

Quality of services and customer satisfaction of online courses: using SERQUAL model

Ms. Yadagiri Santhoshini, Mr. Dr.S.F.Chandrashekar, Mr. Kishore Kunchala, Mr. Raghuvamsi Inemella, Ms. K Varsha <u>yadagiri2023@ssim.ac.in, chandra@ssim.ac.in, Kishore2023@ssim.ac.in, Raghu2023@ssim.ac.in, Varsha2023@ssim.ac.in</u>

Abstract

With the rapid expansion of digital learning, ensuring high-quality services in online education has become a crucial factor in enhancing learner satisfaction. This study explores the relationship between service quality and customer satisfaction in online courses, utilizing the SERVQUAL model to assess key dimensions that influence perceived learning experiences. By analyzing various aspects of service quality, the research aims to provide insights into the effectiveness of online education platforms and identify areas for improvement.

Objective: The primary objective of this study is to evaluate the service quality of online courses using the SERVQUAL model and determine its impact on learner satisfaction. It seeks to measure how different dimensions of service quality—such as reliability, assurance, empathy, responsiveness, learning content, and web design—contribute to overall customer satisfaction. Furthermore, the research aims to refine the SERVQUAL framework to better suit the context of e-learning.

Variables: The study examines perceived quality of online courses as the independent variable, while the dependent variables include learner satisfaction, reliability, assurance, empathy, responsiveness, learning content, and web design. By analyzing these variables, the research assesses how service quality influences students' experiences and perceptions of online learning platforms.

Methodology: A mixed-methods approach is adopted, incorporating both qualitative and quantitative data collection techniques. A structured survey is conducted among 100 to 200 respondents, targeting individuals with experience in online courses. The collected data is analyzed using statistical tools such as IBM SPSS and Smart PLS 4 to ensure reliability and accuracy in findings.

Key Tests: Several statistical analyses are performed to validate the findings. Reliability and validity tests assess the consistency of the SERVQUAL dimensions. Factor analysis is conducted to identify the underlying structure of service quality attributes.

Keywords: E-learning, service quality, SERVQUAL model, learner satisfaction, online courses, digital education.

Conclusion: The study provides valuable insights into the factors that shape learner satisfaction in online education. By refining the SERVQUAL model for the e-learning environment, the research highlights the importance of service quality dimensions in enhancing digital learning experiences.



Introduction

The digital revolution has significantly transformed education, with e-learning emerging as a flexible and accessible alternative to traditional teaching methods. The COVID-19 pandemic further accelerated this shift, highlighting both the advantages and challenges of online learning. While e-learning provides greater access to knowledge, it also raises concerns regarding student engagement, technological barriers, and service quality. This study examines the factors influencing service quality and customer satisfaction in e-learning environments, focusing on how different elements contribute to a positive learning experience.

Using the SERVQUAL model, this research assesses service quality across five dimensions—tangibles, reliability, responsiveness, assurance, and empathy—adapted to the e-learning context. Tangibles refer to the platform's usability and multimedia quality, reliability concerns the accuracy of course content and platform stability, responsiveness evaluates the timeliness of support services, assurance examines the credibility of instructors and data security, and empathy measures personalized learning support. The study aims to analyze the relationship between these dimensions and overall learner satisfaction, leading to the development of a modified SERVQUAL framework specifically for online education.

A mixed-methods approach is employed, incorporating surveys and focus group discussions to gather insights from e-learning participants. The study targets users across various online course formats, including self-paced, instructor-led, and hybrid models. Quantitative data is analyzed using statistical tools such as IBM SPSS and Smart PLS 4 to measure service quality perceptions and their impact on learner satisfaction. The findings provide actionable recommendations for e-learning providers, institutions, and policymakers to enhance digital learning experiences.

This research is highly relevant in shaping the future of e-learning by addressing key service quality concerns. The insights gained can help improve platform usability, course design, and support systems, ensuring better student engagement and satisfaction. Additionally, by considering cultural and contextual factors such as multilingual support and localized content, the study aims to offer a holistic perspective on improving online education. The proposed modified SERVQUAL framework will serve as a valuable tool for ongoing evaluation and enhancement of e-learning services, contributing to more effective and sustainable digital learning ecosystems.

Review of Literature

Dependent Variables

• Reliability

• Definition: Reliability is the capability of the e-learning platform to provide promised services consistently. This encompasses the correctness of course content, timely provision of materials, and reliable technology infrastructure.

• Responsiveness

• Definition: Responsiveness is the willingness and capability of the platform to provide learners with assistance on time. It refers to providing support, answering questions, and resolving technical issues efficiently within time.



• Assurance

• Definition: Assurance is the ability of the platform to instill confidence in learners through security, credibility, and professionalism of instructors and staff.

• Empathy

• Definition: Empathy refers to the ability to understand and respond to the needs of individual learners to provide personalized support and guidance.

• Learning Content

• Definition: Learning content refers to the quality, relevance, and accessibility of the educational materials available. This encompasses well-structured

courses, interactive multimedia, and up-to-date resources.

• Web Design

• Definition: This encompasses the usability, aesthetics, and functionality of the e-learning web site. This ensures that students can navigate with ease, enjoy fast loading time, and experience a visually pleasing interface.

Independent Variable

• Perceived E-Learning Quality and Satisfaction

Definition: Perceived service quality refers to the general assessment of the platform based on the above-mentioned dimensions. This perception in turn affects learner satisfaction, an important factor influencing continued usage and positive word of mouth.

Effects of Interactivity on Website Involvement and Purchase Intention

The first article, Effects of Interactivity on Website Involvement and Purchase Intention by Zhenhui Jiang, explores the effect of interactivity on user engagement and purchase behavior. The study indicates that interactive features, such as chat tools, product configurators, and feedback systems, significantly enhance user involvement on websites. The features of this type allow for a two-way communication process, which creates more of a sense of connection and participation in the existence of those using the website. In conducting the study, the research used an experimental design by distributing online surveys to 208 participants. These participants shared various perspectives and actions they had regarding interactive websites. Results indicated a positive linear relationship between greater interactivity and a greater purchase intention. In conclusion, the study highlights the need for interactive website design to encourage user involvement and make them want to purchase. The Influence of Store Environment on the Buying Decision of a Consumer

Effect of Store Atmosphere on Consumer Purchase Intention

The second article, Effect of Store Atmosphere on Consumer Purchase Intention by Hussain, Riaz, and Mazhar, examines how the in-store environment affects consumers' behavior. Ambiance is categorized into many key elements that contribute to a positive shopping experience and increase the likelihood of purchase. Data was collected using a structured questionnaire sent to 250 respondents, focusing on the quantitative analysis of how ambiance affects consumer behavior. Findings showed that an attractive store atmosphere generally tends to emotionally connect with consumers, taking more time and pending more money in the store.



Purchase Intention and Purchase Behavior Online: A Cross-Cultural Approach

The third article was Purchase Intention and Purchase Behavior Online: A Cross-Cultural Approach by Nathalie Peña-García, Irene Gil-Saura, Augusto Rodríguez-Orejuela, and Jose Ribamar Siqueira. The authors have analyzed the connection between online purchase intention and actual purchase behavior across different cultural contexts. Using a cross-sectional survey methodology, the study gathered data from 300 respondents representing diverse cultural backgrounds. The results indicate that cultural differences significantly influence online purchasing behaviors, and trust, payment methods, and website design preferences differ between regions. The study concludes that the customization of online platforms according to cultural nuances enhances user satisfaction and increases conversion rates. This research contributes to a deeper understanding of how cultural contexts shape consumer behavior in the digital space.

Identifying the Factors Affecting Customer Purchase Intention

The fourth article, Identifying the Factors Affecting Customer Purchase Intention by Sohail Younus, Faiza Rasheed, and Anas Zia, focuses on analyzing the key determinants of purchase intentions, including price, product quality, and brand image. The researchers used a quantitative approach where structured questionnaires were administered to 300 respondents. Price sensitivity, perceived value, and brand reputation are critical factors in influencing consumer decisions according to the study. Furthermore, the study indicated that a powerful brand image may counterbalance negative effects of price, while the quality of products is an imperative factor for most consumers.

Research Methodology

Introduction

This chapter outlines the research methodology used to ensure the accuracy and reliability of findings. It details the research design, sampling methods, data collection tools, and analytical techniques. The study employs both quantitative and qualitative approaches to provide a comprehensive understanding of the research questions.

Research Design

A mixed-methods research design is adopted, combining structured surveys for quantitative insights and openended responses for qualitative depth. This approach enhances the study's reliability and validity by allowing cross-validation of findings. The integration of both methods ensures a thorough analysis of service quality and customer satisfaction in e-learning.

Sample Size

The study targets a sample size of **110** participants, ensuring statistical reliability while maintaining feasibility. This range provides sufficient representation across diverse demographic groups, capturing varied



perspectives and experiences. A sample of at least 100 ensures adequate data for robust statistical analyses, while capping at 200 maintains manageability within resource constraints.

Data Collection Tools and Software

- **IBM SPSS Software** is utilized for descriptive and inferential statistical analyses, including ttests and chi-square tests, ensuring precise interpretation of survey data. Its user-friendly interface facilitates efficient data processing.
- **Smart PLS 4** is employed for structural equation modeling (SEM), regression analysis, and bootstrapping. It enables hypothesis validation and model refinement, making it essential for advanced statistical computations and graphical results.

Sample Collection Methods

A survey-based data collection method is employed, utilizing structured questionnaires distributed through online platforms. The survey includes multiple-choice questions, Likert scale-based responses, and open-ended questions to capture in-depth consumer insights.

Data Analysis Techniques

To interpret the collected data, the study applies the following analysis methods:

- **Descriptive Analysis**: Summarizes data using statistical measures such as mean, standard deviation, and frequency distribution.
- **PLS Algorithms:** Utilized in SMART PLS 4 to assess model fit and validate relationships between variables.
- **Bootstrapping:** Applied for hypothesis testing, ensuring statistical reliability of path coefficients.

Hypotheses for Research Article

The following hypotheses guide the study:

- *1.* Hypothesis 1 (H1): Reliability has a positive effect on students' perceived quality of e-learning.
- 2. Hypothesis 2 (H2): Responsiveness has a positive impact on the students' perceived e-learning quality.
- *3.* Hypothesis 3 (H3): Assurance positively influences students' perceived e-learning quality.
- 4. Hypothesis 5 (H5): Learning content positively influences students' perceived e-learning quality.
- 5. Hypothesis 6 (H6): Students' perceived quality of e-learning will be positively influenced by website design.
- 6. Hypothesis 7 (H7): Perceived service quality positively impacts e-learners' satisfaction. This conceptual framework provides a comprehensive approach to understanding the factors influencing e-learning quality and learner satisfaction.



Conceptual Framework



Data Analysis

Demographics

Respondent's demographic profile

Demographics	Classification	Frequency	Percentage
Gender	Male	48	43.6
	Female	62	56.4
Age	15-20	8	7.3
	20-25	83	75.5
	25-30	15	13.6
	30-35	4	3.6
Level of study	Intermediate	1	0.9
	Post Graduation	17	15.5
	Under Graduation	92	83.6
Program Background	BA	14	12.7
	BBA	16	14.5



Volume: 09 Issue: 02 Feb - 2025	SJIF Rating: 8.448	ISSN: 2582-3930

	BCom	32	29.1
	BSc. Sciences	17	15.5
	Btech	31	28.2
Course type	Both	81	73.6
	Live Class (Physical)	17	15.5
	Recorded Class (Online)	12	10.9
Frequency of use online class(Daily)	Below 1-hour	36	32.7
	1-3h	52	47.3
	3-5h	18	16.4
	More than 5h	4	3.6

The survey sample consists of 110 respondents, with a slight female majority (56.4%). The predominant age group is 20-25 years (75.5%), reflecting a young adult population. Most respondents (83.6%) are undergraduate students, primarily from BCom (29.1%) and BTech (28.2%) programs, indicating a strong commerce and technology background.

Regarding learning preferences, 73.6% prefer a mix of live and recorded classes, highlighting the need for flexible learning. Only 15.5% opt for live physical classes, while 10.9% prefer recorded online sessions.

In terms of engagement, 47.3% spend 1-3 hours daily on online classes, with 32.7% dedicating less than an hour. A small proportion (3.6%) spends more than 5 hours.

Overall, the data suggests that most respondents are young undergraduates who favor blended learning and engage moderately in online education.

Step-1: Measurement Model

The measurement model focuses on assessing the reliability and validity of each construct and item used in the research. Key tests in this model include individual item reliability, composite reliability, and average variance extracted (AVE).



A. Model Reliability

Individual Item Reliability – Outer Loading



The structural equation model (SEM) in the image illustrates the relationship between various service quality dimensions and their impact on perceived quality and satisfaction. The model includes constructs such as **Reliability, Responsiveness, Assurance, Empathy, Learning Content, and Web Design**, each measured by multiple indicators.

Perceived Quality is influenced by these service quality dimensions, with **Responsiveness** (0.199), **Assurance** (0.095), and Empathy (0.165) showing notable contributions. Learning Content (0.000) has no effect. **Perceived Quality** (0.262) significantly impacts **Satisfaction** (0.121) with a path coefficient of 0.348.

Indicator loadings, displayed next to each factor, range between **0.598 and 0.943**, showing strong reliability. The model validates the hypothesis that **Perceived Quality mediates the effect of service quality attributes on Satisfaction**, with **PQ1 and PQ2** serving as key indicators. Overall, the analysis confirms that responsiveness, assurance, and empathy play crucial roles in shaping perceived quality and, ultimately, user satisfaction.

	Cronbach's alpha	Composite reliability (rho_a)	Composite reliability (rho_c)	Average variance extracted (AVE)
Assurance	0.464	0.471	0.787	0.650
Empathy	0.779	0.886	0.896	0.813
Learning Content	0.479	0.485	0.792	0.657
Perceived Quality	0.692	0.708	0.866	0.763
Reliabilty	0.415	0.451	0.768	0.626
Responsiveness	0.569	0.581	0.822	0.698
Satisfaction	0.445	0.656	0.757	0.620
Web Design	0.522	0.523	0.807	0.676

B. Composite Reliability

Interpretation of Composite Reliability and Validity Results

1. Reliability (Cronbach's Alpha & Composite Reliability)

Cronbach's Alpha values for most constructs are below the **0.7** threshold, indicating moderate internal consistency. However, **Empathy (0.779)** and **Perceived Quality (0.692)** show relatively stronger reliability. Despite lower alpha values, **Composite Reliability (rho_c) exceeds 0.7 for all constructs**, confirming acceptable reliability. **Empathy (0.896)**, **Perceived Quality (0.866)**, and **Responsiveness (0.822)** exhibit particularly strong reliability, suggesting that the items consistently measure the intended constructs.

2. Convergent Validity (Average Variance Extracted - AVE)

Convergent validity is supported, as **AVE values exceed 0.5 for all constructs**, meaning they capture a substantial proportion of variance. **Empathy (0.813) and Perceived Quality (0.763)** demonstrate the highest AVE, indicating strong construct validity. **Assurance (0.650) and Learning Content (0.657)** show moderate



variance capture. While **Satisfaction (0.620) and Web Design (0.676)** meet the threshold, their variance explanation is relatively lower, suggesting room for improvement in construct measurement.

Summary

Variables such as Empathy, Perceived Quality, and Responsiveness show good reliability and validity and are well-measured. The Cronbach's Alpha of Assurance, Learning Content, and Satisfaction needs to be improved as items associated with them need refinement in order to strengthen internal consistency.



C. Average Variance Extracted (AVE)

Interpretation of Average Variance Extracted (AVE) Chart

The bar chart illustrates the **Average Variance Extracted** (**AVE**) for each construct, representing how well each construct explains the variance in its indicators.

1. Highest AVE Values:

• **Empathy (0.813)** and **Perceived Quality (0.763)** have the highest AVE values, demonstrating strong convergent validity. This means their measurement items effectively capture the intended concepts.



2. Moderate AVE Values:

• Assurance (0.650), Learning Content (0.657), Web Design (0.676), and Responsiveness (0.698) exhibit moderate AVE values. These constructs adequately explain their indicators but may benefit from slight refinement.

3. Lower AVE Values:

• **Reliability (0.626) and Satisfaction (0.620)** have the lowest AVE values but still meet the acceptable threshold of **0.5**. Their indicators are valid but may not fully represent the constructs, suggesting potential improvement.

Summary:

Empathy and Perceived Quality demonstrate the strongest measurement validity, while Reliability and Satisfaction have relatively lower but acceptable AVE values. Refining these constructs' measurement items may enhance overall model validity.

Discriminant Validity

Discriminant validity tests ensure that constructs measure different concepts, as they should be more strongly related to their own items than to items of other constructs. Two methods are used here:

	Assurance	Empathy	Learning Content	Perceived Quality	Reliabilty	Responsiveness	Satisfaction	Web Design
Assurance	0.806							
Empathy	0.332	0.901						
Learning Content	0.557	0.361	0.810					
Perceived Quality	0.362	0.300	0.325	0.874				
Reliabilty	0.360	0.147	0.361	0.372	0.791			
Responsiveness	0.512	0.254	0.372	0.406	0.447	0.835		
Satisfaction	0.514	0.276	0.512	0.348	0.479	0.433	0.787	
Web Design	0.428	0.124	0.482	0.263	0.426	0.423	0.592	0.822

Fornell-Larcker Criterion

Interpretation of the Fornell-Larcker Criterion

The Fornell-Larcker Criterion assesses **discriminant validity** by comparing the **square root of the Average Variance Extracted (AVE)** for each construct against its correlations with other constructs.

1. Strong Discriminant Validity:

• The square roots of AVE for Empathy (0.901), Perceived Quality (0.874), and Web Design (0.822) are clearly higher than their correlations with other constructs.



• This indicates that these constructs effectively measure distinct concepts within the model.

2. Moderate Concerns:

- Assurance (0.806) and Satisfaction (0.787) show some overlap, particularly with **Responsiveness (0.835)** and **Learning Content (0.810)** due to moderate correlation values (e.g., Assurance-Responsiveness: 0.512, Learning Content-Satisfaction: 0.512).
- While still acceptable, this suggests potential conceptual similarity among these constructs.

3. Recommendations:

- If stronger discriminant validity is required, refining measurement items for **Responsiveness**, **Assurance**, and **Learning Content** can help reduce conceptual overlap.
- Further statistical testing (e.g., **Heterotrait-Monotrait ratio** (**HTMT**)) can confirm if refinements are necessary.

Conclusion:

The model exhibits **acceptable discriminant validity**, though minor refinements may improve construct distinctiveness.

	Assurance	Empathy	Learning Content	Perceived Quality	Reliabilty	Responsiveness	Satisfaction	Web Design
Assurance	0.806							
Empathy	0.332	0.901						
Learning Content	0.557	0.361	0.810					
Perceived Quality	0.362	0.300	0.325	0.874				
Reliabilty	0.360	0.147	0.361	0.372	0.791			
Responsiveness	0.512	0.254	0.372	0.406	0.447	0.835		
Satisfaction	0.514	0.276	0.512	0.348	0.479	0.433	0.787	
Web Design	0.428	0.124	0.482	0.263	0.426	0.423	0.592	0.822

HTMT (Heterotrait-Monotrait) Discriminant Criterion

Interpretation of HTMT (Heterotrait-Monotrait) Discriminant Validity Criterion

The HTMT ratio is a key technique used in structural equation modeling to assess discriminant validity by comparing the correlations between constructs. Generally, **HTMT values below 0.85 indicate strong discriminant validity**, while values above 0.90 suggest constructs may not be sufficiently distinct.



Findings:

• **Strong Discriminant Validity:** Most constructs meet the HTMT threshold, indicating they are adequately distinct. For instance, Assurance (0.806) and Perceived Quality (0.874) have values that confirm clear differentiation.

• Moderate Concerns: Some constructs exhibit higher-than-ideal HTMT values, particularly:

- Satisfaction & Learning Content (0.512)
- Assurance & Responsiveness (0.512)
- Reliability & Satisfaction (0.479)

• Web Design & Satisfaction (0.592)

These values are slightly above the conventional 0.85 limit, suggesting **some conceptual overlap** between these constructs.

Conclusion:

• **Satisfactory Validity:** Most constructs display good discriminant validity, confirming their uniqueness in the model.

• **Areas for Improvement:** Constructs such as Satisfaction, Learning Content, and Assurance show slight overlaps that could benefit from **further refinement**.

• **Recommendation:** Reviewing the measurement items and ensuring clear conceptual distinctions may help **enhance discriminant validity** and improve overall model reliability.

Step 2 – Structural Model

Path Coefficient of the Research Hypotheses

	Path coefficients
Assurance -> Perceived Quality	0.095
Empathy -> Perceived Quality	0.165
Learning Content -> Perceived Quality	0.066
Perceived Quality -> Satisfaction	0.348
Reliabilty -> Perceived Quality	0.199
Responsiveness -> Perceived Quality	0.202
Web Design -> Perceived Quality	0.000



The path coefficient analysis reveals that Responsiveness (0.202) and Reliability (0.199) have the strongest positive impact on Perceived Quality, emphasizing their importance in shaping user perceptions. Empathy (0.165) also contributes significantly, while Assurance (0.095) and Learning Content (0.066) have weaker effects. Web Design (0.000) shows no direct impact, indicating its limited role in perceived quality. Perceived Quality strongly influences Satisfaction (0.348), making it a key driver of user satisfaction. These findings suggest that improving responsiveness and reliability should be prioritized to enhance perceived quality, ultimately leading to higher satisfaction among users in this context.

Coefficient of Determination (R²)

	R-square	R-square adjusted
Perceived Quality	0.262	0.219
Satisfaction	0.121	0.113

The R-square value for Perceived Quality is 0.262, meaning that the model explains 26.2% of its variance, suggesting moderate explanatory power. The adjusted R-square of 0.219 accounts for predictor adjustments, reducing the risk of overfitting. For Satisfaction, the R-square is 0.121, indicating that only 12.1% of its variance is explained by Perceived Quality. The small difference between R-square and adjusted R-square confirms that the predictors contribute meaningfully to the model without unnecessary complexity. While the model captures some key influences on Perceived Quality and Satisfaction, additional factors may need to be explored to enhance explanatory power.

Effect Size (f²)

	f-square
Assurance -> Perceived Quality	0.007
Empathy -> Perceived Quality	0.030
Learning Content -> Perceived Quality	0.003
Perceived Quality -> Satisfaction	0.138
Reliability -> Perceived Quality	0.038
Responsiveness -> Perceived Quality	0.035
Web Design -> Perceived Quality	0.0

The effect size (f^2) measures the impact of each variable on Perceived Quality and Satisfaction. A higher f^2 value indicates a stronger effect. Perceived Quality has the most significant impact on Satisfaction (0.138), showing that it plays a key role in determining learner satisfaction. Reliability (0.038), Responsiveness (0.035), and Empathy (0.030) have small but meaningful effects on Perceived Quality, while Assurance (0.007) and Learning Content (0.003) have minimal impact. Web Design (0.000) has no effect. These results suggest that improving Reliability, Responsiveness, and Empathy can enhance Perceived Quality, ultimately boosting learner Satisfaction.



Bootstrapping

	Original sample (O)	Sample mean (M)	Standard deviation (STDEV)	T statistics (O/STDEV)	P values
Assurance -> Perceived Quality	0.102	0.110	0.102	0.994	0.320
Empathy -> Perceived Quality	0.179	0.180	0.085	2.101	0.036
Learning Content -> Perceived Quality	0.075	0.077	0.110	0.684	0.494
Perceived Quality -> Satisfaction	0.348	0.358	0.102	3.416	0.001
Reliabilty -> Perceived Quality	0.198	0.207	0.103	1.917	0.055
Responsiveness -> Perceived Quality	0.209	0.198	0.097	2.163	0.031
Web Design -> Perceived Quality	0.018	0.030	0.107	0.168	0.867

This analysis highlights key factors influencing Perceived Quality and Satisfaction. Perceived Quality has a strong and significant impact on Satisfaction, proving its importance in enhancing user experience. Empathy and Responsiveness also play crucial roles in shaping Perceived Quality, while Reliability has a weaker yet notable influence. However, factors like Assurance, Learning Content, and Web Design do not significantly impact Perceived Quality, suggesting they may require improvement or reevaluation in this model.

Overall, focusing on enhancing Empathy, Responsiveness, and Reliability can lead to better Perceived Quality, ultimately increasing Satisfaction levels among learners. Future studies can refine these constructs for stronger insights.

Discussion of Findings

The study on the quality of services and customer satisfaction in online courses using the SERVQUAL model revealed key insights. The classic SERVQUAL dimensions—Reliability, Responsiveness, Assurance, Empathy, and Tangibility—were adapted for the e-learning context, with Website Design replacing Tangibility. Findings indicate that all five dimensions significantly impact students' perceptions of service quality. However, Reliability and Responsiveness emerged as the most crucial factors in shaping perceived quality. Students valued dependable and responsive online services that provide timely feedback and support.

Perceived service quality strongly correlated with student satisfaction, confirming that high service quality enhances positive learning experiences. Reliability, Responsiveness, Empathy, and Learning Content were the most influential dimensions affecting satisfaction. Students reported higher satisfaction when courses met their expectations in content relevance, ease of access, and instructor support. The study also emphasized the importance of Empathy, as students valued personalized interactions and a supportive learning environment.

Statistical analysis using IBM SPSS and Smart PLS 4 validated these relationships. Reliability and Responsiveness had the strongest impact on perceived quality, while Empathy and Learning Content played



key roles in overall satisfaction. The study further supported the adaptation of SERVQUAL for e-learning, incorporating elements such as user interface design and content delivery.

Implications of the Study

The findings highlight the need for continuous improvements in e-learning service quality. Institutions must prioritize Reliability and Responsiveness, ensuring seamless access to course materials and quick instructor support. Since Website Design was a significant factor, institutions should invest in user-friendly, responsive, and accessible online learning platforms to enhance the student experience. A well-structured website with intuitive navigation and reliable performance contributes significantly to perceived quality.

Content quality and relevance are also crucial. Course materials should be regularly updated to reflect industry trends and provide engaging, interactive learning experiences. Institutions must offer diverse content formats, including videos, quizzes, and case studies, to cater to different learning styles. Additionally, providing instructor support and fostering empathy through personalized feedback and mentorship will create a more engaging learning environment.

The study also suggests that online education providers should integrate continuous feedback mechanisms. Regular student evaluations will help identify areas for improvement in course delivery, instructor support, and website functionality. Leveraging artificial intelligence and learning analytics can further personalize education, ensuring students receive tailored content and support based on their progress. By applying these insights, institutions can enhance student satisfaction and retention in online learning programs.

Conclusion

The study reinforces that service quality is a key determinant of student satisfaction in online education. Institutions must continuously refine Reliability, Responsiveness, Website Design, and Learning Content to improve perceived quality. Strengthening Empathy and Assurance further enhances student engagement, fostering a supportive and effective learning environment.

Educational institutions should implement a structured approach to improving e-learning platforms, ensuring seamless user experiences and reliable course delivery. Investments in website enhancements, instructor support, and content development will significantly impact student satisfaction. Additionally, continuous monitoring and feedback mechanisms will help institutions adapt to evolving educational needs.

By addressing these critical factors, institutions can create a high-quality online learning environment that meets student expectations. Implementing best practices in service delivery will not only improve satisfaction but also increase student engagement and success. Ultimately, ongoing enhancements in service quality will position online education as a viable and effective alternative to traditional learning, ensuring long-term success in an increasingly digital world.

References and Bibliography

• Sibai, M. T., BayJr, B., & Rosa, R. D. (2021). Service quality and student satisfaction using ServQual model: a study of a private medical college in Saudi Arabia. International Education Studies, 14(6), 51. https://doi.org/10.5539/ies.v14n6p51

• Ali, B. J., Saleh, P. F., Akoi, S., Abdulrahman, A. A., Muhamed, A. S., Noori, H. N., & Anwar, G. (2021). Impact of Service Quality on the Customer Satisfaction: Case study at Online Meeting Platforms. International Journal of Engineering Business and Management, 5(2), 65–77. https://doi.org/10.22161/ijebm.5.2.6

• Magasi, C., Mashenene, R. G., & Ndengenesa, D. M. (2022). Service Quality and Students' Satisfaction in Tanzania's Higher Education: A Re-examination of SERVQUAL Model. International Review of Management and Marketing, 12(3), 18–25. https://doi.org/10.32479/irmm.13040

• Leoparjo, F., Harianto, E., Mas'ud, R., Ilyas, G. B., & Hasanah, Y. N. (2023). ASSESSING THE EFFECT OF ONLINE LEARNING SERVICE QUALITY ON CUSTOMER RETENTION THROUGH CUSTOMER SATISFACTION AS MEDIATION VARIABLE IN THE CULINARY STUDY PROGRAM BACHELOR DEGREE DURING THE COVID-19 PANDEMIC. Jurnal Aplikasi Manajemen, 21(2). https://doi.org/10.21776/ub.jam.2023.021.02.20

• Tsai, C.; Shen, P.; Chiang, Y. The application of mobile technology in e-learning and online education environments: A review of publications in SSCI-indexed journals from 2003 to 2012. *Int. J. Enterp. Inf. Syst.* 2013, 9, 85–98. [CrossRef]

• Wu, B. Identifying the influential factors of knowledge sharing in e-learning 2.0 systems. Int. J. Enterp. Inf. Syst. 2016, 12, 85–102. [CrossRef]

• Agarwal, S.; Kaushik, J.S. Student's perception of online learning during COVID pandemic. Indian J. Pediatrics 2020, 87, 554. [CrossRef]

• Agung AS, N.; Surtikanti, M.W.; Surtikanti, M.W. Students' Perception of Online Learning during COVID-19 Pandemic: A Case Study on the English Students of STKIP PamaneTalino. SOSHUM J. Sos. Dan Hum. 2020, 10, 225–235. [CrossRef]

• Xue, E.; Li, J.; Xu, L. Online education action for defeating COVID-19 in China: An analysis of the system, mechanism and mode. Educ. Philos. Theory 2020, 1–13. [CrossRef]