customer satisfaction. It is simpler to gauge user satisfaction with an online service system that is straightforward, effective, and practical. The level of service delivered has an impact on customer satisfaction. The positive relationship between trust in service providers and consumers' satisfaction are maintained when SEQ is improved, in turn, users' satisfaction and opinion of the value of the service are also increased (Chang, 2013). According to Wang et al. (2014), one of the crucial steps to enhancing user satisfaction and actual user experience is to raise the service quality. Service quality allows users to understand better the dependability of system use, timeliness of response, fluidity of communication, and convenience (Cao & Jittawiriyanukoon, 2022). As a result, the following conclusions can be made:

H3: Service quality has a significant effect on learning satisfaction.

2.4 Self-Efficacy

Self-efficacy (SE) is the capacity to comprehend particular activities through learning. It serves as a critical predictor of learning content as well as the motivational outcome of that content (Zhao et al., 2008). One of the key elements influencing how people take the initiative in daily life is SE, also thought of as a psychological driving behavior (Ren & Chadee, 2017). According to Lee (2006), SE in e-learning is a student's evaluation of their computer skills in a network environment. Similarly, Sánchez et al. (2013) noted that SE is associated with people's perceptions of their abilities to carry out particular system tasks. According to Chughtai (2018), learning SE is a feature that is prone to individual variation, is reasonably stable, and serves as a critical indicator of academic success. Sánchez et al. (2013) believed that the SE of computer users is influenced by their technical competence and directly affected utility, availability, and behavior intention. According to Bartimote-Aufflick et al. (2016), SE is essential for a person's ability to learn and exercise freely to make the right decisions. Therefore, it is possible to assume the following:

H4: Self-efficacy has a significant effect on perceived usefulness.

H5: Self-efficacy has a significant effect on perceived ease of use.

2.5 Perceived Ease of Use

After training, a user's perception of how simple it is to grasp self-service technology and operate information is known as perceived ease of use (PEOU) (Zhao et al., 2008). According to Hu and Lai (2019), the ease of use is demonstrated when users undertake the use of system. The difficulty of comprehending learning information, and task completion effectiveness, are related to PEOU. PEOU is also considered when determining how much time system users spend on the e-learning system and how much learning efficiency may be increased (Cheng., 2012; Shao, 2018). According to Masrek and Gaskin (2016), PEOU significantly impacts students' learning interests and value judgment and is a significant predictor of learning satisfaction. Cheng (2020) pointed out that one of the aspects that affects users' subjective perceptions and cognitive assessments is PEOU, which make it simpler and more satisfying for users to use information systems and information technologies. Sharma et al. (2014) also noted that the most critical factor affecting web-based learning is PEOU, which is influenced by students' subjective cognition. It also influences their value judgments of the course material and increases learning interest. Therefore, it is possible to assume the following:

H6: Perceived ease of use has a significant effect on perceived usefulness.

H8: Perceived ease of use has a significant effect on learning satisfaction.

2.6 Perceived Usefulness

A user's perception of the value of information technology offered by the system platform was called perceived usefulness (PU), and it had some subjectivity and predictability (Al-hawari & Mouakket, 2010). According to Mouakket and Bettayeb (2015), PU was associated with people's perceptions that using the system would enhance job performance, which may help increase people's willingness. Ifinedo (2017) also noted that PU is that users believed that learning could increase their capacity for learning and effectiveness at work, which is influenced by the cognitive level and subjective emotions of the learners. PU has also been acknowledged as the genuine advantage attained by pupils using online learning (Islam et al., 2018). Because of this, PU is viewed as a crucial component of user pleasure and willingness to continue using (Cheng, 2014). According to Al-hawari and Mouakket (2010), PU would be

impacted by organizational factors, technical characteristics, and computer self-efficacy, impacting users' attitudes and desire to reuse. Islam et al. (2018) claimed that PU is a crucial regulatory variable between computer self-efficacy and satisfaction, and it substantially impacts satisfaction based on the technology satisfaction model. Therefore, a hypothesis is proposed per below:

H7: Perceived usefulness has a significant effect on learning satisfaction.

2.7 Learning Satisfaction

Learning satisfaction (LS) measured how well students' expectations, needs, and perceptions of technology use match their actual use based on current values. In other words, the degree to which students' use of the learning system corresponds with their anticipated self-perception is meant by student satisfaction (Islam et al., 2018). According to Sharma et al. (2014), contentment serves as a psychological acceptance mechanism for the legitimacy, excellence, and dependability of the content offered by educational websites. Customer perception of the system's value and willingness to use it again can also determine user satisfaction. The system is successfully used if the customer is willing to utilize it repeatedly (Aldholay et al., 2019). The willingness to continue using the system is typically recognized as a critical indicator of satisfaction, which is influenced by system quality (SYQ), information quality (IQ), service quality (SEQ), and value perception (Chang, 2013). Additionally, student satisfaction increases as students judge service quality to be of a higher standard (Yuce et al., 2019). Sharma et al. (2014) pointed out that influence factors of the students' subjective sense of belonging to a learning website include its usability, usefulness, and dependability. It plays a significant role in students' satisfaction. In addition to the elements above, learners' subjective interests also had a favorable effect on satisfaction (Ifinedo, 2017).

3. Research Methods and Materials

3.1 Research Framework

In Figure 1, The theoretical frameworks of earlier studies are reviewed to develop this study's conceptual framework. A conceptual framework proposes the causal relationship between system quality, information quality, service quality, perceived usability, perceived ease of use, self-efficacy, and learning satisfaction.
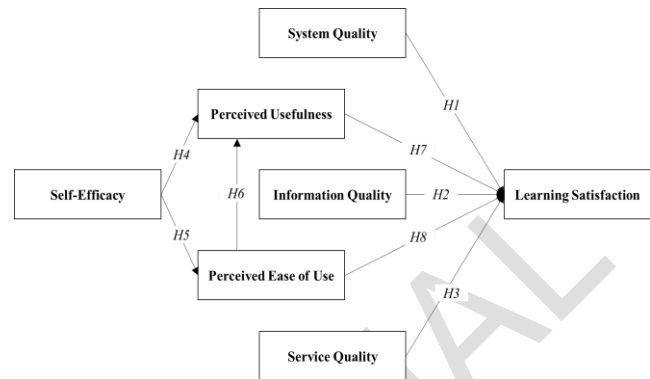

Figure 1: Conceptual Framework

H1: System quality has a significant effect on learning satisfaction.

H2: Information quality has a significant effect on learning satisfaction.

H3: Service quality has a significant effect on learning satisfaction.

H4: Self-efficacy has a significant effect on perceived usefulness.

H5: Self-efficacy has a significant effect on perceived ease of use.

H6: Perceived ease of use has a significant effect on perceived usefulness.

H7: Perceived usefulness has a significant effect on learning satisfaction.

H8: Perceived ease of use has a significant effect on learning satisfaction.

3.2 Research Methodology

The researcher gathered data by online and offline questionnaire distribution to 500 art undergraduates from the three universities which are Sichuan University, Chengdu University, and Sichuan Normal University. Screening questions, demographic information, and a 5-point Likert measurement scale are comprised in the questionnaire. Before the survey's distribution, the researchers asked three specialists from related fields to test the questionnaire's target consistency, and all of the items passed with a score of at least 0.6, with the implementation of the index of item-objective congruence (IOC). A pilot test with a sample size of 30 was then carried out to guarantee the reliability and internal consistency of Cronbach's alpha (Cooper & Schindler, 2011). The CA results were passed at a score more than 0.7. The researchers collected 494 effective response questionnaires, using SPSS and Amos software to analyze the data with confirmatory factor analysis (CFA), and used a structural equation model to examine the relationships between the variables.

3.3 Population and Sample Size

Students majoring in art at three comprehensive universities in Sichuan Province were used as the research subject in this study. The sample size calculator of Soper (2022) determined that the reference sample size needed for the research is 444 when combined with the particular project scale of the theoretical framework for the study. In order to produce accurate and trustworthy study results, the researchers planned to collect data from 500 samples. However, there was only 494 valid responses return for proceeding the data analysis.

3.4 Sampling Technique

The sampling methods are judgmental sampling, stratified random and convenience sampling. For judgmental sampling, the respondents must be those students with at least one month of online education experience. For stratified random sampling, 500 undergraduate students were randomly chosen from 3,600 to complete a questionnaire survey. This was done according to the three institutions' numerical proportions as of Table 1. Convenience sampling was carried out by online and offline questionnaire distribution. The academic staff delivered the paper-based questionnaire as well as online survey link to 500 art undergraduates of the three universities.

Table 1: Sample Units and Sample Size

Target Public Universities	Grade	Population Size Total = 3600	Proportional Sample Unit Size Total = 500
Sichuan University	Freshman	278	39
	Sophomore	236	33
	Junior	233	32
	Senior	212	29
Chengdu University	Freshman	355	49
	Sophomore	342	48
	Junior	297	41
	Senior	285	39
Sichuan Normal University	Freshman	375	52
	Sophomore	361	50
	Junior	327	45
	Senior	299	43

Source: Created by the author.

4. Results and Discussion

4.1 Demographic Information

The researcher obtained 494 valid data from the art undergraduates to participate in the questionnaire for this study. The primary selection procedure was high-quality and accurate, and it received a high response rate. Males were 58.5% whereas females were 41.5% of the total respondents. For online education experience, there was 28.3% of less than one year, followed by 25.7% of 1-2 years, 23.7% of 3-4 years, and 22.3% of over 4 years. The demographic results are demonstrated in Table 2.

Table 2: Demographic Profile

Demographic and General Data (N=494)		Frequency	Percentage
Gender	Male	205	41.5%
	Female	289	58.5%
Online Education Experience	Less than 1 year	140	28.3%
	1-2 years	127	25.7%
	3-4 years	117	23.7%
	Over 4 years	110	22.3%

4.2 Confirmatory Factor Analysis (CFA)

In this study, CFA was used to verify the measurement model. According to DiStefano and Hess (2005), the confirmatory factor analysis (CFA) model is a method to calculate the relationship between variance and covariance and to analyze the convergent and discriminant validity. Yoo and Jeong (2017) believed that assessing structures' reliability and discriminant validity is the initial stage of CFA analysis. Using IBM SPSS Amos, 494 valid data were examined. Meanwhile, the Cronbach's alpha coefficient value of the theoretical framework also exceeded 0.80, the factor load value exceeded 0.50 (Salkind, 2010), the P-value was less than 0.50, the total reliability (CR) exceeded 0.80 (Srinivasan et al., 2002), and the average variance (AVE) extracted exceeds 0.50 (Hair et al., 2010). Therefore, model tests were used to confirm the structural model's validity and reliability as shown in Table 3.

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

Variables	Source of Questionnaire	No. of Items	Cronbach's Alpha	Factors Loading	CR	AVE
System Quality	Cheng (2014)	3	0.820	0.701-0.861	0.825	0.613
Information Quality	Cheng (2014)	4	0.855	0.745-0.826	0.855	0.597
Service Quality	Wang et al. (2014)	5	0.870	0.680-0.808	0.870	0.574
Perceived Usefulness	Cheng (2014)	4	0.883	0.762-0.874	0.883	0.656
Perceived Ease of Use	Sharma et al. (2014)	4	0.871	0.767-0.810	0.872	0.630
Self-Efficacy	Ren and Chadee (2017)	4	0.887	0.762-0.844	0.887	0.663
Learning Satisfaction	Wang et al. (2014)	5	0.856	0.661-0.837	0.859	0.551

As seen in Table 4 below, CMIN/DF = 1.493, GFI = 0.931, AGFI = 0.915, RMSEA = 0.032, CFI = 0.977, NFI = 0.934 and TLI = 0.974. All the indicators obtained in this study passed the CFA test because they were feasible and met the good of fit criteria.

Table 4: Goodness of Fit for Measurement Model

Index	Acceptable Values	Statistical Values
CMIN/DF	< 3 Hair et al. (2010)	1.493
GFI	> 0.90 Hair et al. (2006)	0.931
AGFI	> 0.80 Hooper et al. (2008)	0.915
RMSEA	< 0.05 MacCallum et al. (1996)	0.032
CFI	> 0.90 Hair et al. (2006)	0.977
NFI	> 0.90 Mulaik et al. (1989)	0.934
TLI	> 0.90 Hair et al. (2006)	0.974
Model Summary		**Acceptable Model Fit**

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, NFI = Normed fit index, CFI = Comparative fit index, and TLI = Tucker-Lewis index
Source: Created by the author.

As shown in Table 5, the value obtained in this study is greater than the acceptable value, which verifies the good fitting effect of the model. In addition, the measurement results of these models consolidate the effectiveness of discrimination and verify the effectiveness of subsequent structural model estimates.

Table 5: Discriminant Validity

	SYQ	IQ	SEQ	PU	PEOU	SE	LS
SYQ	**0.783**						
IQ	0.368	**0.773**					
SEQ	0.230	0.225	**0.758**				
PU	0.300	0.260	0.268	**0.810**			
PEOU	0.328	0.253	0.266	0.474	**0.794**		
SE	0.300	0.276	0.252	0.380	0.520	**0.814**	
LS	0.532	0.442	0.285	0.422	0.393	0.372	**0.742**

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

4.3 Structural Equation Model (SEM)

According to Hair et al. (2014), structural equation models have taken over as the primary technique for evaluating causal models with potential variables and can reduce the estimation of measurement errors. Hair et al. (2010) noted that the SEM covariance matrix affects how well the index fits. The measurement and structural models were the two components of the structural equation model (SEM) (Ramlall, 2017). They were crucial to the theoretical framework and hypothesis testing to assess the relationship between independent and observable variables. The approach used by Tabachnick and Fidell (2001) to assess the relationship between variables is the structural equation

model. The structural model parameters are displayed in Table 6 below. The findings were satisfactory, including the values for CMIN/DF, GFI, AGFI, RMSEA, CFI, NFI, and TLI.

Table 6: Goodness of Fit for Structural Model

Index	Acceptable Criterion	Statistical Values Before Adjustment	Statistical Values After Adjustment
CMIN/DF	< 3 Hair et al. (2010)	2.131	1.947
GFI	> 0.90 Hair et al. (2006)	0.898	0.906
AGFI	> 0.80 Hooper et al. (2008)	0.878	0.887
RMSEA	< 0.05 MacCallum et al. (1996)	0.048	0.44
CFI	> 0.90 Hair et al. (2006)	0.946	0.955
NFI	> 0.90 Mulaik et al. (1989)	0.904	0.912
TLI	> 0.90 Hair et al. (2006)	0.940	0.949
Model Summary		**Unacceptable Model Fit**	**Acceptable Model Fit**

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, RMSEA = Root mean square error of approximation CFI = Comparative fit index, and TLI = Tucker-Lewis index
Source: Created by the author.

4.4 Research Hypothesis Testing Result

Structural equation modeling is used to test every hypothesis in this study. To ascertain each variable's significance, the SEM can be measured by R^2 Variance matrix and regression weight. According to Table 7, self-efficacy (SE) has the strongest effect on perceived usefulness (PEOU) with a standardized path coefficient of 0.600 and t-value of 11.187***, SYQ has a significant effect on learning satisfaction of 0.460 (t value = 8.254***), IQ has a significant effect on learning satisfaction of 0.282 (t value = 5.758***), SEQ has a significant effect on learning satisfaction of 0.106 (t value = 2.356*), and SE has a significant effect on learning satisfaction of 0.417 (t value = 2.572*). PEOU has a significant effect on learning perceived usefulness of 0.443 (t value = 7.022 ***), PU has a significant effect on learning satisfaction of 0.256 (t value = 4.530 ***), and PEOU has a significant effect on learning satisfaction of 0.241 (t value = 2.301 *). All of the hypotheses are supported, and their p-values were lower than 0.05.

Table 7: Hypothesis Results of the Structural Equation Modeling

Hypothesis	(β)	t-Value	Result
H1: SYQ → LS	0.460	8.254***	Supported
H2: IQ →LS	0.282	5.758***	Supported

Hypothesis	(β)	t-Value	Result
H3: SEQ → LS	0.106	2.356*	Supported
H4: SE → PU	0.417	2.572*	Supported
H5: SE →PEOU	0.600	11.187***	Supported
H6: PEOU →PU	0.443	7.022***	Supported
H7: PU → LS	0.256	4.530***	Supported
H8: PEOU →LS	0.241	2.301*	Supported

Note: *** $p < 0.001$, * $p < 0.05$
Source: Created by the author.

The information in Table 7 indicates that the results of **H1** demonstrate that SYQ significantly affected LS, with a standardized path coefficient value of 0.460. According to Chan et al. (2017), system quality is a gauge of system performance and one of the key factors influencing the adoption of technology and user satisfaction. It also demonstrates how the system quality would directly impact their online learning experience and how an e-learning system would increase learning effectiveness and performance (Wang et al., 2014).

The standardized path coefficient value of 0.282 demonstrates that academics gradually realized the significance of information quality in using network platforms. The IQ in **H2** has a significant effect on LS (Masrek & Gaskin, 2016). One of the most critical aspects affecting satisfaction is information quality, which has a significant impact on satisfaction (Aparicio et al., 2017; Jung et al., 2015).

SEQ in **H3** significantly influences LS, which has the standardized path coefficient value of 0.106. Accessibility, dependability, responsiveness, assurance, functionality, interactivity, empathy, and other factors are one of the critical factors influencing learners' satisfaction with online learning (DeLone & McLean, 2003; Lin et al., 2011).

H4 is the impact of SE on PU and is the most important of all the hypotheses. The standardized path coefficient is 0.417, indicating that perceived system information knowledge in the online system application would correlate with students' capacity for self-awareness (Kilic et al., 2015). The learning attitude, skill acquisition, willingness to continue learning, and belief that the system is valuable to learners are all impacted by SE (Huang & Liaw, 2018).

H5 confirms the SE's effect on PEOU, with a standardized path coefficient of 0.600. The findings demonstrate that SE positively affects students' independent learning (Islam et al., 2018). Zhao et al. (2008) and Lee (2006) noted that the ease of use of the system is significantly impacted by the SE.

PEOU also significantly affected PU which approves **H6,** with the standardized path coefficient is 0.443. It suggested that PEOU would impact students' readiness to embrace the online learning method through PU, either directly or indirectly (Lee, 2006). Under technological application, PU is also regarded as a predictor of behavioral

intention (Hu & Lai, 2019). Perceived usability indirectly affects perceived usefulness and behavioral intention according to Bag et al. (2020) and Davis (1989).

H7 presents the effect of PU to LS with its standardized path coefficient value of 0.256. It could be used to infer that the utility concept put forth by Ifinedo (2017) is positively connected with satisfaction. According to Zhao et al. (2008), training could raise users' actual skill levels if it was seen to be valuable.

H8 denotes the strong impact of PEOU on LS with the standardized path coefficient value was 0.241. It demonstrated a clear connection between perceived usability and consumer satisfaction (Mouakket & Bettayeb, 2015). Perceived usability was crucial in deciding whether consumers embrace information systems (Amin et al., 2014).

5. Conclusions and Recommendation

5.1 Conclusion and Discussion

This academic study aims to examine the key variables that influence undergraduate students' learning satisfaction with their online art education at Sichuan public universities. As a result, the researchers developed the study's theoretical foundation using data from numerous earlier studies. The study's hypotheses were constructed by the previous theoretical framework. 500 undergraduate students with online learning experiences were determined, and 494 valid responses were received. According to the data analysis, all the factors put out in the theoretical framework had a considerable influence on learning satisfaction, which was consistent with the findings of other studies.

In particular, system quality, information quality, and service quality are key elements that significantly impact learning satisfaction. System quality is the factor that has the most significant impact on learning satisfaction, followed by information quality and service quality. These results demonstrate that system quality significantly influences learners' satisfaction, aligned with Yuce et al. (2019) and Aldholay et al. (2019). Students learning experience could be significantly enhanced by raising the quality of objective elements because information and service quality played a significant role as additional influencing factors.

In addition, perceived usefulness and perceived ease of use directly and considerably impact learning satisfaction. In contrast, self-efficacy has an indirect effect with an impact degree of 0.184 on learning satisfaction. It is essential to keep in mind that the influence of the learners' satisfaction would be affected by self-efficacy. The findings demonstrated that self-efficacy considerably impacts PEOU and PU, with PEOU having the strongest influence value at

0.600. This demonstrates that learners' perceptions of the ease of use of the learning system are significantly influenced by their sense of self-efficacy, which in turn helps learners increase learning effectiveness. As a result, learning satisfaction is positively impacted by students' subjective initiative. According to previous scholars (Jung et al., 2015; Limayem et al., 2007; Sánchez et al., 2013; Yuce et al., 2019), the learning experience of students would be significantly improved when their needs are satisfied. In terms of learning effectiveness, the factors (SYQ, IQ, and SEQ) affect learning satisfaction when combined with the subjective factors (SE, PU, and PEOU).

5.2 Recommendation

The impact and difficulty of COVID-19 on online education are one of the major incidents that endorse online education. Additionally, due to the ongoing effects of domestic and foreign epidemics, education-related departments must adopt an online education strategy. In order to address this issue, network education technology research and development would be crucial. For colleges and institutions looking to upgrade their e-learning platforms and raise the standard of their online instruction, research on the factors influencing this satisfaction could be helpful. It could also be a solid foundation for changing how classes are taught and organizing a systematized education platform.

In particular, this study's three attributes (SYQ, IQ, and SEQ) should be suitably constructed and upgraded as the fundamental guarantee requirements of the online education system. For pupils studying art, learning strategies and information must be tailored to their individual needs. High-quality learning systems, information, and services are critical steps to increase system operation effectiveness, optimize the content of online learning systems, and improve students' learning experiences to satisfy art college students' learning needs better.

Secondly, increasing online learning satisfaction is greatly aided by the research framework's subjective variables SE, PEOU, and PU. Self-efficacy is an important variable in controlling learning satisfaction because it is the most crucial factor based on the findings of this study. Universities and other relevant educational institutions should pay attention to the education and training of students' self-learning when conducting online education and training. Students can develop their learning confidence through training, which will enable them to feel sufficiently confident about the learning activity and take the initiative to accomplish it. Thus, it can improve undergraduate students' effectiveness by altering their intuitive perception of the online learning system, online learning status, and student initiative in learning and using the system.

Researchers and teachers can maximize the benefits of PEOU and PU's positive effects on learning satisfaction while lowering system complexity, improving interface affinities, enhancing the online learning system's knowledge base, and providing students with the most effective, timely, and stable system support possible.

In other words, in the future of e-learning, focusing on the pleasure of online learning is an important responsibility to improve the effectiveness of learners. It is a crucial measure to enhance learning effectiveness and performance to increase online student usage and acknowledge the value of the online learning platform.

5.3 Limitation and Further Study

Additionally, this study contains the following limitations. Only art Undergraduates from three comprehensive Universities in Chengdu, Sichuan Province, were chosen for the survey population. It cannot, after all, represent all majors and universities in Sichuan Province. The theoretical framework, which has excellent pertinence and limits the scope of research, is primarily created for students majoring in art. The theoretical framework may incur highly beneficial variable correlations, such as system compatibility, self-managed learning, practical usage, and student loyalty. In order to produce more fruitful study results, future studies should broaden the scope, refine our methods, and improve research tools.

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