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The Assessment on Perceived Usefulness and Satisfaction with Online Learning of Postgraduate Students in Chengdu, China

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Abstract

Purpose: This study aims to assess the determinants of perceived usefulness and satisfaction among postgraduate students regarding their online learning experiences in China. The research framework for this study encompasses seven latent variables: perceived ease of use, system quality, information quality, service quality, perceived usefulness, confirmation, and satisfaction. **Research design, data, and methodology:** A quantitative research approach was employed in this study, involving the distribution of questionnaires to a sample of 500 postgraduate students drawn from three universities situated in Chengdu, Sichuan, China. Before the data collection, Item-Objective Congruence (IOC): This assessment was employed to establish the content validity of the questionnaire. A pilot test (n=40) was conducted to assess the reliability of the questionnaire. Confirmatory factor analysis (CFA) was applied to assess the validity of the measurement model. Structural Equation Modeling (SEM) was employed to analyze relationships among the variables. **Results:** Perceived ease of use and system quality significantly influence perceived usefulness. The relationship among confirmation, perceived usefulness and satisfaction is supported. Additionally, perceived usefulness significantly influences satisfaction. Nevertheless, information quality and service quality have no significant influence on perceived usefulness. **Conclusions:** By focusing on user-friendliness, system quality, and managing student expectations, institutions can improve perceived usefulness and overall satisfaction.

Keywords : Service Quality, Perceived Usefulness, Confirmation, Satisfaction, Online Learning

JEL Classification Code: E44, F31, F37, G15

1. Introduction

Due to the rapid development of information technology and the emergence of the mobile Internet, which has created a learning life across time and space, learning is unrestricted by time, space, and region. The way of knowledge acquisition has changed, becoming more flexible and diverse. At the same time, many capital markets and entrepreneurs entered China, which has promoted the good and rapid development of network learning in China. Today, online teaching in our country has largely developed with the wave of mobile Internet. According to statistics in 2016, there were 138 million online learners in China, with an increase of 27.5 million with a growth ratio of 24.97%. The number of online learners on mobile phones was 97.98 million, with an increase of 44.95 million, with a growth ratio of 84.80% (Foresight Industry Research Institute, 2018).

Through the construction and development of the Internet, the online learning provided by Chinese universities has made tremendous progress in recent years, especially in large-scale online teaching during the COVID-19 epidemic. In this special period, many problems of online learning are exposed, which provides a lesson for our subsequent universities to promote the construction of online learning. After the analysis, there are three problems in the online learning process (China Research Institute of Commerce and

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Industry, 2022).

Online education in China is developing very rapidly; online learning has played a huge role in special times, but in the meantime, there are also some unreasonable phenomena in the process of online learning, For example, online teaching quality is not good enough, Insufficient integration of technology and education, The regulatory mechanism is not perfect, Thus affecting the effectiveness and satisfaction of students' online learning, This study will be conducted by examining the perceived ease of use, the mass of the system, Information quality, quality of service, Perceived usefulness, affirm, The relationship between the seven variables of satisfaction, Analyze which factors can affect students' online learning effectiveness and satisfaction, Our final results will benefit online learning software development engineers, college educators, and related administrators.

The specific objectives of this study are to determine the key factors affecting the perceived effectiveness of online learning among college students in Chengdu, Sichuan Province, including teaching quality, technical support, and learning resources. Identify the key factors influencing college student satisfaction in online learning include perceived ease of use, system quality, information quality, service quality, perceived usefulness, confirmation, and satisfaction. The study aims to help schools and educational institutions improve the online learning environment and the online learning experience and academic performance of college students.

2. Literature Review

2.1 Perceived Ease of Use

Perceived ease of use is a kind of cognition of people, which is related to people's positive and negative thoughts and can also affect individual learning performance (Ortaçtepe, 2016). According to many studies, people's perception of perceived usefulness and ease of use embodies the idea of using the network system (Davis, 1989). By comparison, people believe that ease of perception means that without much effort, people can complete the assigned tasks and that specialized systems can be mastered without much effort (Radner & Rothschild, 1975). This study focuses on exploring and analyzing perceived usefulness and perceived ease of use. Theoretically, we believe both have a very important impact on whether people adopt the system (Davis, 1989).

In order to study and predict the intentions of private university students to adopt e-learning, the researchers constructed a model based on perceived ease of use and teaching materials to test the intentions of e-learning (Garcia & Silva, 2017). Perceived usefulness is significantly affected by perceived ease of use (Marakarkandy et al., 2016). In TAM, perceived ease of use and usefulness are the main factors influencing people's attitudes and intentions toward the target system (Camarero et al., 2012). Thus, this study set a hypothesis:

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

2.2 System Quality

System quality has the most influence and vitality on information systems research (Aboelmaged, 2018). Through the observation of large-scale online learning, the researchers found that system quality is one of the important prerequisites for students to impact online learning (Elmorshidy, 2018) positively. This variable refers to the searching function of software, the speed of information response, the speed of transmission, and the speed of customer access (Garcia & Silva, 2017). System quality is understood as the system can be safe, reliable, and effective access, and the reaction speed is fast (Shah & Attiq, 2016). System quality is understood as when people use a network APP, an important component of the APP (Salimon et al., 2021).

If a person uses the online learning platform for learning, if there is a problem with the system quality in the process, it may cause the person not to choose this platform for operation and use, which will also affect the ease of use and usefulness experience (Shah & Attiq, 2016). Through experiments, it is found that people's feelings about online learning will be influenced by reasons such as system quality and technical quality and that the ease of use and perceived usefulness are positively influenced by these factors (Wang & Xiao, 2009). System quality has a more direct and positive impact on perceived usefulness (Panigrahi et al., 2018). Hence, a hypothesis is developed:

H2: System quality has a significant influence on perceived usefulness.

2.3 Information Quality

Information quality concept is relatively novel because of its characteristics. People use it to predict an online learning system (Salimon et al., 2021). In the network environment, customers' perception of information quality positively affects customers' perceived usefulness (Aboelmaged, 2018). People can understand information quality. It is a software matching or information resource for groups in need to help them significantly improve their performance ability in work and study (Fan et al., 2021). In order to study and predict the intentions of private university students to adopt e-learning, the researchers constructed a model based on information

quality and teaching materials to test the intentions of e-learning (Salimon et al., 2021).

In studying the willingness to use online software in some countries, it was found that information quality significantly impacts the perceived usefulness of online software (Lin et al., 2011). The study found that system quality, information quality, and service quality significantly impacted students' willingness to use MOOCs, and the above three were significant influence factors for students' usefulness and ease of use (Yang & Chung-Ho, 2017). Therefore, this study concludes that:

H3: Information quality has a significant influence on perceived usefulness.

2.4 Service Quality

The research on service quality has developed a model integrating service quality, which greatly influences customer satisfaction. At the same time, the model can maximize the benefits of the information system. Researchers think that the model integrating service quality has the most influence and vitality on information systems research (Aboelmaged, 2018). As for understanding service quality, people have a personal awareness of the subject when they accept the objective value provided by certain things (Chowdhury et al., 2022). We can understand the students' service quality of online education as a cognitive feeling of the services provided by the online learning platform according to what can be observed and individual feelings (Fan et al., 2021).

Past research has found that the quality of system services plays a significant role in people's perceived usefulness (Rui & Lin, 2018). It is believed that the understanding of online learning is not simple, nor is it single, because there are many components in this process, such as the service quality and system quality of online learning, which will have an impact on the perception of learning content (Elshami et al., 2021). The study found that the quality of service provided by the online learning system greatly impacts the perceived usefulness (Cheng, 2014). So, it can refer a hypothesis:

H4: Service quality has a significant influence on perceived usefulness.

2.5 Perceived Usefulness

Perceived usefulness is a kind of cognition of people, which is related to people's positive and negative thoughts and can also affect individual learning performance (Ortaçtepe, 2016). Perceived usefulness is perceived as the student's perception of its advantages when using the network (Islam et al., 2018). According to many studies, people's perception of perceived usefulness and ease of use embodies the idea of using the network system (Davis, 1989). This study focuses on exploring and analyzing perceived usefulness and perceived ease of use. Theoretically, we believe both have a very important impact on whether people adopt the system (Davis et al., 1989).

In order to study and predict the intentions of private university students to adopt e-learning, the researchers constructed a model based on perceived usefulness and teaching materials to test the intentions of e-learning (Salimon et al., 2021). Through experiments, it is found that people's feelings about online learning will be influenced by technical quality and that the ease of use and perceived usefulness are positively influenced by these factors (Wang & Xiao, 2009). The online learning process, such as perceived usefulness and other factors, will impact their experience, that is, satisfaction (Shah & Attiq, 2016). Perceived usefulness of the online learning system impacts online learning satisfaction (Lee, 2010). Consequently, a hypothesis is set:

H5: Perceived usefulness has significant influence on satisfaction.

2.6 Confirmation

Confirmation refers to the degree to which students' hopes for learning before using online software are confirmed after using these online tools (Ifinedo, 2017). For the understanding of confirmation, it and negation are relatively valid concepts, which certain data can verify to determine whether this result is confirmed or negative (Hempel, 1945). Confirmation is a reaction in cognition, through the feeling of the process of things, through their own repeated thinking and consideration, and getting the result (Garrison, 2003).

Online learning systems are rich learning resources, and people can confirm the usefulness of online learning software to encourage people to continue to use it (Lee et al., 2009; Tung & Chang, 2008). Suppose the learners feel that the information the online learning software provides is rich and helpful. In that case, it will better help them confirm their feelings about the usefulness of the online learning software (Choi et al., 2007).

In an online learning software system, when students achieve expected growth through online learning, their Satisfaction is affected by the confirmation of expected results (Tan & Kim, 2015). Students' Satisfaction with the online learning system is influenced by the perceived usefulness and the confirmation of two important factors, which will also affect whether students continue to use the online learning software in the future (Cheng, 2019). Therefore, this study hypothesizes that:

H6: Confirmation has a significant influence on perceived usefulness.

H7: Confirmation has a significant influence on satisfaction

2.7 Satisfaction

Satisfaction refers to whether students or customers feel good about using e-learning software (Aboelmaged, 2018). Satisfaction can be defined or understood as a degree of self-feeling derived from the learning subject for the online education platform's supporting facilities (content, service, etc.) in the learning process of using the network (Fan et al., 2021). It is noted that the understanding of online learning is not simple, nor is it single, because there are many components in this process, such as the interaction between teachers and students, the freedom of time and space, the matching of learning platforms, and the feeling of learning content. Through three types of theories, such as social cognition, students can analyze the satisfaction degree of network learning in learning through the network platform (Elshami et al., 2021). Personal satisfaction can be recognized in the process of using something. The event provides the individual with a feeling of meeting their expectations, a personal attitude formed (Chowdhury et al., 2022).

3. Research Methods and Materials

3.1 Research Framework

The conceptual framework for this study draws inspiration from the research frameworks of several notable scholars. Specifically, Rui and Lin (2018), Cheng (2014), and Ifinedo (2017) have collectively explored the interrelationships among seven key variables, namely perceived ease of use, system quality, information quality, service quality, perceived usefulness, confirmation, and satisfaction, as visually depicted in Figure 1. This study builds upon and adapts these conceptual foundations to inform its research design and analysis.

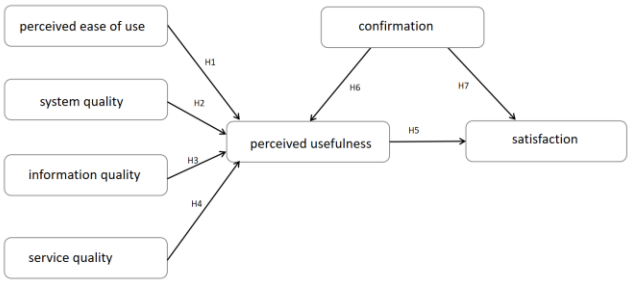

Figure 1: Conceptual Framework

H1: Perceived ease of use has a significant influence on perceived usefulness.
H2: System quality has a significant influence on perceived usefulness.
H3: Information quality has a significant influence on perceived usefulness.
H4: Service quality has a significant influence on perceived usefulness.
H5: Perceived usefulness has significant influence on satisfaction.
H6: Confirmation has a significant influence on perceived usefulness.
H7: Confirmation has a significant influence on satisfaction.

3.2 Research Methodology

In the course of this research, an extensive questionnaire survey was conducted in the context of online learning, with data collection involving students from three distinct universities situated in Chengdu, Sichuan, China. The selection of these specific universities was guided by a careful consideration of various factors, including students' prior experiences and other pertinent considerations. The questionnaire served as the principal tool in this study, designed to fulfill research objectives by encompassing several pivotal components: it included screening questions, employed a five-point Likert scale for measuring items, and featured a section dedicated to capturing demographic profiles of the participants. Subsequently, during the data analysis phase, the researcher applied advanced statistical techniques such as confirmatory factor analysis (CFA) and structural equation modeling (SEM) to assess critical indicators like validity, reliability, model fit, and path coefficients.

Prior to embarking on data collection, meticulous steps were taken to establish the validity of the questionnaire. To this end, the Item-Objective Consistency Index (IOC) was harnessed as a tool for validation. For this crucial task, the research team sought the expertise of four specialists drawn from three distinct universities. The outcomes of their evaluations consistently yielded scores that exceeded the threshold of 0.5, unequivocally affirming the questionnaire's validity.

Following this validation process, the researchers conducted pilot tests, involving a representative sample of 40 individuals, aimed at evaluating the reliability of each construct within the questionnaire. The results of these pilot tests were highly reassuring, as they revealed that the Cronbach alpha coefficient for each potential variable surpassed the widely accepted threshold of 0.7. This signified a commendable level of internal consistency reliability for the questionnaire, thereby affirming its suitability as a robust investigative instrument for this study, as per the guidelines stipulated by Hair et al. (2007). To provide specific insights, the Cronbach alpha scores for the different constructs were found to be as follows: Perceived Ease of Use scored 0.873, System Quality scored 0.825, and Information Quality scored

0.852. Meanwhile, Service Quality yielded a score of 0.900, Perceived Usefulness scored 0.821, Confirmation achieved a high score of 0.931, and Satisfaction garnered an impressive score of 0.943.

3.3 Population and Sample Size

The study focuses on a specific target population, namely postgraduate students enrolled in educational institutions located in Chengdu, Sichuan province, China. These individuals have undergone an extensive period of online learning, lasting over three months, owing to the challenges posed by the pandemic. To ensure the reliability and statistical robustness of the research, it is recommended, as advised by Soper (2023), to maintain a minimum sample size of 425 participants. In accordance with this guidance, the study has diligently selected a sample size of 500, a substantial number that optimally supports the application of the statistical method known as Structural Equation Modeling (SEM). However, following the meticulous screening process and handling of missing data, the final dataset included 496 eligible cases for the subsequent data analysis.

3.4 Sampling Technique

In the context of judgmental sampling, the focus was on postgraduate students distributed across three distinct universities situated in Chengdu, Sichuan Province. These universities included Xihua University (XU), Chengdu University (CDU), and Sichuan Normal University (SICNU). Conversely, quota sampling involves the selection of survey participants based on predetermined shared characteristics or similarities. A detailed outline of this selection process is provided in Table 1.

Table 1: Sample Units and Sample Size

Smart Communities	Population Size	Proportional Sample Size
Xihua University (XU)	2461	163
Chengdu University (CDU)	2232	147
Sichuan Normal University (SICNU)	2871	190
Total	**7,564**	**500**

Source: Constructed by author

4. Results and Discussion

4.1 Demographic Information

The demographic information collected from the sample of 496 postgraduate students provides valuable insights into the composition of the study's participants. This analysis examines key demographic variables, including gender and year of study, to gain a better understanding of the characteristics of the study population.

The data indicates that 34.88% of the respondents are male, comprising 173 individuals. The majority of the participants, accounting for 65.12%, are female, totaling 323 individuals. Approximately 35.28% of the participants, or 175 individuals, are in their first year of graduate studies. A similar percentage, around 34.88%, corresponds to students in their second year of graduate studies, constituting 173 individuals. The remaining 29.84% of the sample, or 148 individuals, are in their third year of graduate studies

Table 2: Demographic Profile

Demographic and General Data (N=496)		Frequency	Percentage
Gender	Male	173	34.88%
	Female	323	65.12%
Year of Study	First Year of Graduate	175	35.28%
	Second Year of Graduate	173	34.88%
	Third Year of Graduate	148	29.84%

Source: Constructed by author.

4.2 Confirmatory Factor Analysis (CFA)

In the context of Confirmatory Factor Analysis (CFA), it is essential to assess the reliability and validity of the measured constructs. The following criteria were used to evaluate the reliability and validity of the constructs in this study. The Cronbach alpha coefficient for all latent variables exceeded the 0.7 threshold, affirming high internal consistency reliability. The Composite Reliability (CR) exceeded the acceptable threshold of 0.60, suggesting robust reliability. The Average Variance Extracted (AVE) surpassed the 0.40 criterion, further supporting the constructs' validity. All factor loadings for the various structures in the study exceeded the 0.50 threshold, reinforcing the convergent validity of the constructs. These results collectively confirm the reliability and validity of the constructs employed in this study, enhancing the confidence in the measurements and their suitability for further analysis

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 Ease of Use	Bashir and Madhavaiah (2014)	5	0.840	0.623-0.779	0.840	0.514
System Quality	Cho et al. (2009)	4	0.818	0.674-0.775	0.820	0.533
Information Quality	Lee et al. (2009)	4	0.830	0.707-0.758	0.831	0.551
Service Quality	Ngai et al. (2007)	4	0.792	0.682-0.715	0.792	0.501
Confirmation	Ozkan and Koseler (2009)	4	0.806	0.679-0.736	0.806	0.511
Perceived Usefulness	Bhattacherjee (2001)	4	0.887	0.792-0.849	0.887	0.662
Satisfaction	Bhattacherjee (2001)	4	0.860	0.760-0.800	0.861	0.607

In the domain of statistical analysis, evaluating the goodness of fit of a model is an essential step to ensure the trustworthiness and validity of research outcomes. The effectiveness of a statistical model is typically gauged by assessing it against a set of predefined criteria. Specifically, the CMIN / DF value was 1.120, lower than the common fit index criteria, GFI value of 0.948, AGFI value of 0.936, RMSEA value of 0.016, CFI value of 0.993, NFI value of 0.940, and TLI value of 0.992. These fit metrics met the acceptable criteria, indicating a good fit between the established structural equation model and the data.

Table 4: Goodness of Fit for Measurement Model

Fit Index	Acceptable Criteria	Statistical Values
CMIN/DF	< 3.00 (Al-Mamary & Shamsuddin, 2015; Awang, 2012)	1.120
GFI	≥ 0.85 (Sica & Ghisi , 2007)	0.948
AGFI	≥ 0.80 (Sica & Ghisi, 2007)	0.936
NFI	≥ 0.80 (Wu & Wang, 2006)	0.940
CFI	≥ 0.80 (Bentler, 1990)	0.993
TLI	≥ 0.80 (Sharma et al., 2005)	0.992
RMSEA	< 0.08 (Pedroso et al., 2016)	0.016
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

Fornell and Larcker (1981) established a criterion for evaluating the validity of constructs, proposing that the correlation coefficients between constructs should be less than the square root of the Average Variance Extracted (AVE) for those constructs. In Table 5, the diagonal entries of the table represent the square root of the AVE for each respective construct. Importantly, it is evident that these diagonal values surpass the correlation coefficients connecting different constructs. This observation strongly supports the assertion that the model exhibits robust discriminant validity and aligns with the criteria for acceptability. Consequently, the findings from this study furnish empirical evidence that validates the strong discriminant validity of the structural framework employed in this research.

Table 5: Discriminant Validity

	PEOU	SYQ	IQ	SEQ	CONF	PU	SAT
PEOU	**0.717**						
SYQ	0.351	**0.730**					
IQ	0.303	0.446	**0.742**				
SEQ	0.326	0.392	0.325	**0.699**			
CONF	0.290	0.278	0.288	0.405	**0.715**		
PU	0.329	0.427	0.272	0.286	0.333	**0.814**	
SAT	0.426	0.525	0.458	0.453	0.426	0.483	**0.779**

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

Source: Created by the author.

4.3 Structural Equation Model (SEM)

To assess whether the model matched the data, we compared it with the acceptable goodness-of-fit range provided in Table 6. The results show that our model performs well on all the fit metrics. Specifically, CMIN / DF was 2.596, GFI 0.861, AGFI 0.836, RMSEA 0.057, CFI 0.906, NFI 0.856 and TLI 0.896. It summarizes the goodness-of-fit results of the structural equation model (SEM), indicating that our SEM is validated on all the fit metrics.

Table 6: Goodness of Fit for Structural Model

Index	Acceptable	Statistical Values
CMIN/DF	< 3.00 (Al-Mamary & Shamsuddin, 2015; Awang, 2012)	2.596
GFI	≥ 0.85 (Sica & Ghisi , 2007)	0.861
AGFI	≥ 0.80 (Sica & Ghisi, 2007)	0.836
NFI	≥ 0.80 (Wu & Wang, 2006)	0.856
CFI	≥ 0.80 (Bentler, 1990)	0.906
TLI	≥ 0.80 (Sharma et al., 2005)	0.896
RMSEA	< 0.08 (Pedroso et al., 2016)	0.057
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

4.4 Research Hypothesis Testing Result

The findings from the analysis employing Structural Equation Modeling (SEM) offer compelling evidence in favor of the hypotheses under investigation. Each hypothesis sought to explore the association between a distinct factor and the intention to use a specific product or service. According to the results, all of these relationships demonstrated a high degree of statistical significance, with p-values well below 0.001. This substantial statistical significance underscores strong and robust support for the formulated hypotheses.

Table 7: Hypothesis Results of the Structural Equation Modeling

Hypothesis	(β)	t-Value	Result
H1: PEOU→PU	0.204	4.102***	Supported
H2: SYQ→PU	0.383	7.155***	Supported
H3: IQ→PU	0.048	0.992	Not Supported
H4: SEQ→PU	0.063	1.278	Not Supported
H5: PU→SAT	0.197	3.928***	Supported
H6: CONF→PU	0.457	8.800***	Supported
H7: CONF→SAT	0.330	6.401***	Supported

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

H1. The data in H1 provide substantial evidence supporting the hypothesis that perceived usefulness influences perceived usefulness. As indicated by Ortaçtepe (2016), the research data from the postgraduate group yield a β value of 0.204 and a t-value of 4.102, affirming the significance of perceived ease of use on perceived usefulness.

H2. The data in H2 affirm the validity of the assumption that system quality impacts perceived usefulness, in alignment with the findings of Garcia and Silva (2017). Based on research data from postgraduate groups, a β value of 0.383 and a t-value of 7.155 underline the substantial influence of system quality on perceived usefulness.

H3. The data in H3 indicate the necessity to further validate the assumption regarding the impact of information systems on perceived ease of use. In accordance with Aboelmaged's study (2018), research data from postgraduate groups suggest that information systems do not significantly affect perceived usefulness, with a β value of 0.048 and a t-value of 0.992.

H4. The data in H4 emphasize the need for further validation concerning the influence of quality of service on perceived usefulness. In line with Rui and Lin's research (2018), findings from the postgraduate group data reveal that the quality of service has a limited impact on perceived usefulness, with a β value of 0.063 and a t-value of 1.278.

H5. The data in H5 confirm the hypothesis that perceived usefulness positively impacts satisfaction, consistent with Camarero et al.'s study (2012). Research data from the postgraduate group show a β value of 0.197 and a t-value of 3.928, indicating the significant role of perceived usefulness in influencing satisfaction.

H6. The data in H6 provide strong support for the hypothesis that confirmation influences perceived usefulness, as validated by Ifinedo's research (2017). Based on research data from the postgraduate group, a substantial β value of 0.457 and a t-value of 8.800 underscore the influential role of confirmation in shaping perceived usefulness.

H7. The data in H7 validate the hypothesis that confirmation significantly impacts satisfaction, aligning with Cheng's study (2021). Research data from the postgraduate group affirm this relationship, with a β value of 0.330 and a t-value of 6.401, emphasizing the substantial influence of confirmation on satisfaction

5. Conclusion and Recommendation

5.1 Conclusion and Discussion

In this study, we sought to explore the determinants of perceived usefulness and satisfaction among postgraduate students regarding their online learning experiences in China. Our research framework incorporated seven latent variables: perceived ease of use, system quality, information quality, service quality, perceived usefulness, confirmation, and satisfaction. Employing a quantitative research approach, we collected data through questionnaires administered to a sample of 500 postgraduate students hailing from three universities located in Chengdu, Sichuan, China. Our methodology involved rigorous steps to ensure the validity and reliability of our instruments, including Item-Objective Congruence (IOC) assessment and a pilot test. We subsequently employed Confirmatory Factor Analysis (CFA) and Structural Equation Modeling (SEM) to analyze the relationships among the variables.

The findings from our study shed light on the factors influencing postgraduate students' online learning experiences in China and offer valuable insights into the realm of educational technology adoption and satisfaction. The study revealed that both perceived ease of use and system quality have a significant and positive influence on perceived usefulness. This implies that when online learning platforms are user-friendly and exhibit high-quality system attributes, students are more likely to perceive them as useful for their educational needs. These findings align with previous research and underscore the importance of usability

and system quality in enhancing the perceived usefulness of online learning tools.

The results provide support for the relationship among confirmation, perceived usefulness, and satisfaction. This suggests that when students have confirmed positive experiences with online learning platforms, it enhances their perception of usefulness, which, in turn, positively affects their satisfaction. This chain of relationships highlights the significance of ensuring a positive and confirmatory experience for students to foster satisfaction with online learning.

The study found that perceived usefulness significantly influences satisfaction among postgraduate students. This implies that when students perceive online learning tools as valuable for achieving their educational goals, it contributes to their overall satisfaction with the online learning experience. This result underscores the importance of designing online learning platforms that meet students' needs and provide meaningful value.

Contrary to our expectations, our study did not find significant relationships between information quality and service quality with perceived usefulness. This suggests that, in the context of online learning, factors related to the quality of information and services may not be the primary drivers of perceived usefulness. Further research may be needed to explore the nuances of these relationships in the online education setting.

In conclusion, our study provides valuable insights into the factors influencing postgraduate students' perceived usefulness and satisfaction with online learning experiences in China. The results underscore the importance of user-friendly platforms, system quality, and confirmation in enhancing perceived usefulness and satisfaction. These findings have practical implications for educators and institutions aiming to improve the quality of online education for postgraduate students.

5.2 Recommendation

Based on the findings of our study, we propose several recommendations for educational institutions, policymakers, and online learning platform providers to enhance the online learning experiences of postgraduate students in China. Educational institutions should invest in user-friendly online learning platforms that are intuitive and easy for postgraduate students to navigate. This can include providing clear instructions, intuitive interface design, and responsive technical support.

Institutions should focus on maintaining and improving the quality of the technological infrastructure supporting online learning. This includes ensuring platform reliability, minimizing downtime, and optimizing platform performance. Institutions should aim to create a positive and confirmatory learning environment for postgraduate students. This can be achieved through effective communication, personalized support, and interactive learning opportunities. Encouraging students to share their positive experiences can also foster confirmation.

Educators and institutions should actively communicate the value of online learning in terms of its contribution to students' educational goals and career advancement. Highlighting the practical benefits of online education can enhance perceived usefulness. While our study did not find significant associations, institutions should not overlook the importance of information quality and service quality. Regular assessments and feedback from students can help identify areas for improvement in these aspects.

One recommendation is to offer training and support resources to both students and instructors to ensure they are proficient in using online learning tools effectively. This can include workshops, tutorials, and access to technical assistance. Continuously monitor postgraduate students' needs and preferences in online learning. Adapt online learning strategies and platforms to address evolving educational requirements and technological advancements.

It should promote student engagement in online learning through interactive activities, peer collaboration, and opportunities for active participation. Engaged students are more likely to find online learning useful and satisfying. Regularly collect feedback from postgraduate students about their online learning experiences can be used to identify areas for improvement and make data-driven decisions to enhance the quality of online education.

Another suggestion is to encourage research and innovation in online education to stay at the forefront of best practices and emerging technologies. Collaborate with researchers and industry experts to explore new pedagogical approaches and technologies. By implementing these recommendations, educational institutions and stakeholders can create a more conducive and satisfactory online learning environment for postgraduate students, ultimately contributing to their academic success and professional development.

5.3 Limitation and Further Study

While our study has provided valuable insights into the determinants of perceived usefulness and satisfaction among postgraduate students in the context of online learning in China, it is important to acknowledge certain limitations that can guide future research in this area. First, this study focused on a specific group of postgraduate students in Chengdu, Sichuan, China. Future research should aim to replicate these findings in diverse settings and with a broader range of student populations to assess the generalizability of the results. Second, while this study utilized established

measurement instruments, there may be room for the development of more context-specific and culturally adapted scales to measure perceived usefulness, satisfaction, and other variables related to online learning experiences. Third, this research primarily relied on quantitative data. Future studies could complement this approach with qualitative research methods, such as interviews or focus groups, to gain a deeper understanding of students' experiences and perceptions.

References

Aboelmaged, M. G. (2018). Predicting the success of Twitter in healthcare. *Online Information Review, 42*(6), 898-922.

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.

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

Bashir, I., & Madhavaiah, C. (2014). Determinants of Young Consumers' Intention to Use Internet Banking Services in India. *Vision: The Journal of Business Perspective, 18*(3), 153-163. https://doi.org/10.1177/0972262914538369

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). An empirical analysis of the antecedents of electronic commerce service continuance. *Decision Support Systems, 32*(2), 201-214.

Camarero, C., Rodríguez, J., & San José, R. (2012). An exploratory study of online forums as a collaborative learning tool. *Online Information Review, 36*(4), 568-586.

Cheng, Y.-M. (2014). Extending the expectation-confirmation model with quality and flow to explore nurses continued blended e-learning intention. *Information Technology & People, 27*(3), 230-258.

Cheng, Y.-M. (2019). How does task-technology fit influence cloud-based e-learning continuance and impact?. *Education + Training, 61*(4), 480-499.

Cheng, Y.-M. (2021). Can tasks and learning be balanced? A dual-pathway model of cloud-based e-learning continuance intention and performance outcomes. *Kybernetes, 51*(1), 210-240.

China Research Institute of Commerce and Industry. (2022, August 25). *Summary of the latest policies of China's online education industry in 2022 (Table).* https://www.askci.com/news/chanye/20220825/1752311968112.shtml

Cho, V., Cheng, T. C. E., & Lai, W. M. J. (2009). The role of perceived user-interface design in continued usage intention of self-paced e-learning tools. *Computers & Education, 53*(2), 216-227.

Choi, D. H., Kim, J., & Kim, S. H. (2007). ERP training with a web-based electronic learning system: The flow theory perspective. *International Journal of Human-Computer Studies, 65*(3), 223-243.

Chowdhury, T. I., Hoque, M. R., Wanke, P., Raihan, M. Z., & Azad, M. A. K. (2022). Antecedents of perceived service quality of online education during a pandemic: Configuration analysis based on fuzzy-set qualitative comparative analysis. *Evaluation Review, 46*(3), 235-265.

Davis, F. D. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. *MIS Quarterly, 13*(3), 319-339.

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.

Elmorshidy, A. (2018). The impact of knowledge management systems on innovation. *VINE Journal of Information and Knowledge Management Systems, 48*(3), 388-403.

Elshami, W., Taha, M. H., Abuzaid, M., Saravanan, C., Al Kawas, S., & Abdalla, M. E. (2021). Satisfaction with online learning in the new normal: Perspective of students and faculty at medical and health sciences colleges. *Medical Education Online, 26*(1), 192-199.

Fan, X., Duangekanong, S., & Xu, M. (2021). Factors Affecting College Students' Intention to Use English U-learning in Sichuan, China. *AU-GSB E-JOURNAL*, *14*(2), 118-129. https://doi.org/10.14456/augsbejr.2021.20

Foresight Industry Research Institute. (2018, January 25). *Analysis of the status quo of the online education industry in China.* https://bg.qianzhan.com/trends/detail/506/180125-7d48689d.html

Fornell, C., & Larcker, D. F. (1981). Evaluating structural equation models with unobservable variables and measurement error. *Journal of Marketing Research, 18*(1), 39-50. https://doi.org/10.1177/002224378101800104

Garcia, S. L., & Silva, C. M. (2017). Differences between perceived usefulness of social media and institutional channels by undergraduate students. *Interactive Technology and Smart Education, 14*(3), 196-215.

Garrison, D. R. (2003). Cognitive presence for effective asynchronous online learning: The role of reflective inquiry, self-direction and metacognition. In J. Bourne & J. C. Moore (Eds.), *Elements of quality online education: Practice and direction* (pp. 47-58). Sloan-C.

Hair, J. F., Money, A. H., Samouel, P., & Page, M. (2007). Researcher Methods for Business. *Education + Training, 49*(4), 336-337.

Hempel, C. G. (1945). Studies in the logic of confirmation. *Mind, 54*, 1-26.

Ifinedo, P. (2017). Students' perceived impact of learning and satisfaction with blogs. *The International Journal of Information and Learning Technology, 34*(4), 322-337.

Islam, A. Y. M. A., Mok, M. M. C., Xiuxiu, Q., & Leng, C. H. (2018). Factors influencing students' satisfaction in using wireless internet in higher education. *The Electronic Library, 36*(1), 2-20.

Lee, B. C., Yoon, J. O., & Lee, I. (2009). Learners' acceptance of e-learning in South Korea: Theories and results. *Computers & Education, 53*(4), 1320-1329.

Lee, J. W. (2010). Online support service quality, online learning acceptance, and student satisfaction. *The Internet and Higher Education, 13*(4), 277-283.

Lin, F., Fofanah, S. S., & Liang, D. (2011). Assessing citizen adoption of e-government initiatives in Gambia: A validation of the technology acceptance model in information systems success. *Government Information Quarterly, 28*(2), 271-279.

Marakarkandy, B., Yajnik, N., & Dasgupta, C. (2016). Enabling internet banking adoption an empirical examination with an augmented technology acceptance model (TAM). *Journal of Enterprise Information Management, 30*(2), 263-294.

Ngai, E. W., Poon, J. K. L., & Chan, Y. H. (2007). Empirical examination of the adoption of WebCT using TAM. *Computers and Education, 48*(2), 250-267.

Ortaçtepe, D. (2016). Using webcasts for student presentations: A case study. *The International Journal of Information and Learning Technology, 33*(1), 57-74.

Ozkan, S., & Koseler, R. (2009). Multi-dimensional students' evaluation of e-learning systems in the higher education context: An empirical investigation. *Computers & Education, 53*(4), 1285-1296.

Panigrahi, R., Srivastava, P. R., & Sharma, D. (2018). Online learning: Adoption, continuance, and learning outcome - A review of literature. *International Journal of Information Management, 43*, 1-14.

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

Radner, R., & Rothschild, M. (1975). On the allocation of effort. *Journal of Economic Theory, 10*(3), 358-376.

Rui, H. K., & Lin, C.-T. (2018). The usage intention of e-learning for police education and training. *Policing: An International Journal, 41*(1), 98-112.

Salimon, M. G., Mokhtar, S. S. M., Aliyu, O. A., Yusr, M. M., & Perumal, S. (2021). Solving e-learning adoption intention puzzles among private universities in Nigeria: An empirical approach. *Journal of Applied Research in Higher Education, 15*(3), 613-631.

Shah, H. J., & Attiq, S. (2016). Impact of technology quality, perceived ease of use and perceived usefulness in the formation of consumer's satisfaction in the context of e-learning. *Abasyn Journal of Social Sciences, 9*(1), 124-139.

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.

Soper, D. (2023). *Calculator: A-priori Sample Size for Structural Equation Models*. Daniel Soper. https://www.danielsoper.com/statcalc/calculator.aspx?id=89

Tan, X., & Kim, Y. (2015). User acceptance of SaaS-based collaboration tools: A case of Google Docs. *Journal of Enterprise Information Management, 28*(3), 423-442.

Tung, F.-C., & Chang, S.-C. (2008). Nursing students' behavioral intention to use online courses: A questionnaire survey. *International Journal of Nursing Studies, 45*(9), 1299-1309.

Wang, J., & Xiao, J. J. (2009). Buying behavior, social support and credit card indebtedness of college students. *International Journal of Consumer Studies, 33*(1), 2-10.

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

Yang, H., & Chung-Ho, S. (2017). Learner behaviour in a MOOC practice-oriented course: in empirical study integrating TAM and TPB. *International Review of Research in Open and Distance Learning, Athabasca, 18*(5), 35-63.