

The Impact of Online Learning Service Quality on Student Satisfaction and Loyalty during the COVID-19 pandemic

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Abstract

This study is undertaken to identify the factors affecting students' satisfaction and loyalty concerning online learning service quality during the COVID-19 pandemic and to investigate the relationship existing between these variables. The target population was the students of Hunan University. Data were collected using a Self-administered questionnaire by 323 students who were subjected to structural equation modeling for analysis of the proposed hypotheses. Findings revealed that five independent variables utilized in this study viz. perceived ease of use, reliability, responsiveness, empathy, assurance positively impact on student's satisfaction except for the factor of responsiveness. Thus, according to the results of this study, there is insufficient evidence of the effect of responsiveness on the satisfaction and loyalty of students. Meanwhile, results also revealed that student satisfaction positively impact on students' loyalty. All these findings will bring more ideas into online learning during the COVID-19 pandemic. For higher education institutions these five factors are important to have a high standard of satisfaction and loyalty for online learning platforms.

Keywords: COVID-19 · Online Learning · Online Service Quality · Student Satisfaction · Student Loyalty · Higher Education Institutions.

INTRODUCTION

Since December 8, 2019 there was an outbreak of pneumonia of unknown etiology have been affirmed in Wuhan city, Hubei province, China (Huang et al., 2020; Hui et al., 2020; Lu et al., 2020; WHO, 2019a). In the early phases of this pneumonia, severe acute respiratory infection symptoms happened, with some patients rapidly developing acute respiratory distress syndrome (ARDS), acute respiratory failure, and other severe complications (Chen et al., 2020).

On January 7, 2020, the China Center for Disease Control and Prevention (CDC) was identified a new type of a novel coronavirus from the throat swab sample of a patient, originally named 2019-nCoV by the World Health Organization (WHO) (Harapan et al., 2020; Hui et al., 2020). On 11 February 2020,

WHO renamed the disease Coronavirus Disease 2019 (COVID-19). On the 11 of March 2020, COVID-19 was declared a pandemic by the WHO due to its spread and severity (Maqableh & Alia, 2021; WHO, 2020b). The COVID-19 pandemic has become the worst global health crisis of the 21st century. This pandemic has disrupted our normal way of life, generating frustration, unprecedented social exclusion, and a range of other concerns; it also affected more than 1.5 billion students across worldwide (UNESCO, 2020). In order to curb the spread of the COVID-19 pandemic, most educational institutions in the world have been closed since March 2020 (Jiang et al., 2021). In late January 2020, China's educational institutions were closed to reduce the spread of the covid-19 pandemic (Jiang et al., 2021; Zhu & Peng, 2020). In an effort to mitigate the

outbreak, the Ministry of Education of the People's Republic of China issued an emergency policy called "Suspending Classes Without Stopping Learning" to convert teaching activities into large-scale online platforms at home while schools were closed on January 29 (Ministry of education, 2020a; Zhang et al., 2020). In the same vein, Chinese colleges and universities closed their campuses and shifted from traditional learning to online learning during the COVID-19 Pandemic. In whole the country between January 29 and April 3 (Jiang et al., 2021; R. Yang, 2020). The outbreak of COVID-19 has had an unprecedented impact on all aspects of society, especially increasing the challenges of online learning for students. Beckstein (2020), reported that the educational landscape for millions of university students around the world has drastically changed due to the pandemic. Therefore, universities of China issued strict rules for the students to prevent the transmission of the virus in the university community under the government policies of COVID-19 (Fakhar-e-Alam Kulyar et al., 2020). According to the Ministry of Education (2020b), more than 950 million university teachers supplied over 942 Million online courses and 7.133 million lectures on online learning platforms, university students have attended these online courses and lectures 1.18 billion times.

Based on modern technology, online learning platforms have supported and assisted students to access learning materials, learning practice, and learning activates for free to succeed the online learning education during COVID-19 Pandemic (Sari & Oktaviani, 2021). Additionally, Colleges and universities adopted different teaching techniques such as video recorded lectures, audio, direct online lectures, blended learning, and shared online materials (Favale et al., 2020; Maqableh & Alia, 2021). Unfortunately, some higher educational institutions do not offer online learning before Covid-19, so find it difficult to navigate through the steps that are needed to provide such courses and programs. In contrast, many higher educational institutions offer online learning before Covid-19, find it easy to provide such courses and programs (Fidalgo et al., 2020; Maqableh & Alia, 2021). Higher educational institutions in china have conducted online learning by optimizing online learning education platforms as a supporting learning

tool. In addition to the collaboration tools that are already in place, educational tool providers are also playing an essential role in providing education systems with online resources to facilitate teachings, such as live streaming platforms, video conferencing, chatting rooms, and online tests (C. Wang, 2020). For higher education institutions, it could lead to more effective online training programs; for online learning providers, it could help in differentiating their products; For students, this could lead to greater satisfaction with the online courses (Udo et al., 2011). In higher educational institutions student's satisfaction is considered of as a prime determinant of online learning programs that precedes student loyalty (Borishade et al., 2021). Furthermore, universities must try their utmost to provide best educational service quality for students, which

ultimately will make students satisfied and loyal to their university (María-Jesús Martínez-Argüelles and Josep-Maria Batalla-Busquets, 2016; L. Pham et al., 2019; Stodnick & Rogers, 2008b). In order to make the universities profitable and thrive, student satisfaction and loyalty are essential; with the highest services quality education related to online learning can help universities improve student satisfaction and loyalty in the pandemic situation of COVID-19 (Shehzadi et al., 2021). Indeed, regarding online learning services quality, student satisfaction and loyalty is a key aspect. Therefore, several of the higher educational institutions are considering them as a viable tool to attract the students. In other words, today's students are regarded as customers of educational institutions and educational institutions (universities) need effective measures to retain their satisfaction and loyalty. In recent years, with the prevalence of internet technology, online learning has become one of the essential educational technologies in educational institutions. Hence, previous studies have shown that students' familiarity with the use of Technology and their views of how to benefit from online learning systems affect student satisfaction (Changchit, 2007; Hammoud et al., 2008; Liu et al., 2009; Mitchell et al., 2005). Nevertheless, the success of online learning system largely depends on the student satisfaction and loyalty of such system, yet the success of these online learning courses varies considerably (Salloum & Shaalan, 2018; Uppal et al., 2018). furthermore, Many research studies

had been carried out on online learning to explore satisfaction and performance of students, online learning acceptance, students Reactions, and perceived online learning engagement, and student satisfaction (El-Sayad et al., 2021; Gopal et al., 2021; Kuoka et al., 2020; Lee, 2010). In the present study, the authors adopt the version of SERVQUAL used by Udo et al (2011) because it is the most comprehensive scale that has been modified to reflect an online learning environment. However, the authors replace “Tangibles” with perceived ease of use (POU) which used by Lee (2010) to more appropriately reflect the online learning environment. Students’ satisfaction and loyalty concerning online education is vital in determining the success of online learning. Besides, other factors such as Perceived ease of use, reliability, responsiveness, empathy, assurance will influence this experience. However, scant amount of literature is available on the factors that affect the students’ satisfaction and loyalty in online learning during Covid-19 crisis. Therefore, our study aimed to investigate Hunan university students’ Perceived ease of use, reliability, responsiveness, empathy, assurance, satisfaction, and loyalty regarding online learning during the Covid-19 pandemic. The rest of the paper is structured as follows; the second part provides a description of the existing literature review. The third part describes the Conceptual framework and puts forward different research hypotheses. The fourth part deals with research methodology in particular; the design; the instrument; and the sample. The fifth part introduces the data analysis and results of the study. Finally, the paper concludes with a discussion; conclusions; Implications of the study; and limitations of the research and future research.

Literature review

Online learning and service quality (SERVQUAL)

Over two decades, online learning as a keyword and as a concept has consistently been a focus of education research (Singh & Thurman, 2019). According to Curtain (2002), Online learning can be broadly defined as “the use of the internet in some way to enhance the interaction between teacher and student. Online delivery covers both

asynchronous forms of interaction such as assessment tools and the provision of web-based course materials and synchronous interaction through email, news groups, and conferencing tools, such as chat groups. It includes both classroom-based instruction and as well as distance education modes. Other terms synonymous with online learning are web-based education’ and e-learning. Based on this definition, several arguments are given in support of online learning. Some of these are affordable, flexible, and accessible (Faize & Nawaz, 2020). This kind of learning setting can increase students' learning potential. Students can study anywhere and anytime at their convenience(Dhawan, 2020). Online learning service quality refers to the quality of personal support services provided through the online learning system such as course selection, financial aid by institutions, help with online registration, and online technical support services by online support service coordinators, and timely feedback by faculty. This means that the service quality of online learning evaluates the student support services provided by online education service providers, online student service coordinators, and faculty (Lee, 2010). SERVQUAL is an abbreviation for “Service Quality”. It is a method of assessing the service quality. Parasuraman et al(1988) introduced SERVQUAL model to measure service quality in various industries. Initially, they Included 10 dimensions into their exploratory study which included tangible features, courteousness responsiveness, security/safety, competence, credibility, reliability, communication, convenience, and understanding with the customer. However, after analyzing the results subsequently advanced the SERVQUAL measure which comprises 22 dimensions in five measurements scale. These scales consist of the following dimensions (Parasuraman et al., 1988):

- 1) “Tangibles” which include the physical facilities, equipment, and appearance of personnel.
- 2) “Reliability” which reflects the ability to perform the promised service dependably and accurately.
- 3) “Responsiveness” which include the willingness to help customers and provide prompt service.

- 4) “Assurance” which is an indication of the knowledge and courtesy of employees and their ability to inspire trust and confidence; and
- 5) Empathy which includes caring and individualized attention that the service firm provides to its customers.

The SERVQUAL model has been utilized in various service industries to measure the service quality such as hotel (Akbaba, 2006; Azeem & Navaneetha, 2020; Saeed et al., 2021), banking (Salleh et al., 2019; Sugiarto & Octaviana, 2021), restaurant (Bojanic & Drew Rosen, 1994; Dusica & Kortoseva, 2018), hospital (Al-Neyadi et al., 2018; Jebrailey et al., 2019), and higher education (Borishade et al., 2021; Stodnick & Rogers, 2008b). Besides that, the model has been modified and applied in various online environment contexts, including online learning (Udo et al., 2011), online shopping (G. Lee & Lin, 2005), online banking (JAVED et al., 2018; Raza et al., 2020), and so forth. Several researchers have utilized this measurement model in online learning environment (Ivanaj et al., 2019; Ku & Park, 2010; Saxena et al., 2021; Uppal et al., 2018). Stodnick and Rogers(2008a) who used the SERVQUAL factors in their study, shown that the SERVQUAL scale exhibited both reliability and convergent and divergent validity. They found that only three SERVQUAL factors (assurance, empathy, and reliability) were true predictors of measuring the quality of e-learning and student satisfaction. In the addition to the SERVQUAL scales, some other variables such as learning content, perceived ease of use, and web content were also tested to examine the online learning service quality(Lee, 2010; Udo et al., 2011; Uppal et al., 2018). Therefore, the most common factors in online learning have tested are reliability, responsiveness, assurance, empathy, website content, perceived ease of use, and learning content. Last but not least, the SERVQUAL has been widely accepted as an effective scale for measuring customer satisfaction and loyalty in multiple areas of interest, it has not been applied to the educational environment until recently (Borishade et al., 2021; Mansori et al., 2014; Stodnick & Rogers, 2008b; Udo et al., 2011; Uppal et al., 2018). Although SERVQUAL has become a dependable customer-driven scale used to gauge customer satisfaction and loyalty in a range of various industries. Therefore,

examining the mediating effect of student satisfaction in higher education is important to understand the nature of online learning during the COVID-19 pandemic which may be different from classroom learning in absence of any pandemic.

Student satisfaction

Numerous attempts have been made by researchers to define the concept of satisfaction. According to Lin et al (2008), a satisfaction can be define as a desirable outcome of any product or service experience. Kunanusorn and Puttawong (2015), likewise, proposed that satisfaction is an emotional reaction to the difference between what customer foresee and what they get or an overall customer attitude towards a service provider. Furthermore, Wu et al (2010) define the learning satisfaction as “the sum of student’s behavioral beliefs and attitudes that result from aggregating all the benefits that a student receives from using blended e-learning system (BELS)”. Many studies seem to conclude that satisfaction is an affective construct rather than a cognitive construct (Kuo et al., 2009; Olsen, 2002; Rust & Oliver, 1994; Wang & Liao, 2007).

The concept of customer satisfaction was first introduced in the field of marketing by Cardozo(1965), proposed that customer satisfaction would increase repurchase behavior. Elliott & Healy (2001), stated that student satisfaction is accepted as a short-term attitude that outcomes from the evolution of their educational experience. Bolliger and Martindale(2004) also asserted that student gratification is the student’s perception pertaining to the university experience and perceived value of the education received while attending an educational institution. In a traditional learning setting, student satisfaction is influenced by several factors such as contact with instructors, social life on campus, availability of career advisors, overall relationships with university and administrators (Magolda & Astin, 1993). Meanwhile, Bean and Bradley (1986) indicated that student satisfaction influenced by the following predictors such as academic integration, usefulness of education, difficulty of the program, institutional fit, and social life. In their study of the quality of online learning, Udo et al (2011) identified the following elements, which lead to student satisfaction: (1) assurance, (2)

empathy, (3) responsiveness, (4) reliability, and (5) web site content.

Student loyalty

The concept of customer loyalty is understood as “a combination of customers’ favourable attitude and the behaviour of repurchase” (Kim et al., 2004). According to Annamdevula and Bellamkonda (2016), Customer loyalty can be viewed as the strength of the relationship between an individual's relative position and repeated favoritism. Student loyalty plays a significant role in sustainable development in higher educational institutions (Kilburn et al., 2016), and assists university administrators to set up suitable programs that promote, establish, develop and sustain successful long-term relationships with former and current students (Annamdevula & Bellamkonda, 2016), it is also a key element in achieving success in the competitive market (Chen, 2016). Furthermore, Perceived online service quality has a direct impact on student satisfaction, which leads to student loyalty (Argüelles and Busquets, 2016). service quality, student satisfaction, and loyalty, these three elements support students’ trust that their higher educational institutions (HEI) will keep on providing the same standard of service in the long-term of future, therefore, they are willing to recommend their university to others (Latif et al., 2021). In support of this notion, Annamdevula & Bellamkonda (2016), whose study has found that a superior standard of perceived service quality resulted in an improved standard of satisfaction, which ultimately increased student loyalty.

Conceptual framework

The researchers offer a conceptual framework developed based on the appraisal of previous significant studies and a review of literature indicating the link between online learning service quality, student satisfaction, and student loyalty in Higher Educational Institutions (HEI) as shown in Figure. 1. The HEI can make their students satisfy and loyal to the institution through appropriate service quality applications such as reliability, responsiveness, empathy, and assurance. When Higher Education Institution makes service quality as a strategic focus, it essentially produces lifetime awareness in

students' memory and makes them satisfied and loyal to the HEI. Therefore, conscious service quality is essential for a higher education institution to sustain and create student loyalty (Borishade et al., 2021). we adopt the version of SERVQUAL used by Udo et al (2011) owing to it being the most comprehensive scale that has been modified to reflect an online learning setting. That consists of five attributes, that is, perceived ease of use, reliability, responsiveness, empathy, assurance. However, the authors replace “Tangibles” with perceived ease of use (PEU) which used by Lee (2010) to more appropriately reflect the online learning environment. Hence, the following section discuss about the relationship between different exogenous variables and endogenous variables with the formulation of relevant hypotheses.

Hypotheses development

Perceived ease of use and satisfaction of the students

Perceived ease of use (PEU) refers to “students’ perception of how easy it was to use the wireless internet service for their learning and research purposes” (Islam et al., 2018). PEU on online learning platforms has a positive impact on satisfaction of the students (Shao, 2020). it is also an important determinant of university students’ satisfaction with online learning platforms (Jiang et al., 2021). PEU measures how user-friendly a particular instrument or method of instruction. Suppose the online learning instrument is perceived as relatively user-friendly. in that case, the student will be more inclined to utilize the instrument. Hence, this process leads to boost the learning process and student satisfaction. On the contrary, the harder an instrument is to use, the more likely the student is to refuse it. Hence, this process leads to student dissatisfaction (Barat et al., 2009). According to Islam (2011) the students’ PEU had a statistically significant effect on their satisfaction of the wireless internet service at a university. Due to the potential effects of perceived ease of use on the satisfaction of the students, we hypothesise that:

H1: The perceived ease of use positively affects the satisfaction of the students

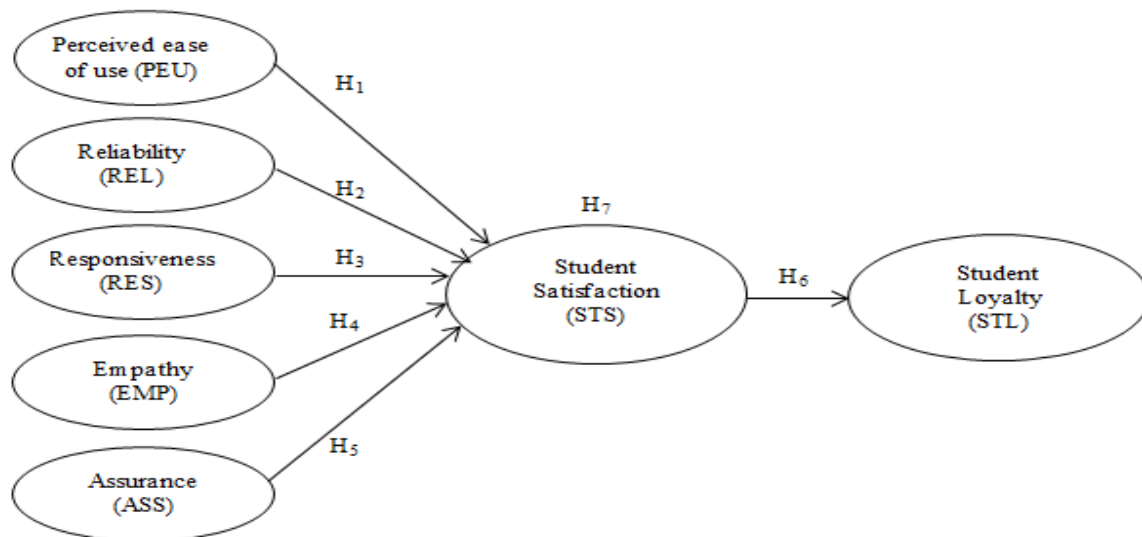


Figure. 1. online learning quality model: SERVQUAL

Reliability and satisfaction of students

In an online context, reliability relates to the willingness of sellers to deliver the product in good condition, exactly as it was displayed on the web site, and on time. In the offline environment, reliability is defined as the “ability to perform the promised service dependably and accurately” (Cristobal et al., 2007; A. P. Parasuraman et al., 1988). Previously, Ali (2019) stressed that reliability showed a direct effect on student satisfaction in using online service quality for their learning purposes in University of Bahrain. On the other hand, Udo et al (2011) hypothesized that In an online learning environment, “Reliability” has a positive association with students’ perceptions of online learning quality. However, their findings indicated a positive but insignificant relationship among these factors. In addition, Alshamyleh et al (2015) revealed that reliability had a statistically significant impact on students satisfaction in using the online service quality at Jordanian universities. Due to the potential effects of reliability on the satisfaction of the students, we hypothesise that:

H2: Reliability positively affects the satisfaction of students

Responsiveness and satisfaction of students

According to Ibrahimi et al (2016) Responsiveness is defined as “the ability to respond to customer requirements timely and flexibly”. Ali (2019) stated that in online service responsiveness refer to the company's ability to

provide quick service to customer via digital media when customer have problems or questions and make them more comfortable. Jameel et al (2021) have highlighted that responsiveness is the most important factor and led to an increase in the satisfaction among university student Accordingly, we hypothesise that:

H3: Responsiveness positively affects the satisfaction of students.

Empathy and satisfaction of students

Empathy is defined as the ability of the company to understand customer’s feelings and problems. It includes caring and individualized attention that the service company provides to its customers (Saxena et al., 2021). Empathy has become more important and is an essential part of online service quality (Kassim & Abdullah, 2010). Previously, Stodnick & Rogers (2008a) used SERVQUAL to measure the quality of the classroom experience. Of the five SERVQUAL dimensions, they found that empathy positively related to student satisfaction with the course. Udo et al (2011) indicated that empathy play a significant role in perceived online learning service quality, which affects students’ satisfaction and intentions to enroll in online courses in the future. Due to the potential effects of empathy on the satisfaction of the students, we hypothesise that:

H4: Empathy positively affects the satisfaction of students

Assurance and satisfaction of students

Assurance is defined as “knowledge and courtesy of employees and their ability to inspire trust and confidence” (Saxena et al., 2021). In an online environment, it refers to “confidence the customer feels in dealing with the site and is due to the reputation of the site and the products or services it sells, as well as clear and truthful information presented” (Parasuraman et al., 2005). In a study conducted by Stodnick & Rogers (2008a), to measure the quality of the classroom experience using the SERVQUAL model. They found that assurance positively related to student satisfaction with the classroom courses. The aim of Udo et al. (2011) study was to assess the quality of e-learning experience using SERVQUAL. Their results revealed that assurance play a significant role in perceived e-learning quality, which in turn affects students’ satisfaction and future intentions to enroll in online courses.

Due to the potential effects of assurance on the satisfaction of the students, we hypothesise that:

H5: Assurance positively affects the satisfaction of students

Satisfaction and loyalty of the students

In higher educational institutions, student satisfaction and student loyalty are closely connected to each other (Navarro et al., 2005), whereby satisfaction is a positive antecedent of student loyalty (Weerasinghe and Fernando, 2017). According to Zeithaml (1988) satisfaction is also the outcome and result of any educational system. Ali et al. (2016) concluded that the dimensions of higher education service quality namely; non-academic aspects, academic aspects, reputation, program issues, and access as greater influencing factors of student satisfaction, Which in turn influences institutional image, and together, they influence student loyalty. In addition, enhancing the student loyalty via i.e., alumni activities, endowment, or further collaboration with former professors is important, because this will lead to positive word of mouth, higher degree of interaction between higher educational institutions and students after graduation (Pham & Lai, 2016). Borishade et al. (2021) examined the role of service quality, student satisfaction and loyalty in higher education institutions at private University, Nigeria using SERVQUAL model. The findings of the study revealed that

service quality dimensions significantly influence student loyalty. However, this relationship is mediated by student satisfaction. The results suggested that the delivery of service quality should be targeted student satisfaction, which will invariably affect student loyalty to the institution. Appuhamilage and Torii (2019) examined the impact of loyalty on the student satisfaction in higher education at Meijo (Private) University, Japan. The results of this study confirmed that student satisfaction has a positive strong impact on student loyalty. Furthermore, they found that satisfaction has a positive direct impact from services and financial support provided by the university. On the contrary, they asserted that there is an indirect impact of image, services and perceived value on loyalty. Based on this discussion, we hypothesise that:

H6: Students’ satisfaction positively affects the loyalty of the students.

Student satisfaction as a mediator variable

Perceived service quality is regarded as the key determinant of satisfaction with a potential outcome of loyalty and student satisfaction indicated as a mediator in the link between service quality and student loyalty (Annamdevula and Bellamkonda, 2016). Similarly, the findings of Subandi and Hamid (2021) study indicated that student satisfaction mediates the relationship between service quality and student loyalty.

According to Hassan et al. (2020), Student Satisfaction partially mediates the relationship between Service Quality and Student Loyalty. Further, they identified a positive relationship between service quality, student satisfaction and student loyalty. Regarding the above variables in Figure. 1, the higher education service quality factors that influence student satisfaction, which in turn affects students’ loyalty include perceived ease of use (Islam, 2011; Shao, 2020), reliability, responsiveness, empathy and assurance (Borishade et al., 2021; sheikh Ali et al., 2019). Therefore the hypothesis that perceived ease of use, reliability, responsiveness, empathy and assurance significantly affects the students’ loyalty through satisfaction was included in this study.

H7: Perceived ease of use, reliability, responsiveness, empathy, and assurance affects students' loyalty through satisfaction.

H7a: Students' satisfaction mediates the relationship between perceived ease of use and student's loyalty

H7b: Students' satisfaction mediates the relationship between reliability and student's loyalty

H7c: Students' satisfaction mediates the relationship between responsiveness and student's loyalty

H7d: Students' satisfaction mediates the relationship between empathy and student's loyalty

H7e: Students' satisfaction mediates the relationship between assurance and student's loyalty

Methodology

Research instrument

Based on previous research, a questionnaire survey in terms of the impact of online learning service quality on the satisfaction and loyalty of students during the COVID-19 pandemic was designed. The questionnaire was translated from English to the Chinese language in order to be fully understood. The questionnaire consists of four parts. The first part is related to demographic data (gender, age, marital status, and year of study, etc.). The rest of the three parts split between online service quality, student satisfaction and student loyalty, respectively. To measure online learning service quality, four components of SERVQUAL (Reliability, Responsiveness, Empathy, and Assurance) were taken from Udo et al. (2011) and perceived ease of use was taken from Lee (2010). The "reliability" scale consists of three items. The "responsiveness" scale consists of three items. The "empathy" scale consists of four items. The "assurance" scale consists of four items. The "perceived ease of use" scale consists of four items. To measure student satisfaction four items were used towards the online service being provided by the college taken from Jiang et al (2021). To measure student loyalty, the items adapted from Waheed et al. (2016). The item consists of three scales.

All these variables were measured on a 5-point Likert scale, ranging from "strongly disagree=1" to "strongly agree =5." A total of 25 questions were asked in the study to check the effect of the five variables on students' satisfaction and loyalty.

Research sample

The target population of this study was students who were studying at Hunan (public) University located in Changsha city, the capital of Hunan province, China. This University runs all its undergraduate and postgraduate courses completely online during the COVID-19 pandemic. Simple Random Sampling (SRS) was applied to gather the data from the respondents. The resulting sample comprised of 323 valid survey questionnaires so that each student remaining in the population of Hunan University has the same probability of being selected for the sample.

Research design

In this study, a quantitative and descriptive approach was adopted. A sequential study has been designed, where descriptive research is performed, followed by quantitative research. The dimensions "perceived ease of use, reliability, responsiveness, empathy, assurance" were exogenous variables while students' loyalty was an endogenous variable and the students' satisfaction was a mediator in the present study.

Data collection

Data were collected through Self-administered questionnaires. We used face-to-face methods to collect data on the spot to a random sample of students studying at Hunan University. Data were gathered during the autumn semester after China's National Day holidays from October 8 to October 31, 2021.

Table 1 shows the demographics analysis of the study participants by gender, age, marital status, academic level, and level of study. The gender distribution of the sample was 40.6 percent (131) males and 59.4 percent (192) females. The percentages of single respondents were (88.5%) and married respondents were (11.5%). Regarding the age group of respondents, data revealed that the dominant group was those aged 18 - 24 years that is 243 (75.2%) and the minority group was those aged 45-54 years that

is only 1 (0.3%). With regard to their academic level, analysis shows that mostly third-year students were higher than other years of study that is 107 (33.1%). While based on level of study significant responses were received from Bachelor 239 (74.0%) and the least amount of responses was from other 3 (0.9%) only. For more details, kindly see Table 1

Table 1. *Demographic Characteristics of Respondents*

Characteristic	Absolut number	Percentage (%)
Gender		
Male	131	40.6%
Female	192	59.4%
Total	323	100%
Marital Status		
Single	286	88.5%
Married	37	11.5%
Total	323	100%
Age group		
18 – 24 years	243	75.2%
25 - 34 years	60	18.6%
35 - 44 years	19	5.9%
45 - 54 years	1	0.3%
Total	323	100%
Academic level		
First-year	73	22.6%
Second-year	96	29.7%
Third-year	107	33.1%
Fourth-year	47	14.6%
Total	323	100%
Level of study		
Bachelor	239	74.0%
Master	57	17.6%

PhD	24	7.4%
Other	3	0.9%
Total	323	100%

Data analysis and study results

To analyze the data, we first used Statistical Package for Social Sciences (SPSS) version 25 (IBM SPSS, 2017) for analysis of the demographic characteristics of respondents. Second, we used SmartPLS version 3 software (Ringle et al., 2015) for computed the collected data. Subsequently, we tested the measurement model to explore the reliability and validity of each of the questionnaire items. Finally, we used Structural equation modeling (SEM) to explore the hypothesized relationship between exogenous, endogenous, mediator variables viz— perceived ease of use, reliability, responsiveness, empathy, assurance, students' satisfaction and students' loyalty. The following subsections present the results according to the SEM/PLS method.

Measurement model results analysis

The two basic techniques of testing the measurement model are reliability and validity. The measurement model was designed and tested for reliability and validity. Table 2 shows the factor loadings and other measurement properties for each latent factor. The factor loading for all items in each factor ranged from 0.765 (EMP4) to 0.966

Table 2. *Online learning service quality dimensions' measurement model results.*

Construct	Factor Loading	Cronbach's Alpha	CR	AVE	Inner VIF
Perceived ease of use (PEU)	0.888	0.920	0.943	0.806	1.561
	0.920				
	0.892				
	0.890				
Reliability(REL)	0.939	0.890	0.931	0.819	1.786
	0.931				
	0.841				
Responsiveness (RES)	0.801	0.785	0.874	0.698	1.904
	0.817				
	0.886				
Empathy (EMP)	0.767	0.832	0.889	0.667	1.904
	0.846				
	0.882				
	0.765				
Assurance (ASS)	0.798	0.821	0.882	0.653	1.710
	0.892				
	0.766				
	0.769				
Student Satisfaction (STS)	0.816	0.863	0.907	0.711	1.502
	0.877				
	0.774				
	0.899				
Student loyalty (STL)	0.889	0.926	0.953	0.872	1.000
	0.945				
	0.966				

CR (Composite reliability); AVE (Average variance extracted); VIF (Variance inflation factor)

(STL3); all exceed the recommended value of 0.60(Chin, 1998a). Instrument reliability was examined by Cronbach's alpha and composite reliability (CR). As shown in Table 2, Cronbach's alpha values range from 0.785 (for responsiveness) to 0.926 (for student loyalty) while Composite reliabilities ranged from 0.874 (for responsiveness) to 0.953 (for student loyalty), which exceeded the 0.70 threshold (Wasko and Faraj, 2005). The average variance extracted measures ranged from 0.653 (for Assurance) to 0.872 (for student loyalty), which exceeded the recommended values of 0.50 (Hair et al., 2016). Therefore, the results demonstrated that all constructs in the study had internal consistency and the convergent validity for the measurement model is achieved.

Discriminant validity was assessed using the Fornell and Larcker criterion(1981) by comparing the squared correlation between two constructs with their respective variance extracted measures. Table 3 shows that all squared correlations between two constructs

were less than the variance extracted measures of both constructs, therefore. All the constructs based on the Fornell-Larcker criterion is achieved, Henseler et al. (2015) propose another approach for establishing discriminant validity is the assessment of Cross-loadings. The results in Table 4 show that all the constructs met the discriminant validity because none of the cross-loading values are less than 0.1(Chin, 1998a).

Structural model results analysis

After the assessment of the measurement model and before evaluating the structural model, we tested the collinearity between study indicators to ensure that the structural model did not include any issue with lateral collinearity (Hair et al., 2017). The collinearity can be tested by looking at the inner variance inflation factor (VIF). The VIF provides a measure of the degree of collinearity. Table 2 shows that there is no issue with collinearity, because inner VIF values for all the variables were below 5 (Hair Jr, Babin, et al., 2017). Next, before testing the

hypotheses we evaluated the structural model, standardized root means square residual (SRMR), normed fit index (NFI), squared Euclidean distance (d_ ULS), and the geodesic

distance (d_G) were tested for the fitness of the structural model analysis .finally, the predictive power(R2) and the predictive relevance (Q2) of the research model were examined.

Table 3. *Fornel- Larker Criterion*

	PEU	REL	RES	EMP	ASS	STS	STL
Perceived ease of use (PEU)	0.898						
Reliability(REL)	0.534	0.905					
Responsiveness (RES)	0.486	0.518	0.835				
Empathy (EMP)	0.416	0.539	0.572	0.817			
Assurance (ASS)	0.412	0.442	0.527	0.416	0.808		
Student Satisfaction (STS)	0.721	0.559	0.49	0.576	0.506	0.843	
Student loyalty (STL)	0.604	0.466	0.413	0.533	0.400	0.789	0.934

Note: Diagonal values (in. bold) represent the square root of the average variance extracted (AVE) of the specific construct.

Table 4. *indicator item cross- loading*

	PEU	REL	RES	EMP	ASS	STS	STL
PEU1	0.354	0.355	0.888	0.459	0.371	0.498	0.664
PEU2	0.383	0.475	0.920	0.559	0.514	0.614	0.670
PEU3	0.350	0.334	0.892	0.435	0.444	0.508	0.592
PEU4	0.391	0.326	0.890	0.459	0.414	0.546	0.658
REL1	0.461	0.523	0.543	0.939	0.470	0.449	0.565
REL2	0.374	0.512	0.519	0.931	0.480	0.471	0.537
REL3	0.356	0.417	0.358	0.841	0.462	0.324	0.389
RES1	0.326	0.471	0.407	0.594	0.801	0.419	0.416
RES2	0.531	0.479	0.364	0.351	0.817	0.241	0.313
RES3	0.486	0.487	0.436	0.348	0.886	0.352	0.472
EMP1	0.423	0.767	0.345	0.384	0.660	0.290	0.440
EMP2	0.271	0.846	0.372	0.486	0.380	0.557	0.535
EMP3	0.222	0.882	0.348	0.468	0.398	0.454	0.474
EMP4	0.476	0.765	0.289	0.415	0.458	0.416	0.422
ASS1	0.798	0.303	0.308	0.384	0.371	0.199	0.353
ASS2	0.892	0.373	0.360	0.383	0.453	0.380	0.461
ASS3	0.766	0.410	0.388	0.409	0.435	0.409	0.434
ASS4	0.769	0.237	0.262	0.240	0.438	0.274	0.369
STS1	0.391	0.460	0.676	0.419	0.399	0.602	0.816
STS2	0.495	0.553	0.571	0.512	0.427	0.642	0.877
STS3	0.375	0.371	0.499	0.421	0.414	0.595	0.774
STS4	0.438	0.543	0.677	0.524	0.417	0.804	0.899
STL1	0.419	0.437	0.501	0.445	0.385	0.889	0.688
STL2	0.314	0.497	0.549	0.406	0.348	0.945	0.735
STL3	0.391	0.554	0.637	0.456	0.423	0.966	0.786

Note: The results marked in bold indicate where the highest value is expected.

Construct legend: Perceived ease of use (PEU); Reliability (REL); Responsiveness (RES); Empathy (EMP); Assurance (ASS); Student Satisfaction (STS), and Student loyalty (STL).

Table 5 represents the summary of the structural model fitness indices where all variables are grouped together. The SRMR value for the saturated model and estimated model are 0.080 and 0.080, respectively, and the threshold for acceptable model fit is ≤ 0.08 (Boateng et al., 2018; Hu & Bentler, 1999). The d_ULS value for the saturated model is 2.072 while the value for the estimated model is 2.123, which is more than 0.05. In parallel with this result, the d_G value for the saturated model and estimated model are 1.196 and 1.201, respectively, which also more than 0.05. This indicates that the model attained the exact model fit tests. Moreover, the normed fit index (NFI) values for the saturated model and estimated model are 0.709 and 0.708, respectively, which is closer to 1, and considered as a better model fit (Bentler & Bonett, 1980; H. Hassan et al., 2020). The R² of endogenous variables are 0.633 and 0.623 for student loyalty and student satisfaction, respectively,

which appear to be substantial because the literature suggests that R² values of 0.19, 0.33, and 0.67 are considered to be weak, moderate, and substantial, respectively (Chin, 1998b; Cohen, 1988; Hock & Ringle, 2006). The Stone–Geisser’s Q² values are 0.445 and 0.539 for student satisfaction and student loyalty, respectively, indicating that the model had acceptable predictive relevance because the Q² values were above 0 (Garson, 2016; Geisser, 1974; Peng & Lai, 2012). In short, the model met the acceptable model fit and the statistical fitness requirement.

Overall, we computed the Goodness of fit regarding the overall quality of the structural model research following Tenenhaus et al, Peng and Lai (2012, 2005).

The GOF is calculated as:

$$GOF = \sqrt{AVE \times R^2} = \sqrt{0.746571 \times 0.631} = 0.6863$$

Table 5 Summary of the model fit criterion

Model fit indices	Saturated Model	Estimated Model
SRMR	0.080	0.080
d_ULS	2.072	2.123
d_G	1.196	1.201
NFI	0.709	0.708
Predictive accuracy/relevance	R ²	Q ²
Student Satisfaction	0.633	0.445
Student loyalty	0.623	0.539

Hypotheses results analysis

As can be seen in Figure. 1. This study examines the relationship between exogenous, mediator and endogenous variables in online learning environment viz— Perceived ease of use, reliability, responsiveness, empathy, assurance, student satisfaction, and student loyalty. Based on previous studies eleven hypotheses were proposed. Among these 11 hypotheses, 6 hypotheses based on the direct hypotheses and 5 hypotheses were based on the indirect hypotheses. Based on the structural model assessment the hypotheses were tested using SmartPIS 3 software through the bootstrapping procedure. Table 6 summarizes the results, and show that the four out the five factors that predict online learning service quality have a positive relationship with student satisfaction, which leads to students’ loyalty positively. Results indicate that the perceived ease of use has a positive relationship with the satisfaction of students for online learning ($\beta = 0.516$, t -value=10.964; $p < 0.05$). Accordingly, H1 was supported. The second factor is reliability, which has a positive relationship with students satisfaction ($\beta = 0.089$, t -value=2.549; $p < 0.05$).

Accordingly, H2 was supported. The third factor is responsiveness, which did not show any significant relationship with students satisfaction ($\beta=0.050$, $t\text{-value}=0.991$; $p>0.05$). Accordingly, H3 was not supported. The fourth factor is empathy. The results show a positive relationship between empathy and students' satisfaction with online learning ($\beta=0.273$, $t\text{-value}=6.904$; $p<0.05$). Accordingly, H4 was supported. The fifth factor is assurance, which has a positive relationship with students satisfaction ($\beta=0.166$, $t\text{-value}=4.154$; $p<0.05$). Accordingly, H5 was supported. More

use, empathy, assurance, and reliability respectively are 0.516, 0.273, 0.166 and 0.089 respectively, which indicate to most significant factor that affects the student's satisfaction from the highest to the lowest, whereas responsiveness did not show any significant relationship with student satisfaction $\beta=0.050$. Also, findings support H6, which shows that students' satisfaction has a positive effect on students' loyalty ($\beta=0.789$, $t\text{-value}=32.922$; $p<0.05$). In brief, it was found that all direct hypotheses were supported (H1, H2, H4, H5, H6) except (H1), as shown in Table 6.

Table 6 Hypotheses findings (Direct effects)

Hypothesis	Relationships		Std. beta	Std. error	t-value	p-value	Decision	
H1 (+)	Perceived ease of use	→	Student Satisfaction	0.516	0.047	10.964	0.000	supported
H2 (+)	Reliability	→	Student Satisfaction	0.089	0.035	2.549	0.011	Supported
H3 (-)	Responsiveness	→	Student Satisfaction	-0.050	0.051	0.991	0.322	Not supported
H4 (+)	Empathy	→	Student Satisfaction	0.273	0.040	6.904	0.000	Supported
H5 (+)	Assurance	→	Student Satisfaction	0.166	0.040	4.154	0.000	Supported
H6 (+)	Student Satisfaction	→	Student loyalty	0.789	0.024	32.922	0.000	Supported

specifically, the β value for perceived ease of

Mediation results analysis

As can be seen in Figure. 1, student satisfaction mediates the relationship between online learning service quality and student loyalty. Based on recommendations for testing mediation in PLS-SEM by Hair et al. (2017), we used the bootstrapped confidence intervals method to assess the mediating effects with 5000 subsamples to ensure the stability of results. Table 7 summarizes the result of the mediation analysis. Students' satisfaction mediates the positive relationship between the perceived ease of use and student loyalty. Therefore, H7 (a) was supported. Also, Students' satisfaction mediates the positive relationship between reliability and students loyalty.

Therefore, H7 (b) was supported. Contrary to our assumption, Students satisfaction did not mediate the positive relationship between responsiveness and students loyalty. Therefore, H7 (c) was not supported. Moreover, the mediation analysis finding indicates that Students' satisfaction mediates the positive relationship between the empathy of students and Students' loyalty. Therefore, H7 (d) was supported. Ultimately, the mediation analysis finding reveals that Students' satisfaction mediates the positive relationship between assurance and students loyalty. Therefore, H7 (e) was supported. In brief, it was found that all indirect hypotheses were supported (H7a, H7b, H7d, H7e,) except (H7c), as shown in Table 7.

Table 7 Mediation Analysis (Indirect effects)

Hypothesis	Relationships	Std. beta	Std. error	t-value	LL	LU	Decision
H7 (a)	Perceived ease of use — Student Satisfaction → Student loyalty	0.408	0.040	10.165	0.326	0.482	Supported

H7 (b)	Reliability	–	Student Satisfaction	→	Student loyalty	0.070	0.029	2.437	0.012	0.126	Supported
H7 (c)	Responsiveness	–	Student Satisfaction	→	Student loyalty	-0.040	0.037	1.067	-0.113	0.036	Not supported
H7 (d)	Empathy	–	Student Satisfaction	→	Student loyalty	0.216	0.032	6.751	0.152	0.277	Supported
H7 (e)	Assurance	–	Student Satisfaction	→	Student loyalty	0.131	0.033	3.986	0.071	0.198	Supported

Discussion and conclusions

Due to the outbreak of COVID-19 pandemic, all colleges and universities were shifted from traditional learning to online learning. This sudden unprecedented transition has changed the methods of higher education institutions in delivering courses for their students (Khalil et al., 2020). Hence, the students are obliged to study in online courses to avoid this pandemic spread on campuses. Therefore the purpose of the present study was twofold: (1) to evaluate the impact of online learning service quality on the satisfaction and loyalty of students during the pandemic period of covid-19 in Hunan University, China, and (2) to test the relationship between online learning service quality and student loyalty through the student satisfaction as a mediator. The authors used SERVQUAL model to measure the quality of online learning. In addition, Our study was motivated by previous studies (Ali, 2019; Gritsova & Tissen, 2021; Ramdhani et al., 2021; Saxena et al., 2021; Udo et al., 2011), which used SERVQUAL to measure the quality of online learning in higher education institutions. We have included a new dimension, “Perceived ease of use”, which also used by previous studies (Elkaseh et al., 2016; Lee, 2010; Masrom, 2007) and by so doing have increasing the predictive power of the model reflect the online learning environment. The current study was conducted after China’s lockdown period to identify the eminent factors that derive the student’s satisfaction with online learning. The study also explored the direct relationship between student’s satisfaction and their loyalty. According to the analysis findings, H1 is supported in this study, and indicated that perceived ease of use is the most positive impact factor (path coefficient of 0.516) that affects the student’s satisfaction during online learning.

This finding is supported by Islam (2011) and shao (2020). Who postulate that perceived ease of use is one of the key determinants of student satisfaction, which is contradictory to the previous findings by Ali (2019). In addition, it was identified as the major factor determining the acceptance of online learning.

If the university can deliver the online course content properly with ease of use, it affects the student’s satisfaction and loyalty. As per the analysis findings, H4 is supported in this study and highlighted that the second most important factor (path coefficient of 0.273) affecting students’ satisfaction during online learning is empathy. Stodnick & Rogers (2008b) and Udo et al., (2011), findings that “empathy” have a significant impact on students satisfaction during online learning are similar to ours. The findings also indicate that the third factor (path coefficient of 0.166) that affects the student’s satisfaction is assurance. Hence, H5 is also supported in this research. Udo et al (2011), were consistent with the results of the present study. In the context of higher education, deal with the students in a polite manner can build trust and assurance among the students (Sohail & Hasan, 2021). Reliability is the fourth most important factor in the study findings (path coefficient of 0.089). Therefore, H2 is supported. Past studies in higher education environment found that reliability has a direct and indirect positive impact on student satisfaction (Ali, 2019; Van Iwaarden et al., 2003). The last factor is responsiveness, which does not have a significant effect on student satisfaction (path coefficient of 0.050). Hence, H3 is not supported. This finding is consistent with previous study conducted by (Stodnick & Rogers, 2008b). On the contrary of previous studies, where responsiveness was found to had a significant effect on student satisfaction (Ali,

2019; Sohail & Hasan, 2021; Z. Yang & Fang, 2004). In previous studies, student satisfaction and loyalty has the highest relationship among all factors, meaning that satisfaction is contributing to student loyalty in online learning setting. According to the results of the current study, satisfaction had the most effects (path coefficient of 0.789) on student loyalty. Hence, H6 is supported. These results are in line with previous studies by Dehghan et al. 2014, Appuhamilage & Torii 2019, Pham et al. 2019 and Annamdevula & Bellamkonda 2016. For H7a (Students' satisfaction mediates the relationship between perceived ease of use and student's loyalty), the hypothesized paths between perceived ease of use, "student satisfaction", and "student loyalty" are all positive and significant, thus supporting the hypothesis. The standardized path coefficients for PEU→STS→STL are 0.408 and 0.040, respectively. In addition, the lower level and upper level for PEU→STS→STL are 0.326 and 0.482, respectively. Meaning that there is a mediator because the LL and UL do not pass zero in the middle (Preacher & Hayes, 2008).

The study also found that Students' satisfaction mediates the relationship between reliability and student's loyalty (H7b). The standardized path coefficients for REL→STS→STL are 0.070 and 0.029, respectively. Thus, supporting the hypothesis. In addition, the lower level and upper level for REL→STS→STL are 0.012 and 0.126, respectively. Meaning that there is a mediator because the LL and UL do not pass zero in the middle. Contrary to our expectations, H7c, which states that student satisfaction, mediates the relationship between responsiveness and student's loyalty. The standardized path coefficients for RES→STS→STL are -0.040 and 0.037, respectively. Hence, hypothesis is not supported. The lower level and upper level for RES→STS→STL are -0.113 and 0.036, respectively. The LL and UL pass zero in the middle, meaning that there is no mediator. Additionally, the study also proved a significant relationship between empathy and student loyalty through student satisfaction H7d. The standardized path coefficients for EMP→STS→STL are 0.216 and 0.032, respectively. Thus, supporting the hypothesis. The lower level and upper level indicate that there is a mediator because the LL and UL do not pass zero in the middle. Finally, H7e

(Students' satisfaction mediates the relationship between assurance and student's loyalty), is supported. The standardized path coefficients for ASS→STS→STL are 0.131 and 0.033, respectively. The confidence intervals (LL=0.071 and LU=0.198), do not straddle a 0 in between indicating there is mediation. This shows the relationship between assurance and student loyalty is fully mediated by student satisfaction.

As it is unknown how long this pandemic will remain, there is an urgent need to measure the effect of online learning services quality on student satisfaction as millions of student depends on them to continue their studies because of the COVID-19 pandemic. However, the present study successfully applied the SERVQUAL and exhibited the direct and indirect effects of the dimensions of online learning service quality on university student's satisfaction.

We can conclude that all of the dimensions of online learning service quality have an impact on satisfaction and loyalty except the dimension of responsiveness. Thus, according to the results of this study, there is insufficient evidence of the effect of responsiveness directly/indirectly on satisfaction and loyalty of students in the online learning environment.

Implications of the study

The basic contribution from this study stems from confirmation of the hypothesized relations between online service quality, student satisfaction, and student loyalty in the context of online learning. Most of the previous studies have focused on assessing the relationship between service quality, student satisfaction, and loyalty in traditional learning and online learning before the outbreak of the COVID-19 pandemic (Borishade et al., 2021; Mansori et al., 2014; Pham et al., 2019; Sohail & Hasan, 2021; Udo et al., 2011). None of the studies had examined the impact of perceived ease of use, reliability, responsiveness, empathy, assurance on student's satisfaction and loyalty with online learning during the period of the COVID-19 pandemic. Therefore, the current study attempts to fill this research gap. The present study is considered a trailblazer in terms of online learning service quality in universities to test the relationship in terms of satisfaction and loyalty

of students. More significantly, examining the mediating effect of student satisfaction as a variable that explains the relationship between online service quality, and student loyalty is an important contribution to the field of higher education. However, student satisfaction with online learning was found as a key predictor for enhancing student loyalty.

Limitations and Future Research

This study, however, is subject to several limitations that should be acknowledged which could be future studies. First, the study was conducted in one public university and one developed country. Therefore, future research will need to apply it to other private universities and developing country to acquire a greater understanding of online learning service quality as a predictor of student's satisfaction and student loyalty. Second, the data collected in this study based on questionnaire survey as a quantitative tool while the qualitative method was ignored owing to time constraints and funding. However, future studies can include qualitative tool such as interviews to get a clear picture of online learning and to understand the student's perspective. Finally, the simple random sampling technique was used in this study. Therefore, Future studies could employ other sampling technique to reveal a better understanding of university student's satisfaction and loyalty with using online learning platforms.

Declarations

Conflict of interest: The authors declare that they have no conflicts of interest.

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