Factors Influencing Undergraduate Students' Satisfaction and Performance Towards Online Learning in Chengdu, China

Linlin Meng[*], Sutthisak Inthawadee, Jirapun Daengdej, Taminee Shinasharkey

Abstract

Purpose: The primary objective of this paper is to delve into the determinants that influence the satisfaction and efficacy of online learning among students enrolled in four universities directly affiliated with the Ministry of Education in Chengdu. Within this framework, seven latent variables were carefully chosen for analysis: perceived usefulness, perceived ease of use, perceived quality, trust, satisfaction, behavioral intention, and performance. **Research design, data, and methodology:** The researchers employed a quantitative survey methodology for the study's implementation. An on-site questionnaire survey was conducted among 500 undergraduates with online learning experience in four universities in Chengdu. The sampling procedure involves judgmental, stratified random, and convenience sampling. This study employed confirmatory factor analysis (CFA) and structural equation modeling (SEM) as statistical techniques. **Results:** Perceived usefulness, perceived ease of use, perceived quality, and trust significantly influence satisfaction. Satisfaction has a significant influence on behavioral intention and performance. In contrast, perceived ease of use does not significantly influence perceived usefulness. **Conclusions:** This study advances our understanding of the determinants of satisfaction and efficacy in online learning environments. The results provide valuable insights for educational institutions and policymakers aiming to enhance students' online learning experiences.

Keywords : Trust, Satisfaction, Behavioral Intention, Performance, Online Learning

JEL Classification Code: E44, F31, F37, G15

1. Introduction

China's education informatization has transitioned into integrated innovation, marked by university educators' growing adoption of smart teaching platforms through mobile devices. This shift has led to a fundamental overhaul of traditional classroom instructional approaches (Jiang et al., 2023). Online education presents many advantages, including the flexibility of learning locations, access to diverse online resources, efficient instructor-led teaching, and a wide array of teaching methodologies. It is a highly effective and sustainable online learning resource, offering robust support for students' preliminary learning and the reinforcement of knowledge (Wang et al., 2021).

The evolution of network course construction in Chinese universities has been characterized by continuous innovation and growth, driven by technological advancements and changing educational needs. The early stages of network course construction were marked by exploring information technology in teaching (Zhang et al., 2020). Universities started experimenting with web-based content delivery, incorporating simple multimedia elements like text and images (Wang et al., 2021). However, limitations in interactivity and accessibility challenged the effectiveness of early online courses (Liang & Zhang, 2011).

This study investigates the factors influencing online learning satisfaction among students in four universities directly affiliated with the Ministry of Education in Chengdu.

1 *Linlin Meng, Ph.D. Candidate in Technology, Education and Management, Graduate School of Business and Advanced Technology Management, Assumption University, Thailand. Email: 106602733@qq.com

2 Sutthisak Inthawadee, Full-Time Lecturer, Graduate School of Business and Advanced Technology Management, Assumption University of Thailand.

3 Jirapun Daengdej, Full-Time Lecturer, Graduate School of Business and Advanced Technology Management, Assumption University of Thailand.

4 Taminee Shinasharkey, Full-Time Lecturer, Graduate School of Business and Advanced Technology Management, Assumption University of Thailand.

Rapid advances in educational technology have changed the landscape of higher education (Liang & Zhang, 2011). In this transition, understanding the factors influencing student satisfaction and performance in online learning is critical to optimizing the learning experience and advancing education.

This study has certain significance for online education practice in Chinese higher education. By investigating the influencing factors of online learning satisfaction among students in four universities affiliated with the Chengdu Ministry of Education, this study aims to provide valuable insights and practical suggestions for optimizing online learning experiences and improving online education outcomes.

The overarching objective of this research was to discern the factors that influence students' satisfaction concerning online learning within universities in Chengdu, China. These factors are elucidated through perceived ease of use, perceived usefulness, perceived quality, satisfaction, trust, behavioral intention, and performance. As a result, it becomes evident that many variables impact student satisfaction and performance. The research model, encompassing a synthesis of various research theories and prior literature from diverse viewpoints, was formulated to investigate these relationships empirically.

2. Literature Review

2.1 Perceived Ease of Use

Davis (1989) introduced the concept of perceived ease of use, defining it as the user's self-perception of how effortless it is to operate a specific technology. This pertains to whether users perceive the technology's usage as relatively simple. Moon and Kim (2001) similarly emphasized that perceived ease of use centers around users' feelings of convenience, simplicity, and interaction with a particular technology or system.

Moon and Kim (2001) figured that when users perceive technology as advantageous and user-friendly, their motivation to embrace it is enhanced. Liu et al. (2013) demonstrated a positive correlation between students' perception of the learning system's utility in achieving educational goals, ease of use, and willingness to utilize it.

Susanto et al. (2016), employing the ECT model, demonstrated a direct link between perceived ease of use and satisfaction. Kim and Yuan (2012) emphasized the significant influence of perceived ease of use in determining satisfaction within the domain of mobile banking. Therefore, the researcher formulates the following hypotheses:

H1: Perceived ease of use has a significant influence on perceived usefulness.

H3: Perceived ease of use has a significant influence on satisfaction.

2.2 Perceived Usefulness

Davis et al. (1989) defined perceived usefulness as the conviction that utilizing a specific application system would enhance an individual's job performance. As per Venkatesh and Davis (2000), perceived usefulness encompasses an individual's conviction in the system's capacity to enhance their job performance. Perceived usefulness holds a crucial position within the marketing domain. Several scholars have asserted that perceived usefulness significantly influences customers' purchasing decisions (Chiu et al., 2007; Ha & Stoel, 2009). Conversely, in public services, perceived usefulness relates to how passengers perceive utility and assistance in facilitating their activities.

Studies conducted by Venkatesh and Davis (2000) demonstrated a positive correlation between perceived usefulness, perceived ease of use, and satisfaction in information system usage. Bhattacherjee (2001) explored the intricate interplay of cognitive beliefs and cognitive influences, particularly about individuals' sustained use of online banking. Central to this investigation is the notion that users' perceived usefulness significantly impacts their contentment. As a result, the researcher formulated the following hypothesis:

H2: Perceived usefulness has a significant influence on satisfaction.

2.3 Perceived Quality

Parasuraman et al. (1985) introduced the SERVQUAL model within service quality research. This model delineates service quality into five distinct dimensions, one being perceived quality. Perceived quality pertains to the holistic impression customers form about a service. Within the consumer decision-making process, perceived quality stands as a pivotal determinant.

Davis et al. (1989) asserts a direct correlation between perceived quality and the reputation of the manufacturing firm behind the product. A wealth of research has delved into the ramifications of perceived quality. The findings consistently demonstrate that perceived quality positively impacts customer satisfaction (Bigne et al., 2001; Chen & Tsai, 2007; Cronin et al., 2000; Petrick & Backman, 2002). Based on this literature, the researcher proposes a hypothesis:

H4: Perceived quality has a significant influence on satisfaction.

2.4 Trust

Numerous studies have underscored the significance of trust in social, commercial, and digital contexts, establishing it as a pivotal element in interpersonal relationships and transitional dynamics. McKnight et al. (2002) assert that trust embodies a multi-faceted concept, encompassing the trustee's confidence in the aspirations and competencies of the counterpart. They underscore the construction of trust within the realm of incomplete information. Mayer et al. (1995) accentuate trust's emotional and cognitive dimensions within relational dynamics.

McKnight et al. (2002) identified a favorable association between trust and satisfaction, revealing a conspicuous positive correlation between users' trust in e-commerce platforms and their ensuing satisfaction. Flavian et al. (2006) underscored the existence of a constructive connection between trust and customer satisfaction, accentuating the inter-dependency between customers' trust in online travel service providers and their contentment with service quality and experiential aspects.

H5: Trust has a significant influence on satisfaction.

2.5 Satisfaction

Many scholars have conducted rich research on satisfaction. Tse and Wilton (1988) highlighted the subjective nature of satisfaction, suggesting that satisfaction is a personal interpretation of the variance between an individual's anticipations and real encounters. Fornell (1992) regards satisfaction as customers' overall evaluation of product or service performance, which is influenced by past experiences, comparisons, and expectations. Prior research has spotlighted the elements that shape satisfaction. Roy and Zhao (2009) delved into the factors impacting online shoppers' contentment and future actions. Their findings revealed that objective and subjective interactivity, functioning through distinct frameworks, positively affected the gratification and subsequent actions of online shoppers.

Zhang (2023) established a positive correlation between customer satisfaction and behavioral intention in mid-to-high-end restaurants. Kim et al. (2010) exhibited a noteworthy positive association between satisfaction and users' intention to reuse. A prior study discovered a connection between the quality of communication and decision-making within system usage and its impact on job performance, ultimately contributing to improved job efficiency and effectiveness (Norzaidi et al., 2007). Arifin (2014) study identified and analyzed the impact of competence, motivation, and organizational skills on job satisfaction and performance of high school teachers in Jayapura, Papua, Indonesia. Building upon the insights gleaned from previous findings, the following hypotheses

are posited:

H6: Satisfaction has a significant influence on behavioral intention.

H7: Satisfaction has a significant influence on performance.

2.6 Behavioral Intention

Various scholars have conducted extensive research on behavioral intention, revealing diverse perspectives on this concept. Different research viewpoints underscore the significance of distinct factors in shaping individual behavioral intentions. Fishbein and Ajzen (1975) asserted that attitudes influence individuals' behavioral intentions. Especially the attitude towards a particular behavior and the subjective norms they perceive influence the behavioral intentions. Attitudes encompass an individual's assessment of specific behavior, while subjective norms center around the impact of social influences and others' behavior expectations. McKnight et al. (2002) introduced the concepts of risk and rule-based trust. Risk trust hinges on behavioral anticipations, while rule-based trust hinges on adhering to established protocols.

2.7 Performance

Bhattacherjee (2001) explored the dimensionality of user performance within the context of information systems. Here, performance is defined as the affirmative influence of employing an information system on users and their work endeavors. Within organizational relationships, performance is an outcome delineated as the ultimate objective of the partner interaction. It assumes a pivotal role in the overarching objective of maximizing advantages within manufacturer-supplier relationships (Perry, 1991). Feng et al. (2022) asserted that performance is pivotal in augmenting effectiveness and efficiency. These perspectives underscore the pivotal significance of performance within the information systems and technology sphere, spanning dimensions from user contentment to integration levels, offering insights into the ramifications and effects of information systems.

3. Research Methods and Materials

3.1 Research Framework

Regarding the previous research frameworks, the first framework was implemented by Mungra and Yadav (2019). This framework investigated trust, commitment, relationship duration, satisfaction, performance, and governance costs. The second research framework, conducted by Zhang et al. (2020), examined positive and negative social and cultural

impacts, positive and negative economic and environmental impacts, satisfaction, and behavioral intention. The third research framework was developed by Lee et al. (2015), which explored usability, usefulness, compatibility, fun, confirmation, satisfaction, and the impact of perception on learning. Lastly, Askariazad and Babakhani (2015) established the fourth previous research framework, focusing on customer expectations, corporate image, perceived quality, customer satisfaction, trust, etc. This research summarizes and identifies relevant variables and is presented in Figure 1.
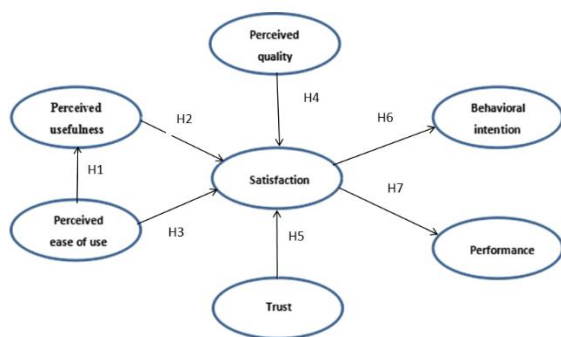

Figure 1: Conceptual Framework

H1: Perceived ease of use has a significant influence on perceived usefulness.
H2: Perceived usefulness has a significant influence on satisfaction.
H3: Perceived ease of use has a significant influence on satisfaction.
H4: Perceived quality has a significant influence on satisfaction.
H5: Trust has a significant influence on satisfaction.
H6: Satisfaction has a significant influence on behavioral intention.
H7: Satisfaction has a significant influence on performance.

3.2 Research Methodology

The data gathered through the Questionnaire Star survey were initially saved in Excel format and converted into SPSS data. The analysis involved calculating the frequency and percentage of participants' responses to all survey information. A pilot test was administered to 30 students to ensure the questionnaire's reliability. Additionally, before distributing the questionnaire to the sample from the target universities, three experts in the domain of education management were consulted to evaluate the survey items using the Indicator of Objective Concordance (IOC) method, ensuring the questionnaire's validity. Upon collecting all the quantitative data, the researchers performed CFA and SEM to analyze the data comprehensively.

For validity and reliability testing, Cronbach's Alpha method was used. The questionnaire's reliability was assessed through an initial test, including an Index of Item-Objective Congruence (IOC) evaluation and a pilot test. The IOC analysis involved three experts rating each scale item, with all items scoring 0.67 or higher. A pilot test involving 30 participants was conducted, and the reliability was measured using the Cronbach alpha coefficient. The results indicated that all questionnaire items exhibited strong internal consistency, with a reliability score of 0.60 or greater (Hair et al., 2006).

3.3 Population and Sample Size

The target population of this study is undergraduates with experience with online learning in four universities affiliated with the Ministry of Education in the Chengdu area. Herzog et al. (2009) proposed a minimum sample size of 100 or 200 for structural equation modeling. Therefore, this research established that a minimum sample size of 500 was suitable for complex models.

3.4 Sampling Technique

The step-by-step sampling procedure is adopted as a sampling strategy. Firstly, using judgmental sampling methods, students from four universities directly under the Ministry of Education in Chengdu were selected as the research objects. Then, the target population was divided into two groups using stratified sampling, as shown in Table 1. The convenience sampling is to reach undergraduate students with online learning experience through a quick method of online survey.

Table 1: Sample Units and Sample Size

College Name	Population Size	Proportional Sample Size
SWUFE	15200	75
SCU	37000	182
UESTC	20230	100
SJU	28914	143
Total	**101344**	**500**

Source: Constructed by author

4. Results and Discussion

4.1 Demographic Information

The data shows that there is a significant gender disparity within the studied population. Females make up the majority, constituting 57.2% of the total sample, while males account for 42.8%. This gender imbalance might be indicative of a variety of factors such as the field of study, regional or

cultural demographics, or institutional preferences in admission.

The population is fairly evenly distributed across different years of study, with no year significantly dominating the others. Freshmen make up 24.2% of the population, sophomore students constitute 26.8%, juniors make up 25.2%, and seniors account for 23.8%. This balanced distribution suggests that the institution has maintained a relatively consistent enrollment pattern over the years.

Table 2: Demographic Profile

Demographic and General Data (N=500)		Frequency	Percentage
Gender	Male	214	42.8%
	Female	286	57.2%
Year of Study	Freshmen	121	24.2%
	Sophomore	134	26.8%
	Junior	126	25.2%
	Senior	119	23.8%

Source: Constructed by author

4.2 Confirmatory Factor Analysis (CFA)

In this study, Confirmatory Factor Analysis (CFA) was employed as a statistical tool to investigate hypothetical constructs that demonstrate apparent reliability but require further scrutiny. The results of the analysis revealed robust internal consistency for all constructs, with reliability scores consistently exceeding 0.7 (Sarmento & Costa, 2016). This finding is substantiated by the values presented in Table 3, which illustrate Cronbach's Alpha values surpassing the 0.7 threshold, signifying strong internal consistency. Furthermore, composite reliability (CR) exceeded the 0.70 benchmark, reinforcing the measurements' reliability. Convergent validity, another critical aspect of construct assessment, was also established. Average extracted variance (AVE) values consistently exceeded 0.50, indicating robust convergent validity. Additionally, the factor loading values, all surpassing the 0.50 threshold, further affirm the validity of the underlying factors (Hair et al., 2006).

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
Perceived usefulness	Abdullah et al. (2016)	6	0.898	0.698–0.835	0.873	0.600
Perceived ease of use	Kumar et al. (2017)	5	0.858	0.709–0.768	0.844	0.551
Perceived quality	Watjatrakul (2020)	4	0.850	0.707–0.790	0.851	0.588
Satisfaction	Solimun and Fernandes (2018)	3	0.842	0.751–0.881	0.844	0.645
Trust	Khan et al. (2023)	4	0.852	0.716–0.865	0.854	0.596
Behavioral intention	Abdullah et al. (2021)	3	0.830	0.751–0.851	0.833	0.624
Performance	Gardas and Navimipour (2021)	5	0.892	0.724–0.859	0.876	0.633

In this study, the goodness of fit for research group 1 was CMIN/df =2.154, GFI=0.908, AGFI=0.889, NFI=0.900, CFI=0.944, TLI=0.936, and RMSEA=0.048. In conclusion, all six indicators met the criteria, preventing the need to modify the model and demonstrating that the conceptual framework under consideration was compatible with the CFA model, as shown in Table 4.

Table 4: Goodness of Fit for Measurement Model

Fit Index	Acceptable Criteria	Statistical Values
CMIN/DF	< 5.00 (Al-Mamary & Shamsuddin, 2015; Awang, 2012)	2.154
GFI	≥ 0.85 (Sica & Ghisi, 2007)	0.908
AGFI	≥ 0.80 (Sica & Ghisi, 2007)	0.889
NFI	≥ 0.80 (Wu & Wang, 2006)	0.900
CFI	≥ 0.80 (Bentler, 1990)	0.944
TLI	≥ 0.80 (Sharma et al., 2005)	0.936
RMSEA	< 0.08 (Pedroso et al., 2016)	0.048
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 = normalized fit index, CFI = comparative fit index, TLI = Tucker Lewis index and RMSEA = root mean square error of approximation

In our investigation, we not only assessed the internal consistency of each variable through convergent validity but also scrutinized whether the constructs are statistically distinct from one another, a concept known as discriminant validity. To evaluate discriminant validity in this study, we adopted the methodology proposed by Fornell and Larcker (1981). According to this approach, discriminant validity is established if the square root of the Average Variance Extracted (AVE) for a given construct surpasses the correlations between that construct and all other associated constructs. In our examination, the value representing discriminant validity exceeded all interconstruct factor correlations. Consequently, we deemed the discriminant validity to be satisfactory in this study.

Table 5: Discriminant Validity

	PU	PEU	PQ	SA	TR	BI	PE
PU	**0.775**						
PEU	0.097	**0.743**					
PQ	0.111	0.191	**0.767**				
SA	0.345	0.378	0.316	**0.803**			
TR	0.072	0.302	0.208	0.382	**0.772**		
BI	0.236	0.196	0.222	0.428	0.186	**0.790**	
PE	0.289	0.236	0.085	0.399	0.178	0.317	**0.795**

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

4.3 Structural Equation Model (SEM)

As per the insights provided by Hair et al. (2010), Structural Equation Modeling (SEM) serves as a robust tool for affirming causal relationships among variables within a proposed model, effectively accommodating measurement inaccuracies within the structural coefficients. The assessment of the goodness of fit indices for the Structural Equation Model (SEM) is elaborated upon in Table 6. After adjustment in SEM analysis, data reported that CMIN/df=1.769, GFI=0.916, AGFI=0.901, CFI=0.962, TLI=0.957, RMSEA=0.039. In conclusion, after adjustment, the proposed model met all criteria for index and got model fit in SEM.

Table 6: Goodness of Fit for Structural Model

Index	Acceptable	Statistical Values Before Adjustment	Statistical Values After Adjustment
CMIN/DF	< 5.00 (Al-Mamary & Shamsuddin, 2015; Awang, 2012)	2.193	1.769
GFI	≥ 0.85 (Sica & Ghisi, 2007)	0.902	0.916
AGFI	≥ 0.80 (Sica & Ghisi, 2007)	0.885	0.901
NFI	≥ 0.80 (Wu & Wang, 2006)	0.896	0.916
CFI	≥ 0.80 (Bentler, 1990)	0.940	0.962
TLI	≥ 0.80 (Sharma et al., 2005)	0.934	0.957
RMSEA	< 0.08 (Pedroso et al., 2016)	0.049	0.039
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 = normalized fit index, CFI = comparative fit index, TLI = Tucker Lewis index and RMSEA = root mean square error of approximation

4.4 Research Hypothesis Testing Result

Table 7 shows that the majority of the hypotheses in this study are supported by the data, indicating significant relationships between the variables under investigation. However, H1, which posited a relationship between perceived ease of use and perceived usefulness, was not supported by the findings.

Table 7: Hypothesis Results of the Structural Equation Modeling

Hypotheses	Standardized Estimate	S.E.	C.R.	P	Testing Result
PEOU→PU	0.077	0.044	1.746	0.081	Not Supported
PU→SA	0.430	0.058	7.369	***	Supported
PEOU→SA	0.299	0.054	5.485	***	Supported
PQ→SA	0.260	0.059	4.446	***	Supported
T→SA	0.271	0.047	5.804	***	Supported
SA→BI	0.502	0.05	10.075	***	Supported
SA→PE	0.350	0.037	9.556	***	Supported

Note: *** p<0.001
Source: Created by the author

The analysis suggests that H1, which posits that perceived ease of use influences perceived usefulness, is not supported by the data. The p-value of 0.081 exceeds the commonly used significance level of 0.001, indicating that there is insufficient evidence to conclude that there is a significant relationship between perceived ease of use and perceived usefulness in this study (Susanto et al., 2016).

H2, which suggests that perceived usefulness influences satisfaction, is strongly supported by the data. The high critical ratio of 7.369 and the significance level of *** (often denoting p < 0.001) indicate a highly significant relationship. This implies that perceived usefulness indeed has a significant influence on satisfaction (Chiu et al., 2007; Ha & Stoel, 2009).

H3, stating that perceived ease of use affects satisfaction, is also well-supported by the data. The critical ratio of 5.485 and the significance level of *** confirm a significant relationship between perceived ease of use and satisfaction (Kim & Yuan, 2012).

H4, proposing that perceived quality impacts satisfaction, is strongly supported. The critical ratio of 4.446 and the significance level of *** indicate a significant relationship between perceived quality and satisfaction (Bigne et al., 2001; Chen & Tsai, 2007; Cronin et al., 2000; Petrick & Backman, 2002).

H5, suggesting that trust influences satisfaction, is also well-supported by the data. The critical ratio of 5.804 and the significance level of *** indicate a significant relationship between trust and satisfaction (Flavian et al., 2006).

H6, which asserts that satisfaction affects behavioral intention, is strongly supported. The high critical ratio of 10.075 and the significance level of *** demonstrate a significant relationship between satisfaction and behavioral intention (Norzaidi et al., 2007).

Finally, H7, suggesting that satisfaction influences performance, is robustly supported. The critical ratio of 9.556 and the significance level of *** confirm a significant relationship between satisfaction and performance (Arifin, 2014).

5. Conclusion and Recommendation

5.1 Conclusion and Discussion

This paper delved into the multifaceted determinants that influence the satisfaction and efficacy of online learning among students enrolled in four universities directly affiliated with the Ministry of Education in Chengdu. The study meticulously examined seven latent variables, including perceived usefulness, perceived ease of use, perceived quality, trust, satisfaction, behavioral intention, and performance, to shed light on the complex dynamics of online learning satisfaction.

Through a rigorous quantitative survey research methodology, the researchers collected data from 500 undergraduates with online learning experience in Chengdu's four universities. The application of confirmatory factor analysis and structural equation modeling as statistical techniques facilitated a comprehensive analysis of the relationships between these latent variables.

The results of this study yielded several noteworthy findings. Firstly, perceived usefulness, perceived ease of use, perceived quality, and trust emerged as significant factors influencing students' satisfaction with online learning. These findings underscore the importance of these factors in shaping the overall satisfaction levels of students engaging in online education.

Furthermore, the study revealed that satisfaction itself plays a pivotal role as it significantly influences both behavioral intention and performance among students. This implies that when students are satisfied with their online learning experiences, they are more likely to exhibit positive behavioral intentions towards their studies and achieve higher levels of academic performance.

However, one surprising finding was that perceived ease of use did not have a significant influence on perceived usefulness. This result suggests that the ease of using online learning platforms may not necessarily translate directly into their perceived usefulness for students. This aspect warrants further exploration and consideration in the design and implementation of online learning systems.

In conclusion, this study advances our understanding of the determinants of satisfaction and efficacy in online learning environments. The results provide valuable insights for educational institutions and policymakers aiming to enhance the online learning experiences of students. By recognizing the significance of factors such as perceived usefulness, perceived ease of use, perceived quality, trust, and satisfaction, educators and institutions can tailor their strategies to better meet the evolving needs of students engaged in online education, ultimately fostering more effective and satisfying learning outcomes. Further research may be needed to delve deeper into the complex interplay between these variables and explore potential interventions to optimize online learning experiences.

5.2 Recommendation

Based on the findings and insights from this study, several recommendations can be made to improve the satisfaction and efficacy of online learning among students in the universities affiliated with the Ministry of Education in Chengdu

Given the significant impact of perceived usefulness on satisfaction, universities should focus on enhancing the utility of their online learning platforms. This can be achieved by ensuring that the content and resources offered align closely with the educational goals and needs of the students. Regularly updating and improving course materials can contribute to this.

As perceived quality emerged as a significant factor, institutions should invest in the development and maintenance of high-quality online courses. This includes ensuring that course materials are up-to-date, interactive, and engaging. Quality assurance mechanisms should be in place to address any issues related to content quality.

Trust was found to be a significant determinant of satisfaction. To foster trust among students, universities should maintain transparency in communication, provide reliable technical support, and ensure the security and privacy of student data. Building a trustworthy online learning environment can enhance overall satisfaction.

Although perceived ease of use did not directly impact perceived usefulness, it is still crucial for creating a positive user experience. Universities should strive to make their online platforms user-friendly, intuitive, and accessible. Conducting usability testing and gathering feedback from students can help identify and address usability issues.

Given the strong influence of satisfaction on behavioral intention and performance, institutions should regularly assess student satisfaction with online learning experiences. Feedback surveys, focus groups, and one-on-one interviews can provide valuable insights. Based on feedback, institutions can make continuous improvements to their online programs.

Recognize that satisfied students are more likely to exhibit positive behavioral intentions. Encourage student engagement by offering opportunities for interaction, collaboration, and peer learning in the online environment. Faculty and instructors should actively promote student participation.

Acknowledge the connection between satisfaction and academic performance. Provide resources and support systems that help students excel in their online studies. Offering academic advising, tutoring services, and study resources can contribute to better performance outcomes.

Ensure that educators are well-equipped to deliver high-quality online instruction. Invest in faculty training programs that focus on effective online teaching methodologies, including interactive content creation and online assessment techniques.

Recognize that the landscape of online education is dynamic. Universities should stay informed about emerging technologies and best practices in online pedagogy. Continual research and adaptation of online learning strategies are essential to meet the evolving needs of students.

Actively encourage students to participate in online learning communities, discussion forums, and collaborative projects. Engagement not only enhances the learning experience but also contributes to higher levels of satisfaction.

Incorporating these recommendations into the design and implementation of online learning programs can help universities affiliated with the Ministry of Education in Chengdu provide a more effective, satisfying, and successful online education experience for their students. It is essential to view these recommendations as part of an ongoing effort to improve the quality and impact of online education.

5.3 Limitation and Further Study

While this study provides valuable insights into the determinants of satisfaction and efficacy in online learning among students in universities affiliated with the Ministry of Education in Chengdu, it is essential to acknowledge certain limitations that may affect the generalizability and interpretation of the findings. First, the study's sample size of 500 undergraduates may not fully represent the diverse population of online learners in Chengdu's universities. The findings may not be applicable to students in different regions or educational contexts. Next, While the study examined several key latent variables, it may not have captured all potential determinants of satisfaction and efficacy in online learning. Other unexplored factors, such as personal motivations and technological infrastructure, could also play a role. Last, the study relied on established measurement scales, which may not fully capture the nuances of the online learning experience in this specific context. The effectiveness of these scales in capturing local perceptions and experiences should be considered.

References

Abdullah, F., Ward, R., & Ahmed, E. (2016). Investigating the influence of the most commonly used external variables of TAM on students' perceived ease of use (PEOU) and perceived usefulness (PU) of E-portfolios. *Computers in Human Behavior*, *63*, 75-90. https://doi.org/10.1016/j.chb.2016.05.014

Abdullah, I., Parveen, S., & Haq, S. U. (2021). Forced online experiment and its acceptance among the University students during pandemic in Pakistan. *Foresight*, *24*(3/4), 392-407. https://doi.org/10.1108/fs-01-2021-0026

Al-Mamary, Y. H., & Shamsuddin, A. (2015). Adoption of Management Information Systems in Context of Yemeni Organizations: A Structural Equation Modeling Approach. *Journal of Digital Information Management, 13*(6), 429-444.

Arifin, H. M. (2014). The influence of competence, motivation, and organisational culture to high school teacher job satisfaction and performance. *International Education Studies*, *8*(1), 38-45. https://doi.org/10.5539/ies.v8n1p38

Askariazad, M. H., & Babakhani, N. (2015). An application of European customer satisfaction index (ECSI) in business to business (B2B) context. *Journal of Business & Industrial Marketing*, *30*(1), 17-31. https://doi.org/10.1108/jbim-07-2011-0093

Awang, Z. (2012). *A Handbook on SEM Structural Equation Modelling: SEM Using AMOS Graphic* (5th ed.). Universiti Teknologi Mara Kelantan.

Bentler, P. M. (1990). Comparative fit indexes in structural models. *Psychological Bulletin, 107*(2), 238-246. https://doi.org/10.1037/0033-2909.107.2.238

Bhattacherjee, A. (2001). Understanding information systems continuance: An expectation-confirmation model. *MIS Quarterly*, *25*(3), 351. https://doi.org/10.2307/3250921

Bigne, E., Sanchez, I., & Sánchez-García, J. (2001). Tourism image, evaluation variables and after purhase behaviour: Inter-relationship. *Tourism Management, 22*(6), 607-616. https://doi.org/10.1016/S0261-5177(01)00035-8

Chen, C. F., & Tsai, D. C. (2007). How Destination Image and Evaluative Factors Affect Behavioral Intentions?. *Tourism Management, 28*(4), 1115-1122. https://doi.org/10.1016/j.tourman.2006.07.007

Chiu, C.-M., Sun, S.-Y., Sun, P.-C., & Ju, T. L. (2007). An empirical analysis of the antecedents of web-based learning continuance. *Computers & Education, 49*(4), 1224-1245. https://doi.org/10.1016/j.compedu.2006.01.010

Cronin, J. J., Brady, M. K., & Hult, G. T. (2000). Assessing the Effects of Quality, Value and Customer Satisfaction on Consumer Behavioral Intentions in Service Environments. *Journal of Retailing, 76*(2), 193-218. https://doi.org/10.1016/S0022-4359(00)00028-2

Davis, F. (1989). Perceived Usefulness, Perceived Ease of Use, and User Acceptance of Information Technology. *MIS Quarterly, 13*(3), 319-340. https://doi.org/10.2307/249008

Davis, F. D., Bagozzi, R. P., & Warshaw, P. R. (1989). User acceptance of computer technology: A comparison of two theoretical models. *Management Science*, *35*(8), 982-1003. https://doi.org/10.1287/mnsc.35.8.982

Feng, D., Xiang, C., Vongurai, R., & Pibulcharoensit, S. (2022). Investigation on Satisfaction and Performance of Online Education Among Fine Arts Major Undergraduates in Chengdu Public Universities. *AU-GSB E-JOURNAL*, *15*(2), 169-177. https://doi.org/10.14456/augsbejr.2022.82

Fishbein, M., & Ajzen, I. (1975). *Belief, Attitude, Intention and Behaviour: An Introduction to Theory and Research.* Addison-Wesley Publishing.

Flavian, C., Guinalíu, M., & Gurrea, R. (2006). The role played by perceived usability, satisfaction and consumer trust on website loyalty. *Information & Management, 43*(1), 1-14. https://doi.org/10.1016/j.im.2005.01.002

Fornell, C. (1992). A National Customer Satisfaction Barometer: The Swedish Experience. *Journal of Marketing, 56*(1), 6-21. https://doi.org/10.2307/1252129

Fornell, C., & Larcker, D. F. (1981). Evaluating structural equation models with unobservable variables and measurement error. *Journal of Marketing Research*, *18*(1), 39. https://doi.org/10.2307/3151312

Gardas, B. B., & Navimipour, N. J. (2021). Performance evaluation of higher education system amid COVID-19: A threat or an opportunity?. *Kybernetes*, *51*(8), 2508-2528. https://doi.org/10.1108/k-10-2020-0713

Ha, S., & Stoel, L. (2009). Consumer E-shopping acceptance: Antecedents in a technology acceptance model. *Journal of Business Research*, *62*(5), 565-571. https://doi.org/10.1016/j.jbusres.2008.06.016

Hair, J. F., Black, W. C., Babin, B. J., & Anderson, R. E. (2010). *Multivariate Data Analysis* (7th ed.). Pearson.

Hair, J., Black, W., Babin, B., Anderson, R., & Tatham, R. (2006). *Multivariate Data Analysis* (6th ed.). Pearson Prentice Hall.

Herzog, S., Reth, M., & Jumaa, H. (2009). Regulation of B-cell proliferation and differentiation by pre-B-cell receptor signalling. *Nature reviews. Immunology*, *9*(3), 195-205. https://doi.org/10.1038/nri2491

Jiang, Y., Shang, J., & Jiao, L. (2023). Review of China's Online Education Policy, 1999–2022. *ECNU Review of Education, 6*(1), 155-182. https://doi.org/10.1177/20965311221099581

Khan, E. A., Cram, A., Wang, X., Tran, K., Cavaleri, M., & Rahman, M. J. (2023). Modelling the impact of online learning quality on students' satisfaction, trust and loyalty. *International Journal of Educational Management*, *37*(2), 281-299. https://doi.org/10.1108/ijem-02-2022-0066

Kim, C., Mirusmonov, M., & Lee, I. (2010). An empirical examination of factors influencing the intention to use mobile payment. *Computers in Human Behavior*, *26*(3), 310-322. https://doi.org/10.1016/j.chb.2009.10.013

Kim, J. Y., & Yuan, X. (2012). The role of perceived quality in new product adoption process in China. *Asia Marketing Journal*, *14*(1), 159-185. https://doi.org/10.53728/2765-6500.1476

Kumar, R., Sachan, A., & Mukherjee, A. (2017). Qualitative approach to determine user experience of e-government services. *Computers in Human Behavior, 71*, 299-306.

Lee, C., Tsao, C., & Chang, W. (2015). The relationship between attitude toward using and customer satisfaction with mobile application services. *Journal of Enterprise Information Management*, *28*(5), 680-697. https://doi.org/10.1108/jeim-07-2014-0077

Liang, R., & Zhang, J. (2011). The effect of service interaction orientation on customer satisfaction and behavioral intention: The moderating effect of dining frequency. *Procedia - Social and Behavioral Sciences, 24*, 1026-1035. https://doi.org/10.1016/j.sbspro.2011.09.082

Liu, Y., Li, H., & Hu, F. (2013). Website attributes in urging online impulse purchase: An empirical investigation on consumer perceptions. *Decision Support Systems*, *55*(3), 829-837. https://doi.org/10.1016/j.dss.2013.04.001

Mayer, R. C., Davis, J. H., & Schoorman, F. D. (1995). An integrative model of organizational trust. *Academy of Management Review*, *20*(3), 709-734. https://doi.org/10.5465/amr.1995.9508080335

McKnight, D. H., Choudhury, V., & Kacmar, C. (2002). Developing and validating trust measures for e-Commerce: An integrative typology. *Information Systems Research*, *13*(3), 334-359. https://doi.org/10.1287/isre.13.3.334.81

Moon, J., & Kim, Y. (2001). Extending the TAM for a world-wide-Web context. *Information & Management, 38*(4), 217-230. https://doi.org/10.1016/s0378-7206(00)00061-6

Mungra, Y., & Yadav, P. K. (2019). The mediating effect of satisfaction on trust-commitment and relational outcomes in manufacturer–supplier relationship. *Journal of Business & Industrial Marketing*, *35*(2), 219-230. https://doi.org/10.1108/jbim-09-2018-0268

Norzaidi, M. D., Chong, S. C., Murali, R., & Intan Salwani, M. (2007). Intranet usage and managers' performance in the port industry. *Industrial Management and Data Systems, 107*(8), 1227-1250.

Parasuraman, A., Zeithaml, V. A., & Berry, L. (1985). A Conceptual Model of Service Quality and Its Implications for Future Research. *Journal of Marketing, 49*(4), 41-50. http://dx.doi.org/10.2307/1251430

Pedroso, R., Zanetello, L., Guimaraes, L., Pettenon, M., Goncalves, V., Scherer, J., Kessler, F., & Pechansky, F. (2016). Confirmatory factor analysis (CFA) of the crack use relapse scale (CURS). *Archives of Clinical Psychiatry, 43*(3), 37-40. https://doi.org/10.1590/0101-60830000000081

Perry, M. A. (1991). Channel member conflict and performance: A proposed model and research agenda. *The International Review of Retail, Distribution and Consumer Research*, *1*(2), 233-252. https://doi.org/10.1080/09593969100000018

Petrick, J. F., & Backman, S. J. (2002). An Examination of the Construct of Perceived Value for the Prediction of Golf Travelers' Intentions to Revisit. *Journal of Travel Research, 41*(1), 38-45.

Roy, D. R., & Zhao, M. (2009). Retail web site interactivity. *International Journal of Retail & Distribution Management*, *37*(10), 821-838. https://doi.org/10.1108/09590550910988011

Sarmento, R., & Costa, V. (2016). *Comparative Approaches to Using R and Python for Statistical Data Analysis* (1st ed.). IGI Global Press.

Sharma, S., Pradhan, K., Satya, S., & Vasudevan, P. (2005). Potentiality of earthworms for waste management and in other uses- a review. *Journal of American Science, 1*(1), 4-16.

Sica, C., & Ghisi, M. (2007). The Italian versions of the Beck Anxiety Inventory and the Beck Depression Inventory-II: Psychometric properties and discriminant power. In M. A. Lange (Ed.), *Leading-edge psychological tests and testing research* (pp. 27-50). Nova Science Publishers.

Solimun, S., & Fernandes, A. A. R. (2018). The mediation effect of customer satisfaction in the relationship between service quality, service orientation, and marketing mix strategy to customer loyalty. *Journal of Management Development, 37*(1), 76-87. https://doi.org/10.1108/JMD-12-2016-0315

Susanto, H. T. A., Chang, L. Y., & Ha, Y. (2016). Determinants of Continuance Intention to Use the Smartphone Banking Services: An Extension to the Expectation-Confirmation Model. *Industrial Management &amp Data Systems, 116*(3), 508-525.

Tse, D. K., & Wilton, P. C. (1988). Models of consumer satisfaction formation: An extension. *Journal of Marketing Research, 25*(2), 204-212. https://doi.org/10.2307/3172652

Venkatesh, V., & Davis, F. D. (2000). A Theoretical Extension of the Technology Acceptance Model: Four Longitudinal Field Studies. *Management Science, 46,* 186-204. https://doi.org/10.1287/mnsc.46.2.186.11926

Wang, P., Ma, T., Liu, L. B., Shang, C., An, P., & Xue, Y. X. (2021). A Comparison of the Effectiveness of Online Instructional Strategies Optimized With Smart Interactive Tools Versus Traditional Teaching for Postgraduate Students. *Frontiers in psychology, 12,* 747719. https://doi.org/10.3389/fpsyg.2021.747719

Watjatrakul, B. (2020). Intention to adopt online learning. *The International Journal of Information and Learning Technology*, *37*(1/2), 46-65. https://doi.org/10.1108/ijilt-03-2019-0040

Wu, J. H., & Wang, Y. M. (2006). Measuring KMS Success: A Respecification of the DeLone and McLean's Model. *Journal of Information & Management, 43*(6), 728-739. http://dx.doi.org/10.1016/j.im.2006.05.002

Zhang, J., Byon, K. K., Xu, K., & Huang, H. (2020). Event impacts associated with residents' satisfaction and behavioral intentions: A pre-post study of the Nanjing youth Olympic Games. *International Journal of Sports Marketing and Sponsorship, 21*(3), 487-511. https://doi.org/10.1108/ijsms-03-2019-0027

Zhang, B. (2023). Research and practice on smart campus construction of vocational colleges in the information 2.0 era. *Vocational Education, 12*(04), 470-474. https://doi.org/10.12677/ve.2023.124072