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ENHANCING STUDENT SATISFACTION IN ONLINE DISTANCE LEARNING: DEVELOPMENT OF THE E-QUALS MODEL FOR SERVICE QUALITY ASSESSMENT

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Abstract

Higher education service quality is a key factor in shaping student satisfaction. The era of rapidly developing technology has given birth to various innovations in the world of higher education, one of which is online distance education. These innovations must be supported by high-quality services, which directly impact student satisfaction. A systematic literature review on research that examines the service quality factors of Online Distance Learning Universities from various countries will obtain a model of service quality factors in shaping student satisfaction in Online Distance Learning Universities. The purpose of this research is to identify and analyze significant service quality factors in shaping student satisfaction in Online Distance Learning Universities. In addition, this study also developed a conceptual framework in the form of a service quality model for student satisfaction in the context of distance higher education. The method used uses a qualitative approach, with the type of PRISMA (Preferred Reporting Items, for Systematic Review and Meta-Analyses). The results of this study reveal that student satisfaction with service quality in Online Distance Learning Universities is influenced by various factors of service quality namely e-learning system quality, course design and content, support services, interaction, teaching & Instructor quality, and technology resources & infrastructure. The result of the research is the E-QUALS model which is a theoretical framework modeling the dimensions of service quality factors that shape student satisfaction in Online Distance Learning Universities.

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INTRODUCTION

Education not only transfers knowledge but also develops skills and shapes a nation's character and civilization (Rabiah, 2019). Universities provide educational services, while students are the primary recipients. Higher education must ensure a high-quality learning process to prepare students for future challenges. So that to meet these demands, universities must create quality services to fully support student needs. According to Lovelock & Wright (1999), service quality is the level of excellence expected and control over that level of excellence to meet customer desires. In this case, students are the main customers of Higher Education (Mattah et al., 2018).

Customer satisfaction is a fundamental concept in modern marketing thought and practice, which emphasizes customer satisfaction and obtaining benefits in return (Supriyanto et al., 2024). Student satisfaction contributes to shaping the impression of credible education and educational institutions, and therefore satisfaction is important for marketing and admission purposes (Thygesen et al., 2020). The success of quality management in the world of education can be measured by the level of customer satisfaction (Rabiah, 2019). Kotler & Keller (2006) argue that satisfaction is a feeling of satisfaction or disappointment of customers based on a comparison of product or service performance with expectations. Student satisfaction is an issue that requires attention because it is related to a number of important factors, which are not only the business processes of higher education but are closely related to the student education process and the quality of educational services produced (Thygesen et al., 2020). Therefore, universities must ensure that their online learning environments align with student needs and expectations to maintain high levels of engagement and academic success.

The era of rapidly developing technology gave birth to various innovations in the world of higher education, one of which is online distance education. The new paradigm of integrating online learning into open and distance education is the way forward faced by *open universities* (Zuhairi et al., 2019). Service quality in this mode of learning significantly impacts student satisfaction, engagement, and overall educational outcomes. The significance of this study is particularly relevant given the increasing adoption of online learning as a mainstream educational model. According to DIKTI Letter Document No. 0827, there are currently 26 universities in Indonesia offering distance education programs across 94 study disciplines, encompassing state and private institutions. While ODL presents numerous opportunities for improving educational accessibility, it also introduces challenges related to maintaining service quality and ensuring student satisfaction. Research by Limbu & Pham (2023) underscores the importance of e-learning system usability, course design, and institutional support in determining student satisfaction. Similarly, Aheto et al. (2024) emphasize the necessity of continuous evaluation and refinement of service quality models to accommodate evolving technological advancements and student needs.

Online education has become mainstream, and improving the quality of online course services has become a social necessity (Li, 2024). Distance education promotes open access by removing time and location constraints, offering flexible learning for individuals and groups (Ferdousi et al., 2022). Most students choose distance education because it allows them to work and study at the same time (Shikulo & Lekhetho, 2020). The phenomenon of the covid pandemic in the last 2 years has made distance learning a necessity and adapted a new trend for higher education to organize distance education. Albanyan (2024) found that while students found distance education useful during the pandemic, they perceived it as less effective than face-to-face learning. Then research from Shikulo & Lekhetho (2020) found that many of the

students took longer to obtain qualifications due to high failure and high repetition rates attributed to lack of resources and underutilization by students, lack of collaboration between teachers and tutors, and low attendance rates of students and lecturers/tutors in tutorial classes. Based on this of course, it is necessary to evaluate how the quality of service is presented through student satisfaction.

User satisfaction, in this case students, is an important metric for assessing the quality of online education (Li, 2024). In designing, developing, and delivering distance education, students' needs must be considered (Zouiri & Kinani, 2022). Research on student satisfaction in distance higher education has been widely conducted, with various service factors as predictors of student satisfaction. However, further research on the quality of distance higher education services can be carried out by adding various elements or aspects of services that continue to develop as technology advances and the needs of higher education increase. Study from Momen et al. (2023) regarding *digital classroom services* recommends that research can be expanded to consider additional elements such as instructor incompetence and distractions. Then research from Bossman & Agyei (2022) recommends other factors of e-learning based on the holistic system success model and can focus on instructors or facilitators of e-learning systems. Further research needs to be explored, especially in the area of student support in online learning, in line with new technological advances and changing student needs (Zuhairi et al., 2019). In a study by Mulhem (2020) it is suggested for further development by adding new factors that can play an important role in improving the quality of e-learning systems. In addition, the study of Momen et al. (2023) suggested that additional research be conducted in several developing countries in future research to generalize the findings of this study. In line with this, Tran (2022) in his research *Perceived satisfaction and effectiveness of online education*, stated that if data is obtained from various countries and in different time spans, it will provide more comparable findings to understand students' perspectives.

Despite the growing body of research on service quality in higher education, several research gaps remain unaddressed in the ODL context. First, existing studies primarily focus on general service quality in higher education but often fail to provide a comprehensive framework tailored specifically for ODL institutions. Second, many service quality models do not adequately account for the dynamic nature of technology and its evolving impact on student satisfaction in distance learning environments. Third, while prior research has explored individual service quality factors, such as instructor effectiveness or technological infrastructure, few studies integrate multiple dimensions of service quality into a unified model that reflects the complexities of ODL experiences. Lastly, many studies are conducted within specific institutional or geographical contexts, making it difficult to generalize findings across diverse ODL environments.

To address these gaps, this study aims to identify and analyze key service quality factors that contribute to student satisfaction in ODL universities. Additionally, it seeks to develop a conceptual service quality model—that integrates these factors into a holistic framework. The specific research objectives of this study are (1) To examine the primary factors of service quality that influence student satisfaction in ODL universities. (2) To evaluate how various service quality factors—such as e-learning system quality, course design, instructor effectiveness, and student support—impact learning experiences in ODL. (3) To propose a conceptual framework that integrates these factors into a structured model for measuring and improving service quality in ODL institutions.

Reflecting on existing research findings and recommendations, the various factors in service quality are complex. Service quality in ODL is multifaceted, involving technical performance, effective teaching practices, strong student support services, and ongoing evaluation. Therefore, this systematic review was conducted to explore the factors of service quality in distance higher education. This is achieved by evaluating empirical studies that have examined variables, constructs, or factors related to service quality that can satisfy students in online distance higher education environments. This study contributes to the existing literature by conducting a Systematic Literature Review (SLR) using the PRISMA framework to analyze key service quality factors in ODL universities. The results will be used to construct the E-QUALS Model (E-learning Quality and User Satisfaction Model), a structured framework that addresses the six core factors of service quality. By integrating these factors, the E-QUALS Model will serve as a valuable tool for higher education institutions seeking to enhance service quality in ODL settings. Ultimately, this study aims to provide practical insights for educational policymakers, university administrators, and instructors to develop more effective ODL environments that prioritize student satisfaction and learning success.

METHODS

This study employs a Systematic Literature Review (SLR) approach, using the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) framework to identify, screen, and analyze relevant research articles on service quality factors influencing student satisfaction in Online Distance Learning (ODL) universities. PRISMA analysis is useful for research to explore and produce systematic searches (Nyoko & Hanafiah, 2024). An important element of the PRISMA Analysis is the PRISMA chart that shows how many studies were assessed, from which sources, how many were excluded and for what reasons, and how many were finally included (Lamé, 2019). The systematic review process follows four key stages: identification, screening, eligibility assessment, and final inclusion.

Data Collection and Search Strategy

To ensure a comprehensive review, a structured search was conducted across three major academic databases: ScienceDirect, Emerald Publishing, Taylor & Francis. These databases were selected due to their extensive collections of high-quality, peer-reviewed journal articles related to education, online learning, and service quality research. The search was conducted using a combination of specific keywords, ensuring that the study captures a broad yet relevant dataset. The search terms included:

- "Service quality in online distance learning"
- "E-learning service quality and student satisfaction"
- "Online learning quality framework"
- "Higher education service quality in distance learning"
- "Factors influencing student satisfaction in ODL"

The search was limited to journal articles published between 2014 and 2024 to ensure the study includes recent research reflecting current trends and technological advancements in ODL. The justification for this time range is based on the rapid evolution of online learning technologies and methodologies in the past decade, particularly accelerated by the COVID-19 pandemic, which significantly impacted online education models globally. Research

published before 2014 was excluded as it might not adequately reflect modern advancements in ODL service quality.

Study Selection and Screening Criteria

The selection process followed PRISMA guidelines, with articles undergoing multiple screening steps to ensure relevance and quality. The inclusion and exclusion criteria were defined as follows:

Inclusion Criteria:

- Peer-reviewed journal articles indexed in Scopus, WoS, or other reputable academic sources.
- Studies that explicitly examine service quality factors affecting student satisfaction in ODL.
- Empirical or theoretical research that proposes, evaluates, or refines service quality models in online learning.
- Articles published between 2014–2024 in English.

Exclusion Criteria:

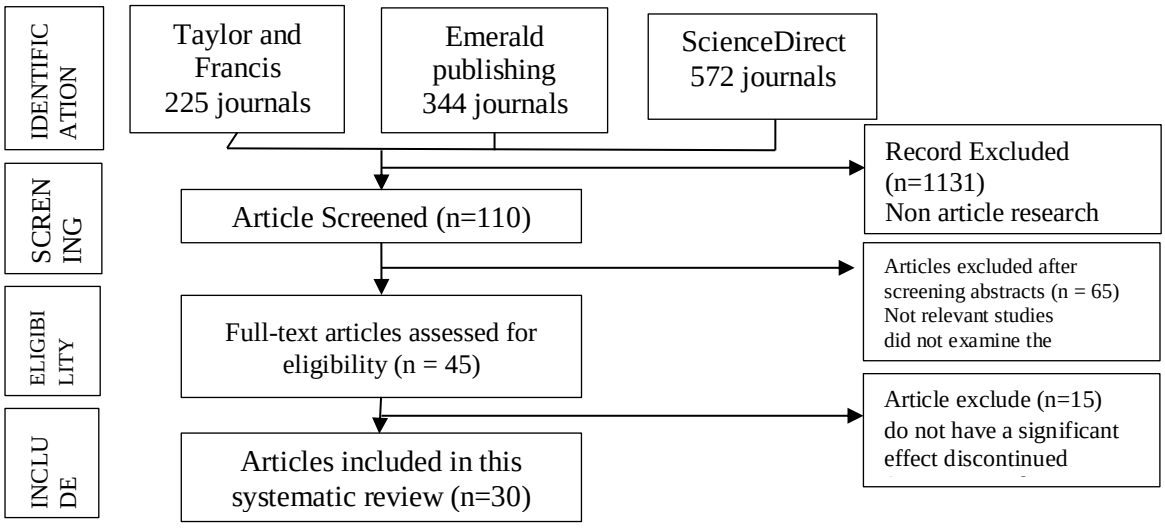
- Conference papers, book chapters, and non-peer-reviewed publications.
- Studies that focus on face-to-face education without clear relevance to online learning.
- Articles that do not provide empirical evidence or detailed discussions on service quality factors in ODL.

After applying these criteria, the initial search identified 1,141 articles. The title and abstract screening process removed 65 articles that were not directly relevant to the topic. The full-text screening phase excluded 15 additional articles due to lack of empirical depth, leaving 30 final articles included in the review. The PRISMA flowchart below illustrates the article selection process in detail:

PRISMA Flow Diagram

Figure 1

PRISMA flow diagram of papers included in review



Data Extraction and Thematic Analysis

To systematically analyze the selected studies, data extraction was conducted based on predefined coding categories aligned with the research objectives. The extracted information included:

- Publication details (author, year, journal, DOI).
- Service quality factors studied (e.g., e-learning system quality, course design, instructor effectiveness, student support).
- Methodological approach (quantitative, qualitative, mixed methods).

- Key findings related to student satisfaction in ODL.

To identify recurring themes and patterns, a thematic coding process was employed. The coding process involved the following steps:

- Initial Open Coding: Identifying key concepts, service quality factors, and student satisfaction indicators in each article.
- Axial Coding: Grouping similar factors into broader service quality categories.
- Selective Coding: Refining and integrating themes to construct a holistic model of service quality in ODL universities.

Dengan menerapkan sintesis tematik, studi ini memastikan bahwa Model E-QUALS secara akurat mewakili faktor-faktor yang paling berpengaruh dalam membentuk kepuasan mahasiswa di lingkungan ODL.

FINDINGS

According to Figure 1, after the screening stage, the final result is 30 articles with high relevance to the quality of service of Online Distance Learning universities and their relationship with student satisfaction. The articles were identified to determine the service quality factors that can satisfy students in Online Distance Learning Colleges. The following is a summary of the analysis of the selected articles in the following Table 1

Table 1
Systematic review table

No.	Author & Year	Service Quality Factors
1.	Mulhem (2020)	1. Quality of lesson content 2. Quality of e learning system 3. Service Quality
2.	Dangaiso et al. (2022)	1. System quality 2. Information Quality 3. Service quality
3.	Tran (2022)	1. Instructor Quality 2. Course Design 3. Fast feedback 4. Student expectations 5. Self-efficacy (moderation)

4.	Makoe & Nsamba (2019)	SERVQUAL modified model 1. Tangibles 2. Reliability 3. Delivery 4. Assurance
5	Shikulo & Lekhetho (2020)	1. Academic Support (Tutoring and Teaching, Feedback Mechanisms) 2. Administrative Support (Counseling and Guidance, Resource Allocation) 3. Emotional and Organizational Support (Time Management Assistance, Motivational Support) 4. Technological Support (Use of ICT Tools) 5. Holistic Approach to Learner Support
6.	Littlefield et al. (2019)	1. Institutional Support Commitment (Leadership, Resource Allocation, and course development) 2. Technology Support (Infrastructure, Technical Assistance) 3. Instructional Design Development (Alignment with Learning Outcomes, Use of Effective Pedagogy). 4. Course Structure (Organization, Accessibility) 5. Teaching and Learning Strategies (Engagement, Feedback Mechanisms) 6. Social and Student Engagement (Community Building, Support Services) 7. Faculty Support (Professional Development, Recognition of Efforts) 8. Student Support (Orientation Program, Academic Resources) 9. Evaluation and Assessment (Continuous Improvement Process, Outcome Measurement)
7.	Latif et al. (2016)	1. Facilitator 2. Curriculum 3. Faculty 4. Support services 5. Learning center
8.	Momen et al. (2023)	1. Technological factors 2. Comfort factor 3. Resource factor
9.	Zouiri & Kinani (2022)	1. Course duration 2. Interactivity 3. Teaching method

10.	Nikou & Maslov (2022)	1. Digital community 2. Information technology (quality & accessibility) 3. Online course design quality
11.	Kulal et al. (2024)	1. Accessibility of materials 2. Internet connectivity
12.	Zuhairi et al. (2019)	1. Support services (academic & non-academic) 2. Instructional design 3. Resource utilization 4. Engagement and motivation 5. (Institutional support)
13.	Wani et al. (2023)	1. Academic Support (Counseling & Tutoring, Assignment handling) 2. Administrative Support Services (Admission Process, Induction/Orientation Program) 3. Resource Availability (Learning Materials, Technology Support) 4. Communication Channel (interactivity, feedback mechanism) 5. Evaluation and Assessment (Timeliness of Results, Quality of Evaluation) 6. Learner Engagement (Participation in Activities, Peer Support Networks) 7. Accessibility and Inclusiveness (Support for Various Learner Needs, Geographic Accessibility)
14	Bouranta et al. (2023)	1. Non-academic aspects, 2. Academic aspect, 3. Reputation 4. Access 5. Program, 6. Online learning
15.	Albanyan (2024)	1. Facilities and techniques, 2. Electronic content, 3. Teaching effectiveness, 4. Interactivity, 5. Assessment.
16	Bossman & Agyei (2022)	1. Technology anxiety 2. Instructor factor 3. Course quality 4. Technology quality, 5. Ease of use.
17.	Agyeiwaah et al. (2022)	1. Perspective & dependency 2. Stimulation & attraction 3. Usability and Innovation
18.	Kornpitack & Sawmong (2022)	1. Performance expectation 2. Actual usage

		3. Student interaction 4. Facility condition
19.	Wang et al. (2023)	1. Personal relevance (course content/design) 2. Social relevance (course content/design) 3. Confirmation of expectations 4. Perceived usefulness
20.	Abdullah et al. (2024)	1. Online self-regulation 2. Engagement (across behavioral, cognitive, and emotional dimensions), 3. online learning experience
21.	Amoush & Mizher (2023)	1. Student-material interaction 2. Student-instructor interaction, 3. Student-student interaction 4. Student-technology interaction
22.	Weng & Qin (2023)	1. Resource quality 2. Instructor communication 3. Learning environment
23.	Limbu & Pham (2023)	1. E-learning system quality (perceived ease of use, perceived usefulness, website design and content, responsiveness, functionality, technical support, ICT advantages and compatibility, and information quality) 2. Instructor quality & Course materials (course content and design, instructor quality, student-student and student-instructor interaction, responsiveness, and support)
24.	Ali et al. (2021)	1. System quality 2. Course materials & instructor quality 3. Information technology & support services
25.	Chetioui et al. (2022)	1. Instructor performance 2. Ease of use of online learning platform 3. Information quality 4. Interactivity 5. Perceived usefulness
26.	Darawong & Widayati (2021)	1. Reliability 2. Responsiveness 3. Competence 4. Empathy 5. Reliability
27.	Khan et al. (2022)	1. System 2. Administrative 3. Education 4. Transformative 5. Social
28.	Salman & Soliman (2022)	1. Institutional support 2. Instructor - student communication 3. Course design
29	Abuhassna et al. (2020)	1. Background.

		2. Experience 3. Collaboration 4. Interaction 5. Student autonomy
30.	Jiménez-Bucarey et al. (2021)	1. Teacher/instructor quality 2. Technical service quality 3. Service quality

Based on the identification and analysis summarized in the table above, there are 6 domains of service quality factors that affect student satisfaction at Online Distance Learning Universities. The service quality factor domains are as follows

Table 2

Thematic synthesis of factors investigated

Factors	Studies	Frequency
E-learning System Quality	Mulhem, 2020; Dangaiso et al., 2022; Wang et al., 2023; Limbu & Pham, 2023; Agyeiwaah et al., 2022; Ali et al., 2021; Khan et al., 2022; Chetioui et al., 2022; Jiménez-Bucarey et al., 2021	9
Quality of Course Content and Design	Mulhem, 2020; Dangaiso et al., 2022; Tran, 2022; Littlefield et al., 2019; Latif et al., 2016; Zouiri & Kinani, 2022; Nikou & Maslov, 2022; Zuhairi et al., 2019; Albanyan, 2024; Bossman & Agyei, 2022; Wang et al., 2023; Limbu & Pham, 2023; Ali et al., 2021; Salman & Soliman, 2022	14
Support Services	Mulhem, 2020; Dangaiso et al., 2022; Makoe & Nsamba, 2019; Shikulo & Lekhetho, 2020; Littlefield et al., 2019; Latif et al., 2016; Zuhairi et al, 2019; Wani et al., 2023; Bouranta et al., 2023; Weng & Qin, 2023; Ali et al., 2021; Darawong & Widayati, 2021; Khan et al., 2022; Jiménez-Bucarey et al., 2021	14
Interactivity Quality	Zouiri & Kinani, 2022; Zuhairi et al., 2019; Wani et al., 2023; Albanyan, 2024; Kornpitack & Sawmong, 2022; Amoush & Mizher, 2023; Weng & Qin, 2023; Limbu & Pham, 2023; Chetioui et al., 2022; Salman & Soliman, 2022; Abuhassna et al., 2020	11
Teaching and Instructor Quality	Tran, 2022; Latif et al., 2016; Zouiri & Kinani, 2022; Bouranta et al., 2023; Albanyan, 2024; Bossman & Agyei, 2022; Abdullah et al, 2024; Weng & Qin, 2023; Limbu & Pham, 2023; Ali et al., 2021; Chetioui et al., 2022; Darawong &	15

	Widayati, 2021; Khan et al., 2022; Abuhassna et al., 2020; Jiménez-Bucarey et al., 2021	
Technology Resources and Infrastructure	Makoe & Nsamba, 2019; Shikulo & Lekhetho, 2020; Littlefield et al., 2019; Momen et al., 2023; Nikou & Maslov, 2022; Kulal et al., 2024; Zuhairi et al., 2019; Wani et al, 2023; Bouranta et al., 2023; Albanyan, 2024; Bossman & Agyei, 2022; Agyeiwaah et al., 2022; Kornpitack & Sawmong, 2022; Weng & Qin, 2023; Ali et al., 2021	15

Through the systematic literature review (SLR) and thematic analysis, six primary service quality factors were identified as critical to student satisfaction in Online Distance Learning (ODL) universities. These factors were selected due to their consistent presence in multiple empirical studies, their practical relevance in improving ODL experiences, and their direct impact on student engagement, learning success, and institutional credibility. The justification for including e-learning system quality as a key dimension stems from multiple studies that emphasize its influence on student satisfaction. Mulhem (2020) found that system quality significantly impacts student engagement, while Dangaiso et al. (2022) recommended that higher education institutions design e-learning platforms with easy navigation and flexible accessibility. Additionally, Limbu & Pham (2023) highlighted technical support and system responsiveness as major factors of student satisfaction during the COVID-19 pandemic. Then the justification for Course Content and Design dimension is based on research highlighting the impact of interactive and structured course content on student learning experiences. Tran (2022) found that course design and timely feedback were key satisfaction drivers, while Nikou & Maslov (2022) showed that students in Finland valued engaging and interactive course materials over traditional text-heavy formats. Additionally, Wang et al. (2023) emphasized that course content should be both personally and socially relevant to increase motivation. A Finnish University Case Study found that students who took courses with a strong digital community and engaging course design were more likely to complete their studies compared to students who took traditional text-based courses (Nikou & Maslov, 2022).

The Student Support Services dimension was chosen because several studies have shown that the availability and responsiveness of support services affect student satisfaction and retention. Makoe & Nsamba (2019) found that students' expectations of support services often exceeded what the institution provided, leading to dissatisfaction. Similarly, Shikulo & Lekhetho (2020) noted that inadequate support systems contributed to higher rates of dropout and course failure. Zuhairi et al. (2019) highlighted that universities with strong academic and non-academic support systems reported better student outcomes. Research from (Shikulo & Lekhetho, 2020) has shown a case study in Namibia, ODL students have difficulty in adjusting their time between work and study, so they need more flexible academic support. So, this study also proposes a model for the implementation of an effective Student Support Service to improve the academic experience and success rate of students through a digital platform.

The inclusion of interactivity as a key dimension is justified by extensive research on the role of engagement in online learning. Amoush & Mizher (2023) found that student-instructor and student-content interactions were strong predictors of satisfaction. Wani et al. (2023) emphasized the importance of feedback mechanisms and social learning tools in fostering engagement. Additionally, Wang et al. (2023) highlighted that MOOCs with active discussion forums and real-time interaction had significantly higher completion rates. In Morocco,

students taking online courses reported that they felt more satisfied when courses had clear duration, high interactivity, and engaging teaching methods (Zouiri & Kinani, 2022). Then the Teaching and Instructor Quality dimension was selected because multiple studies emphasize the importance of instructor-student relationships in ODL success. Tran (2022) found that quick instructor feedback and structured guidance were critical for student engagement. Bossman & Agyei (2022) through their study of distance learners in Ghana showed that instructor responsiveness reduced technology-related frustration, thereby improving the overall learning experience.

Technology Resources and Infrastructure dimension was chosen because research highlights the role of technology in ensuring equity and accessibility in ODL. Momen et al. (2023) found that technological accessibility and availability of resources were critical to student satisfaction. Kulal et al. (2024) emphasized that students in areas with poor internet connectivity struggled with engagement and retention. In Bangladesh India, students experienced barriers to internet connectivity during the COVID-19 pandemic. Universities then developed learning platforms that could be accessed via low-speed cellular networks, thereby increasing student satisfaction in attending online lectures (Momen et al., 2023).

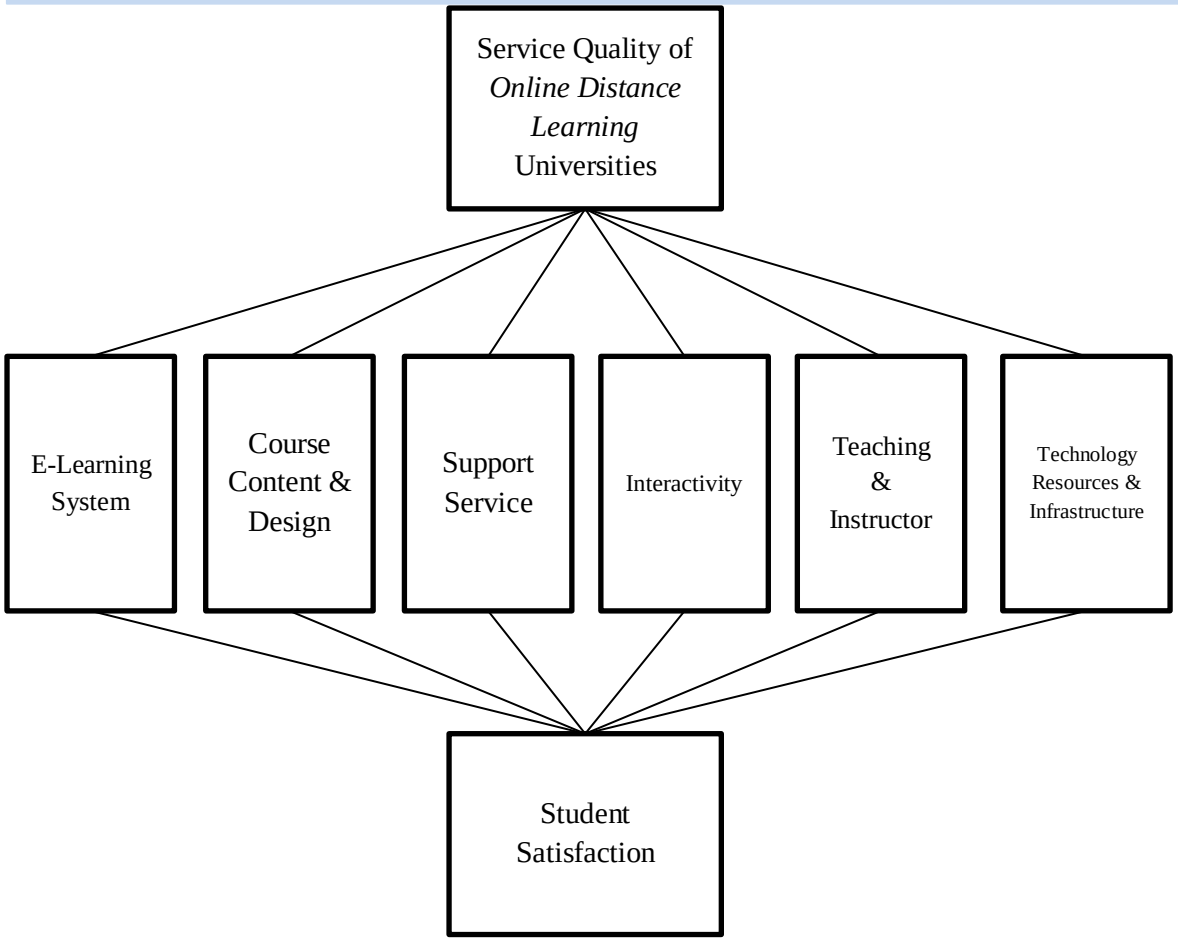
The six factors were selected because they are consistently identified as the strongest predictors of student satisfaction in ODL environments. They address both academic and administrative challenges, ensuring a holistic service quality framework. These factors also align with global trends in technology-enhanced learning, supporting institutions in improving student engagement, retention, and overall learning success. These factors become a dimension of service quality of Online Distance Learning Colleges, while the findings of the SLR results of other factors can be included in the dimension and become indicators in the dimension itselfThe findings of this new model integrate these factors into a structured framework, which serves as a comprehensive guide for institutions to improve service quality.

DISCUSSION

Based on the results of the systematic literature review that has been summarized, the following is a model of service quality factors that affect student satisfaction in Online Distance Learning Universities:

Figure 2

Model of Service Quality of Online Distance Learning Universities



The appropriate model name for service quality in Online Distance Learning could be the **E-QUALS Model** (**E-learning Quality and User Satisfaction**). The name **E-QUALS Model** is easy to remember and encompasses the core concepts of service quality (Quality) and user satisfaction (User Satisfaction) in the context of e-learning in distance education. The name also carries a strong association with "equality", which is in keeping with the goal of *Online Distance Learning* to provide quality and equitable educational services to all students. The model incorporates significant factors used in service quality research, adapted to the specific needs of online education services at the tertiary level. Based on the SLR article, the **E-QUALS Model** has six main factors with the following indicators:

Table 3

E-QUALS Model Factors and Indicator

E-QUALS Factors	E-QUALS Indicator	Studies
E-learning System Quality	Ease of Access	Mulhem (2020); Dangaiso et al. (2022); Wang et al. (2023); Limbu & Pham (2023); Latif et al. (2016); Nikou & Maslov (2022); Wani et al. (2023) Weng & Qin (2023); Ali et al. (2021)
	Navigation and Interface	Dangaiso et al. (2022); Chetioui et al. (2022); Agyeiwaah et al. (2022);

		Limbu & Pham (2023); Albanyan (2024)
	Technical Support	Littlefield et al. (2019); Bouranta et al. (2023); Weng & Qin (2023); Limbu & Pham (2023); Ali et al. (2021); Jiménez-Bucarey et al. (2021)
Quality of Course Content and Design	Relevance of Material	Zouiri & Kinani (2022); Agyeiwaah et al. (2022); Latif et al. (2016); Zuhairi et al. (2019); Wani et al. (2023); Wang et al. (2023); Limbu & Pham (2023); Nikou & Maslov (2022); Shikulo & Lekhetho (2020); Bouranta et al. (2023); Chetioui et al. (2022); Abuhassna et al. (2020)
	Alignment with Needs	Zouiri & Kinani (2022); Wang et al. (2023); Littlefield et al. (2019); Agyeiwaah et al. (2022); Albanyan (2024); Zuhairi et al. (2019)
	Course Design	Latif et al. (2016); Nikou & Maslov (2022); Littlefield et al. (2019); Limbu & Pham (2023); Zouiri & Kinani (2022); Weng & Qin (2023); Salman & Soliman (2022)
Support Services	Academic and Non-academic Services	Zuhairi et al. (2019); Makoe & Nsamba (2019); Shikulo & Lekhetho (2020); Wani et al. (2023); Bouranta et al. (2023); Jiménez-Bucarey et al. (2021)
	Administrative Support	Shikulo & Lekhetho (2020); Littlefield et al. (2019); Wani et al. (2023); Khan et al. (2022)
	Responsiveness	Bouranta et al. (2023); Albanyan (2024); Khan et al. (2022); Littlefield et al. (2019); Jiménez-Bucarey et al. (2021)
Interactivity Quality	Student - Instructor Interaction	Amoush & Mizher (2023); Tran (2022); Zouiri & Kinani (2022); Weng & Qin (2023);
	Collaboration between students	Wani et al. (2023); Limbu & Pham (2023); Zuhairi et al. (2019); Agyeiwaah et al. (2022); Bouranta et al. (2023); Nikou & Maslov (2022)
	Feedback	Latif et al. (2016); Agyeiwaah et al. (2022); Limbu & Pham (2023) Zouiri & Kinani (2022); Weng & Qin (2023)

Teaching and Instructor Quality	Instructor Competency	Tran (2022); Littlefield et al. (2019); Albanyan (2024); Wani et al. (2023); Zouiri & Kinani (2022)
	Technology Mastery	Ali et al. (2021); Chetioui et al. (2022); Darawong & Widayati (2021); Weng & Qin (2023); Bossman & Agyei (2022)
	Instructor Responsiveness	Weng & Qin (2023); Zouiri & Kinani (2022); Tran (2022) Agyeiwaah et al. (2022); Limbu & Pham (2023)
Technology Resources and Infrastructure	Availability of Learning Materials	Nikou & Maslov (2022); Littlefield et al. (2019); Bouranta et al. (2023); Kulal et al. (2024); Bossman & Agyei (2022); Weng & Qin (2023)
	Internet Connection Stability	Albanyan (2024); Nikou & Maslov (2022); Bossman & Agyei (2022)
	Technical Facilities	Momen et al. (2023); Littlefield et al. (2019); Zuhairi et al. (2019)

E-learning System Quality

The quality of the e-learning system is also an important factor affecting student satisfaction. Students need a system that is intuitive, easy to use, and can be accessed at any time. Wani et al. (2023) revealed accessibility and inclusiveness related to support for various learner needs and geographical accessibility. This factor includes uncomplicated use of the system as well as flexibility in navigating the same system. For example, if the e-learning system used by students has a complicated *interface* or often causes technical glitches, student satisfaction is at risk of decreasing. Furthermore, in Limbu & Pham (2023) system-related factors such as perceived ease of use, perceived usefulness, website design and content, responsiveness, functionality, technical support, ICT advantages and compatibility, and information quality affect student satisfaction. In relation to e-learning system, it is related to how the E-Learning system can run and fulfill students' needs. Dangaiso et al. (2022) recommended that the higher education industry should design e-learning systems that can improve ease of access, easy navigation, and user flexibility. Weng & Qin (2023) also suggested that to improve the online education experience, academic institutions can invest in improving online learning platforms. Based on this, improving the quality of e-learning systems must be a priority for distance education institutions to provide quality services to students. This is intended for quality assurance or quality of Online Distance Learning colleges. In addition, Dangaiso et al. (2022) also concluded that student satisfaction with the e-learning system fosters student loyalty in the long term both in terms of e-learning use and commitment to the university.

Quality of Course Content and Design

Relevant and attractively designed learning content is also very important in increasing student satisfaction. The relevance of content to students' needs and goals can increase learning motivation. In addition, interactive and easy-to-understand course design will facilitate a more effective learning process. The findings of Agyeiwaah et al. (2022) which indicate the need for

educational institutions to develop an attractive and motivating visual environment for online course delivery as a stimulating online learning atmosphere is essential. Then Littlefield et al. (2019) stated the need for the development of instructional design with the aim of alignment with learning outcomes, the use of effective pedagogy and course structure to organize the course and also accommodate its accessibility.

This study shows that the more relevant and interesting the course materials are, the greater the satisfaction felt by students. Courses that are poorly structured or irrelevant to students' needs will decrease their motivation and satisfaction. The factors that influence student satisfaction with regard to the relevance of course content and design revealed by Wang et al. (2023) are as follows: (1) Personal Relevance, which is the degree of alignment of course content with each learner's personal goals and interests. Higher personal relevance results in greater satisfaction because students find the material meaningful. (2) Social Relevance, which refers to how the course content meets the needs of society and contributes to collective issues. Courses that are considered socially relevant can increase satisfaction by fostering a sense of aligned purpose among learners. Thus, in designing, developing, and delivering distance education courses, students' needs must be considered (Zouiri & Kinani, 2022).

Quality of Support Services

Students who study online need strong academic and non-academic support. Services such as guidance, counseling, and technical assistance play an important role in ensuring student success in the online learning environment. Learning environment factors including the physical and psychological aspects of the college environment play an important role in shaping students' online learning experience (Weng & Qin, 2023) Effective student support is essential to increase learning engagement and motivation. The study from Zuhairi et al. (2019) emphasizes that support should be tailored to meet the unique needs of distance learners, who often require both academic and non-academic assistance. As for support services that are administrative in nature, according to Wani et al. (2023) that must also be considered are the

Admissions Process, Student Induction/Orientation Program. In addition, the availability of timely and responsive services can help overcome the challenges faced by students, both from an academic and technical perspective. Lack of support services can cause students to feel uncared for, which in turn lowers their level of satisfaction with the distance education program.

Quality of Interaction

Educational activities are behavioral activities in which there are various social interactions between teachers and students, students and students, and or teachers and students and their environment (Sigiyuwanta et al., 2024). Effective interaction between students and instructors, fellow students, technology and learning content is a crucial factor (Amoush & Mizher, 2023). These interactions include active discussion, collaboration and prompt feedback. One of the key points in online student satisfaction is related to facilitator interaction and feedback (Latif et al., 2016). One strategy to increase online student engagement includes interactive learning environments and personalized support (Zuhairi et al., 2019). Minimal interaction in online courses can make students feel isolated, resulting in decreased satisfaction. Students emphasized the importance of hands-on lessons and interactive elements in enhancing their learning experience. This suggests that engagement through real-time discussion and interaction is essential for effective online education (Albanyan, 2024). Therefore, it is

important for educational institutions to design interaction strategies that encourage active participation from students.

Teaching and Instructor Quality

The role of the instructor in distance education is not only limited to the delivery of materials, but also includes the ability to provide quick, responsive and quality feedback. Instructors who are competent in using online learning technologies and methods will be better able to create a conducive learning environment. In addition, instructor communication is required, i.e. the way educators interact with students can increase or hinder satisfaction levels. (Weng & Qin, 2023). Poor teaching or lack of response from the instructor can hinder the learning process and reduce student satisfaction. Effective instructional design should focus on identifying learner needs, setting clear objectives, and creating engaging learning activities (Zuhairi et al., 2019). Research from Albanyan (2024) shows that to improve the quality of distance learning, educational institutions should focus on developing technical tools and improving teaching practices aligned with global standards. Weng & Qin (2023) To improve the online education experience, this study suggests that academic institutions: (1) Invest in upgrading online learning platforms. (2) Provide comprehensive training for instructors on the effective use of digital tools. (3) Create a supportive environment that meets educational and psychological needs.

Quality of Technology Resources and Infrastructure

Online Distance Learning Higher Education has transformed educational practices by increasing accessibility to knowledge. Universities that deliver distance education are positioned to utilize these resources effectively but face challenges related to sustainability and effectiveness (Zuhairi et al., 2019). The availability of learning resources such as learning materials that can be accessed online, as well as adequate technological infrastructure (e.g. stable internet connection), play an important role in supporting students' learning experience. If the technology infrastructure is not supportive, students will face many technical barriers, which ultimately decrease their satisfaction with the distance learning program. Providing resources to plan, develop, and evaluate online programs is one of the rubrics to help institutions maintain high standards but also encourage continuous improvement in distance education practices (Littlefield et al., 2019). Resource Quality is concerned with the availability and effectiveness of educational resources significantly impacting the student experience. (Weng & Qin, 2023).

The findings of this study confirm that student satisfaction in Online Distance Learning (ODL) universities is determined by six key service quality factors: e-learning system quality, course content and design, student support services, interactivity quality, teaching and instructor quality, and technology resources and infrastructure. These factors have been systematically integrated into the E-QUALS Model (E-learning Quality and User Satisfaction Model), which offers a structured framework for assessing and improving service quality in ODL environments. While several existing models of service quality in education have been developed, such as SERVQUAL (Parasuraman et al., 1988) and E-S-QUAL (Parasuraman et al., 2005), these models were not specifically designed for online learning environments. Existing frameworks often focus on general service quality factors applicable to traditional face-to-face learning or generic e-learning models without considering the unique challenges of ODL.

The E-QUALS Model offers a novel contribution by addressing specific challenges in ODL environments, such as:

- Integration of Six Essential Factors: Unlike previous models that focus primarily on technical and instructional aspects, E-QUALS integrates institutional, technological, and pedagogical elements to provide a holistic framework.
- Emphasis on Interactivity and Instructor Engagement: Traditional models often overlook the importance of student engagement and interactive learning in ODL. E-QUALS highlights the need for active instructor-student and peer interactions to reduce feelings of isolation.
- Consideration of Technological Barriers: Unlike existing models, E-QUALS explicitly includes infrastructure and technology accessibility as core factors affecting student satisfaction, making it more applicable to developing regions with digital divide challenges.
- Adaptability to Institutional Policies: The model is designed to be flexible and adaptable, allowing universities to implement it based on their institutional capabilities and student demographics.

By incorporating these elements, the E-QUALS Model provides a comprehensive and contextually relevant approach to measuring and improving student satisfaction in ODL universities.

In practice, universities can apply the E-QUALS Model by implementing concrete strategies aligned with each dimension. For instance, enhancing e-learning system quality requires institutions to invest in mobile-friendly learning platforms with offline access, while improving course content and design involves incorporating interactive learning materials, modular course structures, and real-world applications. Additionally, universities can strengthen student support services by offering virtual academic advising, mental health support, and peer mentorship programs, thereby fostering a more inclusive and student-centered learning environment. Furthermore, promoting student engagement through active learning strategies, such as discussion forums and live Q&A sessions, can help mitigate the isolation often experienced in online education. Instructor quality can be improved through faculty training programs on digital pedagogy and interactive teaching techniques, while investments in technology infrastructure, such as low-bandwidth content streaming and open educational resources (OERs), can bridge accessibility gaps for students in remote areas.

The E-QUALS Model is not only adaptable but also actionable, allowing institutions to customize its implementation based on their student demographics, technological infrastructure, and educational policies. The success of this model depends on universities adopting a data-driven approach, continuously assessing student feedback and satisfaction metrics to refine their strategies. By aligning service quality improvements with the six E-QUALS factors, institutions can ensure greater student retention, enhanced academic performance, and a more engaging ODL experience. Future research should focus on empirical validation of the model in various geographical and institutional contexts to further refine its applicability and effectiveness.

CONCLUSIONS

This study has developed the E-QUALS Model (E-learning Quality and User Satisfaction Model) as a comprehensive framework for assessing and improving service quality in Online

Distance Learning (ODL) universities. By integrating e-learning system quality, course content and design, student support services, interactivity quality, teaching and instructor quality, and technology resources and infrastructure, the model provides a holistic approach to enhancing student satisfaction and learning outcomes. Unlike traditional service quality models, E-QUALS specifically addresses the unique challenges of ODL environments, making it a valuable tool for institutions adapting to the evolving demands of online education.

Theoretically, this model expands existing service quality research by incorporating both technological and pedagogical factors, offering a structured way to measure and enhance student satisfaction in ODL. Practically, universities can implement this model by improving digital infrastructure, designing interactive courses, strengthening academic and technical support, and fostering greater student-instructor engagement. These targeted interventions can lead to higher student retention, better academic performance, and a more engaging online learning experience. However, this study has limitations, especially in terms of the scope of research methods and data collection which is limited to previous studies without in-depth empirical tests. For future research, empirical validation of the E-QUALS Model across different educational institutions and geographical contexts is essential to refine its applicability. Additionally, further studies should explore the integration of AI-driven learning analytics to personalize student support and improve engagement. Investigating the long-term impact of service quality improvements on student retention and academic success will also provide valuable insights for ODL institutions worldwide. By continuously evolving, the E-QUALS Model can serve as a dynamic framework for ensuring high-quality, inclusive, and student-centered online education.

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