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A Quantitative Study on Factors Influencing College Students' Satisfaction with Cloud-Based Online Courses in Chengdu, China

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Abstract

Purpose: In the fierce market competition, education and training institutions seek to improve the satisfaction and perceived usefulness of cloud-based online courses to improve their survival and development. This study investigates the influencing factors of satisfaction with cloud-based online courses in Chengdu, China. **Research design, Data, and methodology:** The quantitative study will collect data through questionnaires from 503 undergraduate students with more than one year of experience in cloud-based online courses at a public university in Chengdu, China. The sampling methods are purposive, stratified random, and convenient. Before data collection, the index of item-objective congruence (IOC) and pilot test (n=50) were used to verify validity and reliability. The convergence validity and discriminant validity of the measurement model were evaluated by confirmatory factor analysis (CFA). The structural equation model (SEM) is used to test the influence of the measured variables, and the research conclusion is drawn. **Results:** Course content quality, perceived usefulness, system quality, information quality and service quality significantly influence on satisfaction. Moreover, perceived ease of use significantly influences perceived usefulness. **Conclusions:** Cloud-based online courses should be improved in the aspects of content quality, perceived usefulness, perceived ease of use, information quality, system quality, and service quality to improve satisfaction, and the market competitiveness.

Keywords : Cloud-Based Online Courses, Course Content Quality, Perceived Usefulness, System Quality, Satisfaction

JEL Classification Code: E44, F31, F37, G15

1. Introduction

In the context of the COVID-19 pandemic, Chinese schools are turning to cloud-based online courses, as instructed by China's Ministry of Education. As a result, the number of cloud-based online course-teaching users in China surged by 423 million in March 2020. Cloud-based teaching behaviors and habits remain even after students and teachers have returned to school. By now, cloud-based online courses have become a daily way of learning, and more people are using cloud-based online courses. The number of cloud-based online courses in China is expected to continue to rise until 2030, and the competition will become more intense. Major learning platforms should continuously improve the satisfaction of such courses to survive and develop in the fierce market competition (Swanson & Valdois, 2022).

Through this research, it can achieve the following three goals: First, promote the development of cloud-based online courses by educational and training institutions, which can play a huge role in completing learners' academic upgrading, passing qualification examinations, and improving professional skills (such learners are the benefit group). Secondly, the research results are also of great value to developing the course platform system providing better services for learners through research, such as developing a more simplified and easier-to-operate online course learning system, online testing tools, etc. Increase learners' perceived usefulness and satisfaction (both learners and learning platforms benefit). Third, the cloud-based online courses of major training institutions vary. Some tend to practical, some

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tend to theoretical learning, and so on. The results of this survey are aimed at theoretical learning courses in the liberal arts category (education and training institutions are the beneficiary groups), which can develop differentiated strategies in courses and provide better services for students.

The main objective of this study was to provide additional empirical evidence on the determinants of perceived usefulness and satisfaction of college students in Southwest China through cloud-based online courses offered by education and training institutions in Southwest China. Previous studies on cloud-based online courses mainly focus on courses of public universities, and few studies on the impact of cloud-based online courses in the platform of education and training institutions on learners through the quality of course content, perceived ease of use, information quality, system quality, perceived usefulness, and satisfaction. In addition, southwest China has its unique regional culture, which is different from other regions and needs to be studied separately. This study aims to provide valuable insights and lay the foundation for future reference and academic research.

2. Literature Review

2.1 Course Content Quality

Course Content Quality refers to the degree of adaptability instructors exhibit in facilitating collaborative activities and assessments, focusing on both the system and content quality. Lee (2008) discusses this notion of resilient content. Likewise, course quality refers to the subjective evaluation made by users about a cloud-based online course system, specifically about the degree to which the provided information aligns with their requirements (Adeyinka & Mutula, 2010). According to Lee (2006), Course Content Quality encompasses two key dimensions: material richness and regularity of updates.

The happiness of learners with the curriculum is greatly influenced by the richness of its material Arbaugh, 2000; (Burns et al., 1990). If the user perceives the cloud-based online courses system to possess a high level of content quality, the user will probably attribute a favorable influence on the content of the courses, thereby leading to the user's adoption of the system (Lee, 2006). According to Burns et al. (1990), Arbaugh (2000), and Chen et al. (20113), there is a strong correlation between the regular updating of cloud-based online course content by the cloud-based online courses system and a notable enhancement in learners' satisfaction. Therefore, a hypothesis is put forward:

H1: Course content quality has a significant influence on satisfaction.

2.2 Perceived Usefulness

Perceived Usefulness is the influence of cloud-based online course systems on users' learning outcomes, as Davis (1989) and Venkatesh and Davis (2000) discussed. Perceived Usefulness within the realm of cloud-based online courses pertains to the degree to which students believe that utilizing a cloud-based online courses system would enhance their academic achievements (Lee, 2006). Perceived Usefulness, as defined by Davis (1989), refers to the degree to which individuals consider that using a certain system can enhance their learning outcomes.

According to a study conducted by Saeed et al. (2003), it has been found that service quality has an impact on perceived usefulness and perceived ease of use. Pai and Huang (2011) claim that system service quality significantly impacts perceived usefulness. The impact of perceived usefulness on learners' acceptance and adoption of cloud-based online course systems is mediated by their perceived ease of use (Lee, 2006). The concept of personal perceived usefulness pertains to the individual's motivation derived from enhanced learning performance and the utilization of technology (Robey & Farrow, 1982). Therefore, a hypothesis is put forward:

H2: Perceived usefulness has a significant influence on satisfaction.

2.3 Information Quality

The concept of information quality, as defined by DeLone and McLean (1992, 2003), pertains to the capacity of a system to deliver accurate cloud-based online course information, facilitate user purpose, and offer a substantial quantity of learning materials. The system provides accurate and comprehensive information suitable for educational purposes, as described by Ahn et al. (2007) and Roca et al. (2006) regarding information quality. Information quality refers to how consumers view information as relevant, accurate, comprehensive, and timely (Lee et al., 2005).

The concept of information quality encompasses several aspects, including the accuracy, comprehensiveness, security, intelligibility, dependability, precision, and timeliness of the information output generated by a system (Cheng, 2012). Cheng (2012) posits that the perceived cloud-based online course system as simple and user-friendly encompasses two key elements. Firstly, it entails the provision of accessible learning materials by the information system for learners. Secondly, it involves the availability of meticulously crafted courses within the information system for learners. Numerous studies have indicated that the level of information quality plays a crucial role in influencing users' happiness with a system, which in turn impacts the usage of such a system (DeLone & McLean, 1992; Katerattanakul &

Siau, 1999; McKinney et al., 2002). Therefore, a hypothesis is put forward:
H3: Information quality has a significant influence on satisfaction.

2.4 System Quality

The term "system quality" in the context of cloud-based online courses pertains to the operational effectiveness, availability, ease of use, and inclusivity experienced by learners when utilizing the cloud-based online courses platform inside a given course (Cidral et al., 2018). System quality encompasses two key aspects: simplicity and task execution (Elkaseh et al., 2016). The concept of system quality refers to the evaluation of the information processing system itself (Chen, 2013).

DeLone and McLean (1992) assert that system quality encompasses several factors, such as query function, response time, file transfer speed, and hardware and software access speed. Furthermore, Sagar and Van der Zwaan (2006) highlighted that ease of use is associated with other aspects of system quality, such as security, dependability, support, selection of accessible environment, flexibility, and login simplicity. Hence, a system's quality directly impacts the perception of its simplicity of use. The utilization and satisfaction of learners in the cloud-based online courses information system model are influenced by system quality and Information Quality (DeLone & McLean, 1992; Seddon, 1997). Therefore, a hypothesis is put forward:
H4: System quality has a significant influence on satisfaction.

2.5 Service Quality

Baroudi and Orlikowski (1988) and Kim et al. (2008) propose that service quality pertains to the user's subjective evaluation of the comprehensive service quality offered by the information system. Within cloud-based online courses, service quality may be defined as the level of assistance and support given by instructors and support service personnel (Ozkan & Koseler, 2009). In Cheng (2012) article, service quality is defined as the discrepancy between the anticipated and observed perceived quality of the services rendered by the system.

According to a study conducted by Saeed et al. (2003), it has been found that service quality has an impact on perceived usefulness and perceived ease of use. Assessing the correlation between learner satisfaction and service quality is a viable approach for gauging learner satisfaction (Pitt et al., 1995). In addition, Athiyaman (1997) and Deshields et al. (2005) researched student satisfaction, focusing specifically on the relationship between service quality and customer satisfaction. Therefore, a hypothesis is put forward:
H5: Service quality has a significant influence on satisfaction.

2.6 Perceived Ease of Use

The idea of perceived ease of use originates in the TAM, and several research have operationalized it to assess user adoption of novel technologies (Elkaseh et al., 2016). The concept of perceived ease of use refers to individuals' beliefs of the likelihood of achieving success when utilizing the service offered by the designated system (Bashir & Madhavaiah, 2015). The concept of perceived ease of use was operationalized as the degree of certainty individuals had regarding the simplicity associated with the entire system (Chauhan, 2015). researchers have characterized perceived ease of use as the subjective perception of college students about the efficiency and convenience of Cloud-based online courses instructional technology (Neo et al., 2015).

Furthermore, Sagar and Van der Zwaan (2006) highlighted that several aspects of system quality, such as security, dependability, support, selection of accessible environment, flexibility, and login simplicity, significantly correlate with the ease of use. Hence, the quality of a system has a direct impact on the perceived ease of use. Venkatesh and Agarwal (2006) conducted a study that indicates that the convenience of use experienced by users is influenced to a great extent by factors such as system response time, document transfer speed, query function, software, and hardware access speed. Therefore, a hypothesis is put forward:
H6: Perceived ease of use has a significant influence on perceived usefulness.

2.7 Satisfaction

According to Oliver (1980), research shows that individuals tend to develop a positive perception of satisfaction when they perceive cloud-based online course offerings to provide greater value than initially anticipated. User satisfaction refers to the level of satisfaction experienced by individuals concerning the entire system, as defined by DeLone and McLean (2003). According to Sun et al. (2008), user satisfaction is a valuable metric for assessing the extent to which user expectations are met, indicating the success of a given endeavor.

Assessing the correlation between learner satisfaction and service quality is a viable approach for gauging learner satisfaction (Pitt et al., 1995). This study examines student happiness through the lens of customer satisfaction and service quality, drawing on Athiyaman's (1997) and Deshields et al. (2005) work. Rai et al. (2002) demonstrated

a favorable correlation between learner satisfaction and perceived usefulness and ease of use. According to Kettinger and Lee (1994), the key determinants of learner satisfaction in learning information systems are the dependability and empathy of service quality. Hayashi et al. (2004) state that perceived usefulness can greatly enhance user satisfaction.

3. Research Methods and Materials

3.1 Research Framework

This study aims to ascertain the conceptual framework of factors influencing cloud-based online courses' satisfaction and perceived utility. The University Student Survey reveals all research variables. The research framework was developed based on three core theories and previous theoretical frameworks. This study's conceptual framework was based on the theories of ECM, TAM, IS success model, and D & M IS model. The researchers concluded this investigation after establishing various connections. Yung-Ming Cheng (2020) developed the first previous research framework, which includes research on course content quality, perceived usefulness, and satisfaction. Cheng (2012) conducted the second study, which investigated perceived usefulness and ease of use. Chang (2013) conducted the third study, which examines system, information, and service quality.

This study has independent, moderating, and dependent factors. Polit et al. (2001) state that studies seek to determine the source of phenomena. In the causality model, the independent variable is the cause, and the dependent variable is the effect. If a change in the value of one variable affects another variable, the variable is an independent variable, and the affected variable is a dependent variable. The intermediate variable is affected by the independent Variable, thus affecting the dependent variable. (Flannelly et al., 2014). This study's independent variables were course content quality, perceived ease of use, Information quality, system quality, and service quality. The dependent variable is satisfaction. The intermediate variable of perceived usefulness is the modulator of this study (Farooq & Vij, 2018). The research framework is shown in Figure 1.

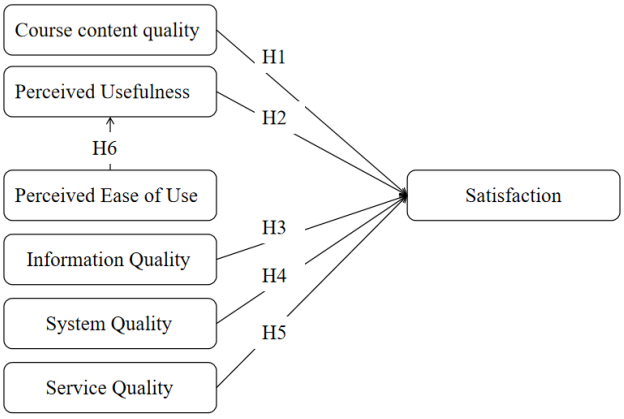

Figure 1: Conceptual Framework

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

3.2 Research Methodology

This study surveyed undergraduates with more than one year of cloud-based online course learning experience in a public undergraduate university in Chengdu, China, in 2022. Research Ethics states that respondents consent to the use of data and that no personal data is involved. The questionnaire is divided into screening questions, measurement variables, and demographic questions. The five-point Likert Scale measured the variables (Likert, 1932). The questionnaire was distributed to over two thousand participants, and 503 usable responses were obtained. Finally, the confirmatory factor analysis (CFA) and structural equation model (SEM) were analyzed by statistical software.

Before collecting data, the research team conducted a thorough assessment of the measurement tool's quality, which included an Item-Objective Congruence (IOC) evaluation and a pilot test. The IOC assessment was performed by a panel of three experts, and all items surpassed the acceptable threshold of 0.6, demonstrating their alignment with the research objectives. Subsequently, a pilot test involving 50 participants was carried out to gauge the measurement tool's reliability. The results indicated that the measurement tool met the required standards, with a Cronbach's alpha

coefficient equaling or exceeding 0.60, signifying a satisfactory level of structural quality (Nunnally & Bernstein, 1994).

3.3 Population and Sample Size

Weathington et al. (2012) believed that the target population is a complete set of elements related to research. The target population of this study is undergraduates with more than one year of cloud-based online course learning experience in a public undergraduate university in Chengdu, China, in 2022 (composed of three majors: law, management, and art theory). Kotler and Armstrong (2016) point out that sample size refers to the total number of sample elements extracted from the population. In addition, this study used a calculator developed by Soper (2015) to calculate the appropriate sample size, with a recommended minimum sample size of 425. However, Hair et al. (2010) pointed out that the appropriate sample size depends on the density measured by the model. Therefore, over two thousand questionnaires were distributed to the target population, and 503 valid questionnaires were ultimately used.

3.4 Sampling Technique

Quantitative methods were used for data collection and subsequent analysis. Researchers use probability sampling and non-probability sampling as sampling techniques. In addition, the sampling process of this study is divided into three steps: purposive sampling, stratified random sampling, and convenience sampling. First, we conducted an objective sample of undergraduates (composed of three majors: law, management, and art theory) with more than one year of cloud-based online course learning experience in a public undergraduate university in Chengdu, China. Then, stratified random sampling was used to collect data proportionally, as shown in Table 1. After obtaining the consent of the interviewed schools and students, the researchers distributed online questionnaires to the participants through email, social media, WeChat, and other means in a convenience sampling method.

Table 1: Sample Units and Sample Size

Target Group	Population Size	Proportional Sample Size
Art theory	420	80
Management	750	143
Law	1468	280
Total	2638	503

Source: Constructed by author

4. Results and Discussion

4.1 Demographic Information

As shown in Table 2, of the 503 respondents, 121 were male (24.05%), and 382 were female (75.95%). Most were aged 18-22, with 332, accounting for 66%. The next is 23-24 years old, with 107 people, accounting for 21.47%. The proportion of 25-28-year-olds is the lowest, with 64 people accounting for 12.53%. 80 students majored in art theory, accounting for 16%, 142 students majored in management, accounting for 28.42%, and 278 students majored in law, accounting for 55.58%. Regarding academic qualifications, all undergraduates have over one year of cloud-based online course learning experience.

Table 2: Demographic Profile

Demographic and General Data (N=503)		Frequency	Percentage
Gender	Male	121	24.05%
	Female	382	75.95%
Age	18-22	332	66%
	23-24	107	21.47%
	25-28	64	12.53%
Major	Art theory	80	16%
	Management	143	28.42%
	Law	280	55.58%

4.2 Confirmatory Factor Analysis (CFA)

Alkhadim et al. (2019) see CFA as a key method for analyzing all expected variables in a structural model. Table 3: Cronbach's Alpha was used to test the reliability of the questionnaire. In this study, all structures were reliable, with alpha coefficient values greater than 0.7 for each group. Developed by Jöreskog (1971) for confirmatory factor analysis, CFA was used to evaluate the convergence and discriminant effectiveness of the measured model. Byrne (2010) also points out that convergence validity and different validity are two methods of construct validity, which CFA can verify. In this study, factor loading, mean-variance extraction (A VE), and complete reliability (CR) are usually used to test the convergence validity of the conceptual model (Hair et al., 2013). In this study, factor load values of all variables were greater than 0.5, and P-values less than 0.05 were considered acceptable (Hair et al., 2013). In addition, the CR values of all variables are greater than 0.7, and the AVE values of all variables are greater than 0.5.

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

Variables	Source of Questionnaire (Measurement Indicator)	No. of Item	Cronbach's Alpha	Factors Loading	CR	AVE
Course content quality (CCQ)	Cheng (2020)	3	0.826	0.543-0.962	0.749	0.517
Perceived Usefulness (PU)	Cheng (2020)	4	0.880	0.698-0.909	0.887	0.665
Information Quality (IQ)	Chang (2012)	6	0.893	0.631-0.882	0.900	0.603
System Quality (SYQ)	Cheng (2012)	4	0.841	0.633-0.865	0.845	0.579
Service Quality (SEQ)	Cheng (2012)	3	0.869	0.818-0.837	0.870	0.690
Perceived Ease of Use (PEOU)	Cheng (2012)	4	0.846	0.618-0.900	0.861	0.614
Satisfaction (SAT)	Cheng (2020)	4	0.895	0.712-0.901	0.898	0.688

Brown (2015) pointed out whether the measurement model between observed variables and potential variables in the model is consistent with the observed data can be tested by Confirmatory factor analysis (CFA). Ainur et al. (2017) model fit degree can be measured using Good-of-Fit (GOF). As can be seen from Table 4, the value of GOF is CMIN/DF = 843.721/329 or 2.565, GFI = 0.901, AGFI = 0.878, NFI=0.905, CFI = 0.939, TLI = 0.930, RMSEA = 0.056.

Table 4: Goodness of Fit for Measurement Model

Fit Index	Acceptable Criteria	Statistical Values
CMIN/DF	< 5.00 (Al-Mamary & Shamsuddin, 2015; Awang, 2012)	843.721/329 or 2.565
GFI	≥ 0.85 (Sica & Ghisi, 2007)	0.901
AGFI	≥ 0.80 (Sica & Ghisi, 2007)	0.878
NFI	≥ 0.80 (Wu & Wang, 2006)	0.905
CFI	≥ 0.80 (Bentler, 1990)	0.939
TLI	≥ 0.80 (Sharma et al., 2005)	0.930
RMSEA	< 0.08 (Pedroso et al., 2016)	0.056
Model Summary		**Acceptable Model Fit**

Remark: CMIN/DF = The ratio of the chi-square value to degree of freedom, GFI = Goodness-of-fit index, AGFI = Adjusted goodness-of-fit index, NFI = Normed fit index, CFI = Comparative fit index, TLI = Tucker-Lewis index, and RMSEA = Root mean square error of approximation

Fornell and Larcker (1981) pointed out that for discriminant validity to be confirmed, the square root of AVE must be greater than any of the interrelated construction coefficients. In this study, the square root of all AVE values is greater than the understructure correlation. Therefore, the measurement model can accept discriminant validity. See Table 5.

Table 5: Discriminant Validity

	CCQ	PU	PEOU	IQ	SYQ	SEQ	SAT
CCQ	**0.719**						
PU	0.45	**0.815**					
PEOU	0.405	0.341	**0.784**				
IQ	0.411	0.297	0.252	**0.777**			
SYQ	0.337	0.282	0.284	0.281	**0.761**		
SEQ	0.424	0.32	0.236	0.309	0.168	**0.831**	
SAT	0.348	0.288	0.237	0.26	0.236	0.244	**0.829**

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

4.3 Structural Equation Model (SEM)

According to Zhang et al. (2007), SEM is the statistical method for analyzing the relationship between variables based on a variable covariance matrix. The well-fitting index is shown in Table 6. The statistical values were CMIN/DF = 3.177, GFI = 0.851, AGFI = 0.817, NFI= 0.881, CFI = 0.915, TLI = 0.903, RMSEA = 0.066. In summary, the fitting of the structural model can be determined from the above values.

Table 6: Goodness of Fit for Structural Model

Index	Acceptable	Statistical Values
CMIN/DF	< 5.00 (Al-Mamary & Shamsuddin, 2015; Awang, 2012)	1051.500/331 or 3.177
GFI	≥ 0.85 (Sica & Ghisi, 2007)	0.851
AGFI	≥ 0.80 (Sica & Ghisi, 2007)	0.817
NFI	≥ 0.80 (Wu & Wang, 2006)	0.881
CFI	≥ 0.80 (Bentler, 1990)	0.915
TLI	≥ 0.80 (Sharma et al., 2005)	0.903
RMSEA	< 0.08 (Pedroso et al., 2016)	0.066
Model Summary		**Acceptable Model Fit**

Remark: CMIN/DF = The ratio of the chi-square value to degree of freedom, GFI = Goodness-of-fit index, AGFI = Adjusted goodness-of-fit index, NFI = Normed fit index, CFI = Comparative fit index, TLI = Tucker-Lewis index, and RMSEA = Root mean square error of approximation

4.4 Research Hypothesis Testing Result

According to Lefcheck et al. (2021), structural equation models can distinguish between measurement and structural models. The structural equation model combines the measurement structure in factor analysis with the path analysis framework by setting potential and unobserved structures. The observation variables of the measurement concept come from the former. The latter constructs relationships between constructs and incorporates mediation pathways into the structural model. Meanwhile, the path coefficient measures the correlation between external and internal potential variables in the structural equation model. As can be seen from Table 7, the hypothesis test results support H1, H2, H3, H4, H5 and H6.

Table 7: Hypothesis Results of the Structural Equation Modeling

Hypothesis	(β)	t-value	Result
H1: CCQ→SAT	0.126	2.601*	Supported
H2: PU→SAT	0.189	4.004*	Supported
H3: IQ→SAT	0.109	2.372*	Supported
H4: SYQ→SAT	0.150	3.069*	Supported
H5: SEQ→SAT	0.119	2.460*	Supported
H6: PEOU→PU	0.159	3.650*	Supported

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

H1: Course content quality significantly impacts the satisfaction of cloud-based online courses, with a standardized path coefficient of 0.126 and a T-value of 2.601*. Successful course content quality leads to learner satisfaction with cloud-based online courses. It represents that when the course content provided by the cloud-based online course system is useful, comprehensive, and accurate, users will have a deeper understanding of the course content and be more satisfied with the e-learning system (Kim et al., 2008). Sharma et al. (2005) said that if lecturers cannot obtain the latest information, courses cannot be updated in time, the quality of course content will also decline, and users' satisfaction will decline. This is consistent with the findings of Ohliati and Abbas (2019), who also pointed out that the quality of course content affects learner satisfaction.

H2: Perceived usefulness significantly influences satisfaction with the cloud-based online courses, with a standardized path coefficient of 0.189 and a T-value of 4.004*. This suggests that perceived usefulness has a positive effect on satisfaction. Rai et al. (2002) also proved the evaluation results of the Seddon IS Success Model (Seddon, 1997), and perceived usefulness has a significant positive impact on user satisfaction. The perceived usefulness of cloud-based online courses system is a significant predictor of learner satisfaction (Lee, 2010; Lin & Wang, 2012). Furthermore, Cheng (2020) found that their perceived usefulness positively influences the satisfaction of cloud-based online course systems. The conclusion that "the perceived usefulness of course software has a significant impact on users' satisfaction with online courses" is corroborated by the research of Arbaugh (2000). Similarly, user satisfaction is found to be substantially influenced by perceived usefulness in Seddon (1997), Alsabawy et al. (2011), and Limayem and Cheung (2008).

H3: Information quality significantly influences satisfaction with the cloud-based online courses. The standardized path coefficient is 0.109, and the t value is 2.372*. This is consistent with Chen and Chen (2010) study on the relationship between information quality and perceived usefulness in the online course system, and Lwoga (2014) also reached a similar conclusion. According to previous research, learners' perception of quality, such as information quality, is necessary for overall satisfaction (Chen & Chen, 2010; DeLone & McLean, 2003).

Roca et al. (2006) found that the higher the information quality, the higher the satisfaction of e-learning system consumers. Saeed and Abdinnour-Helm (2008) argue that improving information quality can help users make accurate judgments and improve their productivity. Therefore, increased information quality will increase satisfaction with cloud-based online courses.

H4: System quality significantly impacts the satisfaction of cloud-based online courses. The standardized path coefficient is 0.150, and the T-value is 3.069*. According to previous research, the perception of quality by learners, such as system quality, is a prerequisite for overall satisfaction (Chen & Chen, 2010; DeLone & McLean, 2003; Seddon, 1997). According to the research, users with high levels of satisfaction may concur that a high-quality e-learning system enhances their learning experience (classroom performance). Seddon and Kiew (1994) evaluated several D&M IS Success Models developed by Delone and McLean. The findings indicate that system quality has a substantial effect on learner satisfaction. This is consistent with the findings of Roca et al. (2006), who also pointed out that system quality affects learner satisfaction.

H5: Service quality significantly influences satisfaction with cloud-based online courses. The standardized path coefficient is 0.119, and the T-value is 2.460*. According to prior research, learners' perception of quality, such as service quality, is necessary for overall satisfaction (Chen & Chen, 2010; DeLone & McLean, 2003; Seddon, 1997; Sun et al., 2008; Wu & Wang, 2006). DeLone and McLean (2003) postulated a direct correlation between service quality and learner satisfaction in their model. Whether it is an e-learning system or an information system, the quality of service provided by technicians can positively affect the satisfaction of the learners with the system. Measuring the relationship between service quality and user satisfaction is an effective method for measuring user satisfaction (Pitt et al., 1995). At the same time, Athiyaman (1997) and Deshields et al. (2005) also confirmed that service quality directly affects learners' satisfaction with online courses.

H6: Perceived ease of use significantly influences the perceived usefulness of cloud-based online courses. The standardized path coefficient is 0.159, and the T-value is 3.650*. If the user believes that the system for online learning in the e-learning environment is simple, the user believes that the e-learning system has advantages. In other words, the easier users interact with e-learning systems, the more likely they find e-learning systems useful (Lee et al., 2005; Ong et al., 2004; Saade & Bahli, 2005; Stoel & Lee, 2003;). In

addition, Wu and Chen (2005) also argue that if learners perceive an online learning system as easy to use, they will perceive the service as beneficial.

5. Conclusion and Recommendation

5.1 Conclusion and Discussion

Because of the importance of educational and training institutions to monitor and analyze the satisfaction of cloud-based online courses, this study aims to explore the factors that affect the perceived usefulness and satisfaction of college students in Chengdu on cloud-based online courses. The conceptual framework is developed from the three core theories and previous theoretical frameworks. The variables of the conceptual framework include course content quality, perceived usefulness, perceived ease of use, information quality, system quality, and service quality and satisfaction. In addition, the researchers put forward six hypotheses corresponding to the research questions. Then, a preliminary experiment was conducted on 50 questionnaires, and the validity and reliability of the questionnaires were tested using the project objective consistency index (IOC) and Cronbach's alpha—probabilistic and non-probabilistic sampling techniques collected data from 500 patients in Chengdu, China. In addition, confirmatory factor analysis (CFA) was used to evaluate the measurement model's convergence and discriminant validity. The structural equation model (SEM) was used to test the influence of the measured variables, and the research conclusion was drawn.

The results of this study can be described as follows. First, the results of this study show that the perceived usefulness of cloud-based online courses has a positive and significant impact on learners' satisfaction. Seddon (1997) believes that learners' satisfaction depends on the perceived usefulness of online education. The research conducted by Rai et al. (2002) shows a good correlation between learners' satisfaction and perceived usefulness. Therefore, attention should be paid to improving the perceived usefulness of cloud-based online courses. Secondly, perceived ease of use has the greatest impact on perceived usefulness. Research conducted by Rai et al. (2002) shows a good correlation between learners' satisfaction and perceived usefulness and between perceived usefulness and grateful ease of use. Selim (2003) also believes that the main factor affecting the perceived usefulness and efficiency of learning technologies is the degree of user-friendliness demonstrated by cloud-based online courses, that is, perceived ease of use. Thirdly, system quality positively and significantly impacts learners' satisfaction. The study by Machado et al. (2014) revealed a significant relationship between system quality and user satisfaction in online course systems. Subsequently, Aparicio et al. (2017) and Urbach and Ahlemann (2010) also showed evidence that system quality positively impacts learner satisfaction. Therefore, improving system quality should be strengthened to improve the satisfaction of cloud-based online courses. The content quality of cloud-based online courses positively and significantly impacts learners' satisfaction. According to Lee et al. (2005), the quality of course content tested is an integral part of the overall quality of course materials, and it has been found to have a favorable impact on user satisfaction.

Therefore, attention should be paid to improving the quality of cloud-based online courses. Service quality and information quality also significantly impact the satisfaction of cloud-based online courses. The primary outcome of Mtebe and Raphael (2018) research indicates that service quality is the most influential factor in determining users' satisfaction with online course systems. This conclusion aligns with previous studies done by Ssekakubo et al. (2011), Sun et al. (2008), and Tella (2012). Numerous studies have indicated that the level of information quality plays a crucial role in influencing users' happiness with a system, which in turn impacts the usage of such a system (DeLone & McLean, 1992; Katerattanakul & Siau, 1999; McKinney et al., 2002). The impact of system quality and information quality on the use and satisfaction of learners is seen in the effective online courses information system model (DeLone & McLean, 1992; Seddon, 1997). Therefore, these results indicate that service quality and information quality should be strengthened to improve the satisfaction of cloud-based online courses.

In conclusion, the determinants of cloud-based online course satisfaction are perceived usefulness, course content quality, system quality, service quality, and information quality. Moreover, perceived ease of use is key to predicting perceived usefulness.

5.2 Recommendation

The researchers investigated the factors influencing college students' usefulness and satisfaction with online courses (cloud-based online courses) of education and training institutions in Southwest China in terms of seven dimensions: course content quality (CCQ), perceived usefulness (PU), perceived ease of use (PEOU), information quality (IQ), system quality (SYQ), service quality (SEQ), and satisfaction (SAT).

To better obtain students' satisfaction with online courses. All key factors should be developed and promoted. In this study, perceived usefulness is the strongest predictor of students' satisfaction with using online courses in this study. Therefore, that factor determines student satisfaction with online courses and helps strengthen and promote the system's usefulness. Also, if students perceive that online courses are helpful to their learning and can be a tool to assist them, they

will be more likely to use the technology. The quality of information, the quality of the system, and the quality of service should be ensured by the instructor and the training organization at the later stages of course development. Online courses should be guaranteed to be characterized by flexible learning and rich content. Therefore, before the use of educational institutions, the service level of practitioners should be strengthened in terms of system maintenance and background management so that students can use online courses more efficiently to improve their learning efficiency. Only when students experience that online courses are highly useful and practical, with a simple operation interface and other factors in the learning process, can students' recognition and promotion of the system be improved? So that students' satisfaction with the online course is enhanced.

To summarize, the researchers carefully described the factors influencing college students' usefulness and satisfaction with online courses (cloud-based online courses) in educational and training institutions. It provides a reference point for course developers and decision-makers in higher education institutions at a later stage so that it can be applied to justify higher education institutions in this project.

5.3 Limitation and Further Study

Although this study found some interesting findings, certain limitations need to be noted, and the following are recommendations for further research. First, the field of this study is cloud-based online courses in educational and training institutions. It has the common characteristics of general online courses. However, it is only for online courses in educational and training institutions, which is very different from the online courses in universities. Secondly, this study is aimed at Chengdu, China. As the politics, economy, culture, and technology of Chengdu are unique compared with other regions in China, its population's lifestyle, working habits, and learning habits will also be different from those of other regions. Therefore, this study does not apply to online courses offered by universities. As for whether it applies to other regions, it is also necessary to look at the research reports in different regions.

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