

Quality of e-Learning in Nepalese Universities During the COVID-19 Pandemic

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Abstract: Covid 19 pandemic triggered changes in various socio-economic sectors that were already in pace. Among them, the digitalization of higher education faced one of the profound shifts due to the pandemic. The application of digital education is gaining momentum and is likely to continue until the long future after Covid 19. However, there are limited assessments of its quality, especially in the countries in the global south. The purpose of this study was to assess the quality of online learning in Nepalese universities during the pandemic using a customized SERVQUAL model with six dimensions, namely, tangibility, assurance, responsiveness, empathy, and online-class. The online-class dimension is added in this study, which includes conditions of e-learning such as electricity supply, internet service, electronic devices, time schedule, thus characterizing the conditions in a developing country. Specifically, this study focused students' perceived quality of e-learning in universities in Nepal. A survey was conducted between April to July 2021 among 451 graduates and undergraduates who participated in online classes during the pandemic from six universities to explore their satisfaction with the quality of digital education. The survey included 27 questions related to six dimensions: reliability, responsiveness, assurance, empathy, tangibility, and online-class. The data was analyzed quantitatively using the open-source platform Jamovi (version 2.3.28). The results showed that students expressed satisfaction with the quality of online education of e-learning during the pandemic. However, the study found variations in student perceptions based on demographic factors, highlighting differences in satisfaction levels across diverse student groups. This result implies that despite its increasing application, e-learning needs to accommodate a more inclusive approach to improve its quality and satisfy learners from all socio-economic backgrounds. A blended mode of teaching could be more effective in the changing context. This should be paralleled with instructors as well as support staff training. At the same time, the limitations of online-class can be addressed in collaboration with government agencies and universities which further enhances the quality of e-learning.

Keywords: e-Learning, Digital education quality, Service quality assessment, COVID-19, Nepal, Higher education

1. Introduction

The education sector has been digitalized, promoting online teaching and learning during the COVID-19 pandemic. As the pandemic progressed, digitalization was accompanied by designing new systems and infrastructures, with students' learning outcomes assessed online (Eltahir, Alsalhi, and Al-Qatawneh, 2022). The digitalization is significantly advanced in the higher education sector (Márquez-Ramos, 2021). Although distance higher education is gaining momentum and is likely to continue, there are limited assessments of its service quality. Existing studies have primarily focused on the overall and descriptive assessments of online learning (Al Rawashdeh et al., 2021) or the challenges of inclusivity across different societal groups (Devkota, 2021; Muthuprasad et al., 2021; Nayak and Alam, 2022). Therefore, as much as studies are necessary, to examine its quality and scrutinize its usefulness. The quality of online higher education is a particular concern in developing countries like Nepal, where infrastructures for its proliferation—such as electricity, internet access, and technology—are hindered by issues related to production, access, economic constraints, and human resources (Upadhayaya et al., 2021).

In recent years, higher education has increasingly been considered a service industry (Davies, 2021; Larson, 2009). Higher education institutions (HEIs) are shifting from simply delivering knowledge to offering a range of services to students, such as academic support, career guidance, counseling, physical and mental health support, and financial assistance (Dugenio-Nadela et al., 2023). With the engagement of the private sector in education,

Pavlov and Joy (2018) argue that education has evolved into a market economy, contributing to national revenue, job creation, knowledge production, patent generation, and intellectual property rights. The sector is further flourishing due to increased access and the integration of new technologies in online learning (World Bank, 2024). Thus, studies claim that online education is the future of learning (Chan, Bista and Allen, 2021). With the proliferation of online education during Covid 19 and its aftermath, it is imperative to explore the quality of service in such a thriving industry.

Despite the unprecedented proliferation of digital learning during and after the Covid 19 pandemic, a paucity of studies analyzes the factors determining its quality. This is a less evaluated issue in higher education institutions in developing countries (Zaw and Hlaing, 2024). Available literature barely explored the quality of digital education at the university level. For example, Poudel (2021) applied the Service Quality (SERVQUAL) model to examine the quality of digital education at the college level. Similarly, Adhikari (202) explored non-academic factors of quality in a campus in Western Nepal. Some studies in the pre-pandemic era assessed the quality of distance learning but also at the college level (Baniya, 2016). These studies barely analyze the quality of digital education as perceived by university students on a wider scale. At the same time, studies also highlight issues such as poor digital infrastructure, the digital divide, and its impact on access and outcome of digital learning in developing countries (Al Rawashdeh et al., 2021). However, there is less concern if digital infrastructure, which we conceptualize as 'online learning' in this study, impacts the quality of education and students' satisfaction. This is concerning because, in developing countries, a deep digital divide exists, implying a state of unequal distribution of electricity and internet facilities, poor access to computers or laptops, and a lack of technical know-how (Muthuprasad, Aiswarya, Aditya & Jha, 2021). In this study, we assume that online learning is an additional dimension determining the remaining dimensions of quality digital education, such as responsiveness, assurance, tangible, empathy, and reliability as described by the SERVQUAL model.

The purpose of this study is to measure the quality of digital education in Nepalese universities during the Covid 19 pandemic. It has examined the students' perception and analyzed whether their satisfaction is reciprocal to the quality of digital education in Nepal. The main research questions this study addressed are as follows:

RQ1: How did the university students experience the quality of digital education in Nepalese universities during the Covid 19 pandemic?

RQ2: To what extent do online teaching and students' demographics play a role in forming a perception of digital education quality in Nepal?

The present study explores students' perceptions of the quality of online education during the Covid 19 pandemic in Nepal. It assumes that students' quality assessments will provide valuable feedback to the key stakeholders of HEIs to improve digital education and guide policy reforms if needed. For this study, e-learning (synonymously used with online learning, digital education, distance learning (ODL), digital learning, and internet-based learning) is defined as a learning environment that uses communication technologies, such as mobile devices or computers, to deliver lectures, learning activities, and students' assessments via the internet.

This article is divided into seven sections. The following section discusses conceptual and theoretical models, along with a review of relevant past studies. This follows with sections on methods and materials, results and findings, discussion, conclusion and limitations, and future research potential.

2. Review of Literature

Four themes of literature are dominant in this field. First, service quality models that focus on the theoretical and practical aspects of the SERVQUAL (service quality) model. Second, the body of literature explores why digital education is essential and what factors determine its quality. Third, literature that applies the SERVQUAL model to examine the quality of e-learning before and after the COVID-19 pandemic is analyzed. Fourth, studies on the quality of e-learning focusing on Nepal's higher education institutions (HEIs) are considered.

2.1 Service Quality Models

Scholars agree that customer satisfaction is crucial for service industries to sustain their business (Parasuraman, Zeithaml, and Berry, 1985; Sumi and Kabir, 2021). Consumer satisfaction, in turn, influences customer loyalty and trust (Uppal, Ali and Gulliver, 2017). However, the satisfaction is heavily dependent on service quality. Various models such as the Nordic model (Ghotbabadi and Baharun, 2012), SERVQUAL (Parasuraman, Zeithaml, and Berry, 1985, 1988), SERVPERF (Cronin and Taylor, 1992), perceived service quality (Grönross, 1984) and total quality management (Rahman and Nasrin, 2024) are in practice to assess service quality. This study adopts the SERVQUAL model to assess the service quality of online learning in higher education.

SERVQUAL is a widely adopted model for examining the quality of service from the consumer's perspective. Developed in 1985 by a group of business scholars, it measures the gap between customer expectations and perceptions across five key service dimensions: tangibles, reliability, responsiveness, assurance, and empathy (Parasuraman, Zeithaml, and Berry, 1985, 1988). These dimensions are collectively represented by the acronym "RATER." Reliability implies the industry's capacity to execute the service correctly and honor its promises. Assurance encompasses the awareness and respect of personnel and their capability to stimulate confidence and trust. Tangibility includes physical evidence of the service, such as offices, equipment, managers, and communication materials. Empathy represents communication, access, and understanding of the customer. Responsiveness refers to the promptness of personnel to deliver facilities. The model is popular among researchers because it is flexible and can be applied across a wide range of research areas, including the education sector (Uppal, Ali, and Gulliver, 2017). Despite their broader representation and application in various sectors of the service industry, these dimensions cannot be translated into the education sector and need modifications before applying to the quality of digital education. Similarly, the SERVQUAL model does not cover the aspects of digital education that represent its basic infrastructures, such as electricity, internet, device ownership, space for learning, etc. In this study, these aspects represent a new dimension 'online-class' in aggregate.

2.2 Quality of e-Learning

Past studies suggest that while the digitalization of higher education demands continuity, it must be accompanied by quality control (El Mhouti, Nasseh, and Erradi 2013; UNICEF, 2024). Studies argue that the increasing application of digital technologies must be balanced with the quality they offer to students. The value of digitalized higher education is also a concern for the business community (Larson, 2009), managers (Rizos, Sfakianaki, and Kakouris, 2022), and parents (World Bank, 2024). Sumi and Kabir (2021) argue that implementing an operative e-learning system requires concerted efforts from all concerned.

Studies highlight the positive role of digitalization in higher education, arguing that constant quality measurement supports its further improvement. Majid et al. (2022) showed that online learning increased motivation, yielded satisfactory outcomes, and enhanced the teaching and learning environments. Sousa and Mourao (2022) emphasized that the digitalization of higher education should involve multi-stakeholder participation in decision-making to empower students by facilitating and promoting their learning processes. Haleem et al. (2022) argued that digital technologies improve student performance and enhance the learning environment. Naim (2021) found that quality standards helped the university improve its online courses, align course materials with learning outcomes, and offer a systematic approach to evaluating and improving course quality. Overall, digitalization enhanced education quality, met international standards, and improved teaching and learning experiences.

2.3 SERVQUAL Models for e-Learning Quality Assessments

It is critical to differentiate the quality of e-learning before and after the Covid 19 pandemic to identify factors associated with students' perceived quality and to find research needs.

Application of SERVQUAL model in education is diverse. Sumi and Kabir (2021) applied a modified SERVQUAL model with seven dimensions: reliability, assurance, tangibility, empathy, responsiveness, learning content, and materials. The study found that reliability, assurance, and empathy significantly impacted student satisfaction, while responsiveness did not. Learning materials strongly influenced students' perceptions of service quality. Wantara (2022) found that, except for assurance, students' perceptions of the other four SERVQUAL dimensions were significant in evaluating digital education at the University of Trunojoyo Madura Indonesia, during the Covid 19 pandemic. Agrawal, Verma, and Malhotra (2021) identified empathy, responsiveness, reliability, and web content as significant factors affecting student satisfaction. Limbu and Pham (2023) found that system quality and instructor/course material quality are substantive factors of student satisfaction. Despite their wider coverage of students' perception of digital education and the application of the SERVQUAL model, these studies pay less attention to the local factors that determine e-learning quality.

A few studies concerned this. In a study, Saleem et al. (2022) found that situational factors, such as poor access to technology and inconsistent electricity supply, significantly impacted online education quality in Pakistan. A need for innovative approaches to make digital learning more effective and qualified is suggested by Behera et al. (2023). Ramírez-Hurtado et al. (2021) maintain that fine-tuned collaboration among teachers, students, and administrative staff can enhance online learning quality in any context. These findings, nevertheless, do not hint

policymakers and concerned stakeholders in developing countries about the measures to be undertaken to address the quality of digital education.

Pre-pandemic studies on the quality of digital education highlight similar aspects as pandemic era literature and so leave similar gaps. Udo et al. (2011) applied a revised SERVQUAL model, including the website content as a new one to examine the factors affecting the quality of distance learning. The authors found that, except for reliability, the other four dimensions played a significant role in learning. Dursun, Oskaybas, and Gokmen (2013) found disproportionate weight given by students to the SERVQUAL dimensions. Responsiveness received the lowest score, followed by reliability, empathy, tangibles, and credibility. Pham et al. (2019) found an association between the quality of e-learning and the support service quality in HEIs in the pre-pandemic era. These studies, as stated before, do not suggest measures that could affect the quality of digital education in a pandemic-like situation.

2.4 Quality Perception Across Students' Demography

The Covid 19 pandemic literature barely concern students' demography as the factor determining the quality of digital education. A few pre-pandemic studies explored the relationship between students' demography and their perception of the quality of digital education. Arthar-Nyarko, Twoli and Khatiti (2017) found that students' age, gender, marital status, and geographic distance had a significant relationship with e-Learning satisfaction. Min and Khoon (2014) also found that gender and levels of study were significantly associated with students' perception of the service quality of higher education. Dursun, Oskaybas, and Gokmen (2013) identified significant relationships between students' profession, gender, marital status, age, and place of study, and the perceived quality of digital education services. Richardson, Long, and Woodley (2003) found significant relationships between factors such as age, discipline, hearing status, prior qualifications, and perceived quality of education. Studies also found a non-linear relationship between students' age and gender, and service quality (Ilias et al., 2008). The present study explores the relationship between the students' demography and their perception towards the quality of digital education.

2.5 Research Context: Digital Education Quality in Nepal

In Nepal, universities offered online courses since the commencement of the Online and Distance Learning Policy in 2007 (Upadhyaya et al., 2021). The digitalization trend sharply increased amid the Covid 19 pandemic. Nearly 85% of learners benefited through this mode across various levels of education (Sapkota, 2023). Nevertheless, very limited studies examined the quality aspect of the new mode of learning applying the SERVQUAL measures. Poudel (2021) examines all five service quality dimensions as prescribed by Parasuraman, Berry, and Zeithaml (1988) and their relationship with students' satisfaction in three colleges in the Chitwan district of Nepal. The study found that the empathy dimension is significantly associated with students' satisfaction regarding service quality provided by their colleges. The present study expands SERVQUAL measures at the university level and examines how university students perceived the quality of e-learning during the Covid-19 pandemic.

Other studies attempt to analyze the quality of digital education but do not fully apply SERVQUAL measures. For example, Upadhyaya et al. (2021) identified quality as one of the major components influencing students' perceptions of course delivery and participation, with significant differences based on students' residence (rural vs. urban) and internet infrastructure and electricity availability. Sharma et al. (2020) examined four dimensions of ODL—learner dimensions, instructor characteristics, technological characteristics, and course management and coordination and found that all four dimensions are positively correlated with students' satisfaction with online learning, with female students reporting higher satisfaction than male students. Adhikari (2024) investigated non-academic aspects of service quality.

Some studies examined the quality of distance education in Nepal in the pre-Covid 19 era. For instance, Baniya (2016) found empathy and responsiveness as significant predictors of service quality at management schools. A study by Shakya, Sharma, and Thapa (2017) noted that the quality of education through digital means should be analyzed in terms of accessibility, learning flexibility, and the ability to meet educational demands across diverse regions of Nepal.

Past studies show a paucity of literature focusing on the quality of e-learning offered by higher education institutions during the Covid 19 period. A notable gap exists in this area regarding the use of the SERVQUAL model, specifically in Nepal. Additionally, studies are rarely concerned 'online-class' as a predictor of service quality. Understanding the performance of distance education during the pandemic is crucial, as it serves as a substantial factor in predicting the future quality of e-learning. Students' perceptions and satisfaction with digital learning technologies would better predict the future of digital education.

3. Methods and Materials of the Study

This study investigated the quality of digital education from students' perspectives using the customized SERVQUAL model. The research focused on students' online learning experiences during the Covid 19 pandemic, applying 22 Likert scale perceptions (breakdown in table no. 1 below) to measure students' perceptions as suggested by the model and adding online-class as an additional dimension. The online-class dimension is taken as a moderating variable that mediates the other five dimensions of the SERVQUAL model. It consisted of 5 Likert scale statements, including factors such as supply of electricity, internet facility, availability of digital technologies, etc., which are not addressed by the five dimensions in the SERVQUAL model and are also critical in the case of a developing country like Nepal. The quality of e-learning was assessed with students' gender, marital status, employment status, and study location. Additionally, the relationship between online-classes and perceived service quality was also tested.

3.1 Hypotheses

H1: There is a significant difference in the perceived quality of e-learning based on gender.

To maintain the quality of e-learning, both genders may not perceive it at the same level. The study by Dursun, Oskaybas, and Gokmen (2013) found no significant difference in the perceived and expected service quality of online learning based on gender. However, the context of Nepal is different, given the social, cultural, and rural-urban differences, which might have a significant role in the accessibility of education among genders.

H2: There is a significant difference in the perceived quality of e-learning based on marital status.

One advantage of online learning is that students can attend classes from home, regardless of their marital status (Dursun, Oskaybas, and Gokmen, 2013). This study evaluates whether this is the case among higher education students in different universities in Nepal.

H3: There is a significant difference in perceived service quality of e-learning based on study location.

The study location also influences the quality of e-learning. In rural areas, scarce internet access can reduce the effectiveness of online learning (Giri, 2021; Chaudhary et al., 2022). Thus, this study tests the hypothesis that there is a significant difference in the perceived service quality of e-learning based on study location (urban vs. rural areas).

H4: There is a significant difference in the perceived quality of e-learning based on employment status.

According to Nepal et al. (2024), employed individuals showed higher interest in online learning than unemployed people. This study tests the hypothesis that there is a significant difference in the perceived service quality of online learning based on employment status.

H5: There is a significant relationship between the perceived quality of e-learning and online-class participation.

Past studies found an association between online-class and service quality (Kanan et al., 2023; Tj & Tanurahrjo, 2020). This study tests the hypothesis that there is a significant relationship between the perceived service quality of digital education and online-class participation.

3.2 Research Design

The study employed a quantitative design to assess the quality of e-learning from the student's perspective (Fig. 1). The SERVQUAL model, developed by Parasuraman, Zeithaml, and Berry (1985, 1988), was customized to measure perceived service quality across five dimensions, with an additional dimension for online-class. This approach, focusing solely on perceived service quality, has been similarly applied in studies by Al-Mushasha and Nassuora (2012), Uppal, Ali and Gulliver (2017), and Pham et al. (2019) in the context of e-learning. The SERVQUAL model is flexible and has been adapted to measure service quality in various fields. Due to the pandemic in Nepal, the government imposed a lockdown, which forced educational institutions for long educational vacations. It affected the academic calendar, forcing universities to apply internet-based learning as an alternative to continuing education. So, expected service quality and the gap between expected and perceived service quality defined by the model were irrelevant. So, this study only considered perceived service quality.

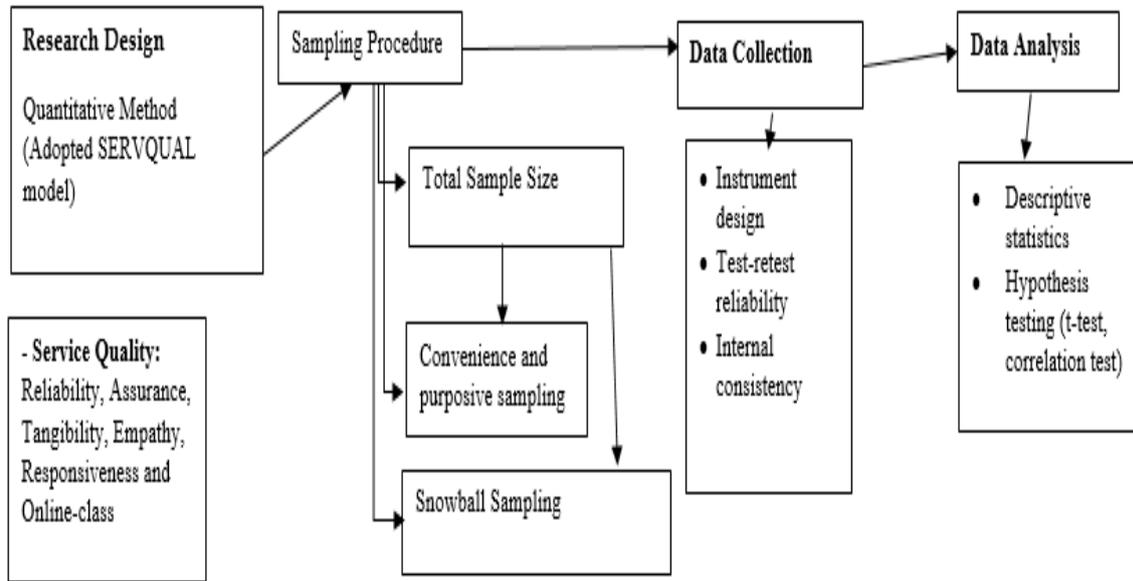


Figure 1: Research Design and Steps

3.3 Population and Sampling Procedure

The study targeted students who participated in online classes at universities in Nepal during the first and second Covid 19 lockdown periods. Therefore, the students who took classes during the first and second national lockdowns were the population of the study. The total number of students who joined online classes across Nepalese universities was unknown. Given the restrictions on human mobility, a snowball method was employed to select the sample.

Using convenience and purposive sampling methods, students who were in direct contact with the researcher through social media platforms and institutional associations were reached out for the study, and through the snowball sampling method, the researcher requested university faculty and administrators to distribute the survey questionnaire among students who were taking online classes during the pandemic. The rationale behind choosing convenience and purposive as well as snowball sampling is, first, due to the lockdown, all the universities were forced to adopt online teaching and learning. Second, reaching out to the students directly for data collection was impossible, and the researcher had to rely on their networks. These methods may introduce selection bias, as respondents may not fully represent the broader student population, which was also the researcher's concern during the research period. To address this, researchers diversified participants from multiple universities across Nepal (Fig. 2). For the reduction of possible bias, researchers ensure balanced representation from rural and urban municipalities and exclude data from small areas but include respondents from various places. This approach aimed to enhance the study's validity by capturing diverse student experiences and minimizing bias.

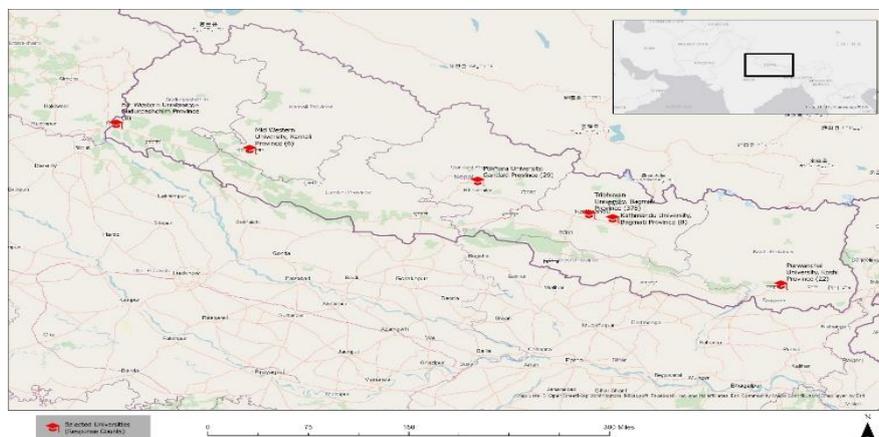


Figure 2: Selected Universities and Survey Response Counts

3.4 Data Collection

A survey questionnaire was distributed to online platforms as this approach is considered appropriate, as recommended by Kelley-Quon (2018) and Mohajan (2020). The survey was conducted among students pursuing bachelor's and MA in six universities, as shown in Figure 2, across Nepal between April and July 2021 during national lockdowns for Covid 19. Viber and WhatsApp for those in direct contact with the researchers and already engaged in online classes. For other students, questionnaires were distributed through the university faculty and staff. Given the lockdown constraints, snowball sampling was deemed suitable as it allows researchers to reach individuals with specific characteristics who might be difficult to identify otherwise (Parker, Scott and Geddes, 2019). The first nationwide lockdown began on 24 March 2020 and lasted until 21 July 2020, during which all public and private institutions, including higher education, were closed. In response, online learning was initiated on 28 March 2020.

Approximately 650 questionnaires were distributed, and 512 responses were returned. Of these, 19 were found to be duplicate responses, which were retained for reliability testing. The study population is unknown due to the difficulty of tracking the total number of students in online classes during the lockdowns. After careful evaluation, 451 responses met the inclusion criteria, while 42 were excluded. Thus, 451 valid responses were analyzed in the study.

3.5 Data Analysis

To develop the scale, dimensions were initially selected based on the model discussed by Parasuraman, Zeithaml, and Berry (1985, 1988) for identifying service quality. An additional dimension focusing on online-class was adopted from the works of Uppal, Ali, and Gulliver (2017) and Pham et al. (2019). Based on these dimensions, an initial set of 42 Likert scale statements was created. The scale ranged from 1 (strongly disagree) to 5 (strongly agree).

The open-source platform Jamovi (version 2.3.28) was utilized to analyze the data. The survey included 27 questions related to six dimensions: reliability, responsiveness, assurance, empathy, tangibility, and online-class. Since a Likert scale was used across dimensions, an average (mean score) was calculated by adding rating scores across all responses divided by the total responses. These were the scores for six dimensions. Using these scores, descriptive statistics were drawn. Additionally, mean and standard deviation values were computed based on gender, place of origin, marital status, and employment status to compare service quality across different groups. To identify differences between these groups, t-tests were conducted.

Furthermore, correlation coefficients were calculated to analyze the relationship strengths and directions among dimensions. The significance of these relationships was assessed using the p-value, with a standard threshold of 95% confidence level. Descriptive statistics were used to summarize the data because mean and standard deviations provide the average scores of each dimension with their average deviations from the means. This summary is used to explain the level of perceived quality on each dimension and is also used for comparison based on gender, marital status, employment status, and studying place. For hypothesis testing, an independent t-test was used to test the significant difference in scores of dimensions of service quality based on gender, marital status, employment status, and study place. Correlation analysis and significant tests were performed to test the relationship between online classes and perceived quality.

3.6 Instrument Development and its Reliability and Validity

A two-step process was employed to ensure the validity of the questionnaire because an additional dimension, online-class was added. Content validity was analyzed for validation of that dimension as well as statements related to SERVQUAL. First, four experts with at least five years of experience in online teaching (since 2015) were consulted for validity analysis. In the second step, seven students who had completed at least one online course were selected. Initially, the researchers discussed the questionnaire separately with each group. Following adjustments based on their feedback, a combined meeting was conducted online, following the approach suggested by Sumi and Kabir (2021). Based on these discussions, 22 statements related to service quality and five statements related to online-class were finalized for the study.

Cronbach's Alpha was conducted to assess the internal consistency of each SERVQUAL dimension and the online-class dimension. The results indicated that the SERVQUAL dimensions—tangibility, reliability, assurance, and empathy—had Alpha values ranging from 0.7 to 0.8, considered acceptable (Doll et al. 1995). However, the Alpha value for the responsiveness dimension was 0.577, which falls into questionable range. Despite this, the

overall Cronbach’s Alpha for SERVQUAL (22 items) and the online-class dimension (5 items) were 0.88 and 0.818, respectively, indicating good internal reliability (Doll et al., 1995). Individual values are presented in Table 1.

Table 1: Cronbach’s Alpha

Dimensions	Number of Items	Cronbach’s Alpha	Intra-class Correlation
Tangible	4	0.709	0.983
Reliability	5	0.704	0.937
Responsiveness	4	0.577	0.961
Assurance	4	0.706	0.989
Empathy	5	0.752	0.944
Online class	5	0.818	0.984

An intra-class correlation (ICC) analysis was conducted using 50 samples with a test-retest method, considering a 15-day interval between tests. Test-retest was conducted to ensure the reliability of data obtained from respondents, and intra-class correlation was calculated to ensure the reliability of data collected from respondents. The analysis was performed in SPSS 27, using a two-way mixed-effects model with absolute agreement. The ICC values ranged from 0.931 to 0.989, indicating excellent reliability, as suggested by Koo and Li (2016).

4. Results and Findings

The demographic distribution of respondents is shown in Table 2. 54.99% of the respondents were female, while 45.01% were male, whereas 82.71% of the respondents were unmarried (single), and 17.29% were married. Most respondents were working (68.51% of the total respondents) and 53.66% of the respondents were studying online from rural areas (villages), whereas 46.34% were studying from urban areas (cities). Graduate students were higher than undergraduates in response where 56.76% of the respondents were pursuing graduate (master’s) studies, while 43.24% were at the undergraduate (bachelor’s) level.

Table 2: Demographic Information (n=451)

Variable	Frequency	Percent (%)
Gender		
Female	248	54.99
Male	203	45.01
Marital Status		
Unmarried	373	82.71
Married	78	17.29
Employment status		
Unemployed	309	68.51
Employed	142	31.49
Geographic location of the respondents		
Rural area (village)	242	53.66
Urban area (city)	209	46.34
Pursuing Degree		
Undergraduate (bachelor)	195	43.24
Graduate (master)	256	56.76

The average values for the five service quality attributes, tangibles, reliability, responsiveness, assurance, and empathy, ranged from 3.58 to 3.86, where 0 was the minimum and 5 was the maximum, with standard deviations between 0.576 and 0.646. They were averaged to calculate service quality value. This resulted in an overall average perceived service quality score of 3.72 with a standard deviation of 0.473. The average value for online-class was 3.43, with a standard deviation of 0.781, as shown in Table 3 (also in figure 3).

Table 3: Descriptive Statistic of Dimensions of Service Quality and Online-Class

Dimensions	Mean	Standard deviation	Coefficient of Variance
Tangible	3.59	0.646	17.99%
Responsiveness	3.58	0.631	17.63%
Reliability	3.83	0.576	15.04%
Assurance	3.86	0.624	16.17%
Empathy	3.75	0.624	16.64%
Service quality	3.72	0.473	12.72%
Online class	3.43	0.781	22.77%

The zero-order correlation among tangible, reliability, responsiveness, assurance, and empathy was weak and positive, but the p-value shows that these relations were significant. Details are shown in Table 4 (also in figure 3).

Table 4: Correlation Matrix of Dimensions of Service Quality

	Tangible	Reliability	Responsiveness	Assurance	Empathy	Service quality
Tangible	1					
Reliability	0.653**	1				
Responsiveness	0.406**	0.407**	1			
Assurance	0.485**	0.553**	0.467**	1		
Empathy	0.341**	0.431**	0.467**	0.521**	1	
Online Class	0.466**	0.483**	0.330**	0.526**	0.434**	0.591**

Note: ** indicates that significant at 0.01

The average perceived quality between males and females was slightly different but more than 3, and the p-value shows that the difference was not significant, whereas the value was higher for married respondents but significant compared to unmarried respondents. Similarly, the correlation between online class and service quality was 0.591 with a p-value of 0.000, indicating that the relation is positively moderate and significant. Correlation results are shown in Table 5.

Table 5: Service Quality of Digital Education and its Significance

Category	Mean	SD	SE	t-value	p-value
Female	3.71	0.402	0.0255	0.425	0.671
Male	3.73	0.549	0.0385		
Married	3.69	0.480	0.0248	2.693	0.007
Unmarried	3.85	0.420	0.0476		
Rural	3.68	0.475	0.031	1.814	0.070
Urban	3.76	0.468	0.032		
Unemployed	3.70	0.401	0.026	-0.947	0.344
Employed	3.75	0.500	0.042		

The average perceived quality of online learning between respondents from rural and urban areas was slightly different but more than 3, and the p-value shows that the difference was insignificant. Similarly, the perceived quality of online learning among married respondents was little more than unmarried, and test statistics (p-value=0.007) are significant.

The results of the hypothesis tests are summarized in Table 6. The p-values for differences in perceived service quality based on gender, study location, and employment status were all greater than 0.05, indicating that these differences were not statistically significant. As a result, H1, H3 and H4 were rejected. The p-value for the difference in perceived quality based on marital status was less than 0.05, indicating a significant difference,

leading to the acceptance of H2. H5 regarding a significant and positive relationship between service quality and online classes was also accepted.

Table 6: Hypotheses Testing

	Statement	Test Value	Sig.	Result
H1	There is a significant difference in the perceived quality of e-learning based on gender.	0.425	0.671	H1 Rejected
H2	There is a significant difference in the perceived quality in e-learning based on marital status.	2.693	0.007	H2 Accepted
H3	There is a significant difference in perceived quality in e-learning based on study place.	1.814	0.070	H3 Rejected
H4	There is a significant difference in perceived quality in e-learning based on employment status.	-0.947	0.344	H4 Rejected
H5	There is a significant relationship between perceived quality and online-classes.	0.591 (correlation value)	0.000	H5 Accepted

5. Discussion

This study found that student's perception of the quality of e-learning during the pandemic in Nepal was moderate and that they were satisfied with the service. It indicated that students agreed on the quality of online education during the pandemic. The range of elements of service quality was moderate (between 3 and 4), implying that there was room for further improvement in the quality of digital education. Assurance had the highest value, followed by reliability, empathy, tangible, and responsiveness. In particular, the subject matter of teaching, lecture delivery, understanding, and interaction received low scores. This finding is similar to the findings of past studies (Al-Mushasha and Nassuora 2012; Nayak and Alam 2022; Alqahtani et al. 2022). The higher score given to assurance means that students were satisfied with teachers' and staff's services. However, responses also indicated that besides lecture delivery, instructors must use discussion and presentation methods to make lectures more engaging.

The study results indicate no significant difference in perception of digital service quality concerning students' gender and employment status. Thus, males and females do not perceive significant differences in service quality. However, there was a significant difference between married and unmarried respondents and respondents learning from rural and urban areas. This finding is similar to the findings of past studies (Agrawal, Verma, and Malhotra, 2021; Dursun, Oskaybas, and Gokmen, 2013; Limbu and Pham, 2023; Richardson, Long, and Woodley, 2003). Udo et al. (2011) confirmed that besides reliability, students' perceived quality was impacted by four other dimensions. In a study, Sumi and Kabir (2021) found that students' ratings of all dimensions were harmonious, and there was a significant effect on perceived service quality. Students' positive perception of the quality of online education services during the Covid 19 pandemic confirms its usefulness and perceived benefit.

Regarding the new online-class dimension, the score was lower than other dimensions of the SERVQUAL model (Fig. 3). Statements on this dimension included factors such as electricity supply, internet speed, availability of digital technologies, and space for the study, which received a moderate response. Past studies also show that students' motivation for online learning in the Global South was affected by the lack of electricity supply, access to the internet, and multimedia devices (Agrawal, Verma, and Malhotra, 2022; Chaudhary et al. 2022). This implies that HEIs must address electricity and internet facilities both within the institution and on the students' side. Implementing a mechanism to gather feedback from parents may help HEIs to ensure the quality of online education. Since the perception varies by place of study (rural and urban), HEIs may also collaborate with government agencies to address issues rural students face, such as electricity, internet, and digital technology.

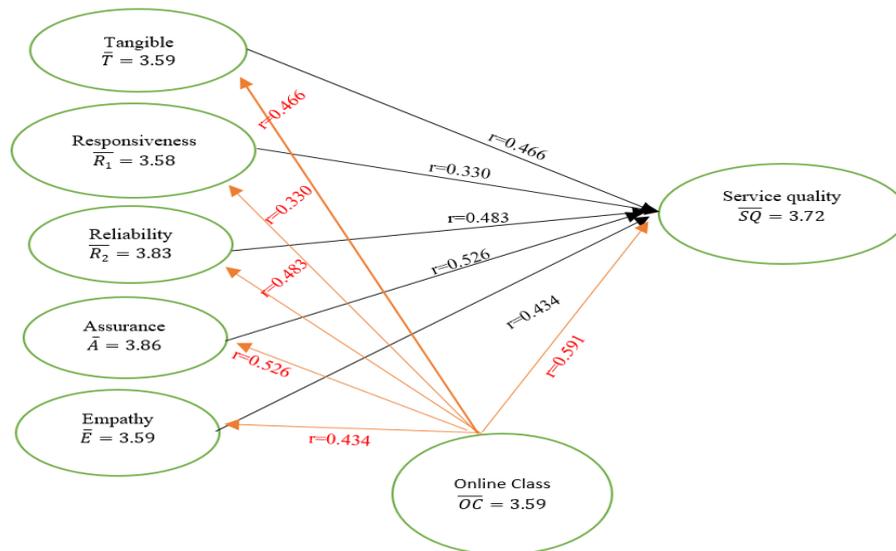


Figure 3: Mean and Correlation Coefficients of Dimensions of SERVQUAL and Online class

The findings concerning the overall dimensions of the SERVQUAL model, precisely the new online-class dimension, reveal that higher education institutions across developing countries, including Nepal, could rethink higher education policies as well as the pedagogical avenues. Blended mode of learning could be more effective to satisfy the students' needs. Policymakers need to address the digital divide between rural and urban areas. Managers in the universities should train both instructors and staff on aspects of e-learning pedagogy, such as engagement with students, develop feedback system, and interactive classes. A major dimension of the new policy should be to enhance the quality of online-class. This would significantly improve quality of e-learning in universities.

6. Conclusion

This study concludes that Nepalese students positively responded to the switch to e-learning during Covid 19 despite emergency measures, implying their satisfaction with the quality of the service. Among five SERVQUAL dimensions representing the quality of the education service, students rated high responsiveness, followed by reliability, tangibility, assurance, and responsiveness. Online class dimension was another predictor of the quality of e-learning that precisely reflects the condition of service delivery in Nepal. It was the precondition to mend the e-learning service through the other five dimensions. The quality of distance education also depends on students' demography. This study further concludes that HEIs in Nepal need specific programs to improve the quality of e-learning, focusing primarily on the items represented by online-class dimension. HEIs need to collaborate with government agencies to maintain and improve online teaching facilities. HEIs need to organize faculty training programs. Instructors need to be dressed up and combine lectures and group discussion methods. Mechanisms to establish contacts and get feedback responses from students and other stakeholders seem helpful.

6.1 Limitations and Future Research Implications

Even though this study expanded the knowledge of the student's perception of the quality of e-learning, it has several limitations. Similarly, prospects for future research remain.

First, this study is based on samples from six different universities in Nepal. Therefore, generalizations of e-learning quality may be overstatements because they may differ in the case of individual universities. This might be true because universities in Nepal vary regarding history, number of students, teachers and administrative staff, and location. Each factor influences the quality of distance education. Any further studies could pick one of the HEIs and examine the quality.

Second, this research partially adopted SERVQUAL measures, i.e., 22 items of Likert scales of perception, but scales for expectation measurement are left. We argue that expectation is not an applicable component to measure the quality of digital education during the Covid 19 pandemic because the online learning mode was an emergency measure that students had no other options to retain in the education system. Assessing the gap

between expectation and perception could reveal an accurate picture of digital education's quality. Future research should consider this.

Third, this study contextualized the Covid 19 pandemic to assess the quality of e-learning. It has not been considered the pre- and post-Covid 19 periods to examine the quality as digitalization is gaining momentum post-pandemic, either solo or blended mode, its quality concerns in all contexts and periods. Therefore, any future studies could compare pre-pandemic era and post-pandemic era data and examine an accurate picture of the quality of e-learning and predict its future.

Ethics Statement: Participants in this study were informed before including in this study. They gave full approval of using the information for the purpose of this study. The survey was also approved by the ethics committee of Center for Nepal and Asian Studies (CNAS), Tribhuvan University (TU).

AI Statement: Authors declare that artificial intelligence was not used to prepare this study.

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