The Effect of Digital Service Quality on Student Satisfaction in Higher Education: A Conceptual Framework

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ABSTRACT

The rapid digital transformation of higher education has fundamentally changed the way students interact with universities and access academic and administrative services. Learning management systems, student portals, online registration systems, digital libraries, virtual learning environments and other technology-enabled services have become integral components of contemporary higher education. As students increasingly depend on digital platforms, the quality of digitally delivered services may influence their perceptions of institutional effectiveness and their overall satisfaction. Although previous research has established relationships between service quality and student satisfaction, much of the higher education literature continues to focus on conventional service-quality models or individual digital platforms. This fragmentation creates a need for a more integrated conceptualization of digital service quality within the higher education context.

This conceptual paper proposes a framework examining the effect of five dimensions of digital service quality, reliability, responsiveness, ease of use, information quality, and security and privacy on student satisfaction in higher education. The framework is primarily grounded in the DeLone and McLean Information Systems Success Model, which identifies system quality, information quality and service quality as important dimensions of information-system success. The proposed framework extends this perspective by integrating technology-mediated service characteristics relevant to contemporary higher education. Based on the literature, five hypotheses are developed: reliability positively influences student satisfaction (H1a); responsiveness positively influences student satisfaction (H1b); ease of use positively influences student satisfaction (H1c); information positively influences student satisfaction (H1d); and security and privacy positively influence student satisfaction (H1e). The proposed framework contributes to higher education service-quality literature by providing a parsimonious and multidimensional model for examining students' evaluations of digital services. The framework also provides practical guidance for higher education institutions seeking to enhance student satisfaction through reliable, responsive, usable, informative and secure digital services.

Keywords: Digital service quality, student satisfaction, higher education, e-service quality, information systems, digital transformation, online learning

INTRODUCTION

Digital transformation has become an important characteristic of contemporary higher education. Universities increasingly depend on information and communication technologies to deliver learning, administrative, communication and student-support services. Learning management systems (LMS), student portals, online registration, digital libraries, virtual classrooms, online assessment systems and electronic payment services have changed the way students interact with higher education institutions. The transformation is not limited to replacing physical services with digital alternatives. It also changes how students evaluate the quality of university services. Students may interact with an institution through digital channels before, during and after their learning activities. Consequently, the reliability of a university portal, the quality of information displayed on an LMS, the ease with which students complete online procedures and the responsiveness of technical support may influence students' overall perceptions of the institution.

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Research has demonstrated that digital and e-learning quality is associated with student satisfaction. Al-Fraihat et al. (2020), for example, found that system quality, information quality, service quality, educational quality, support quality, learner quality and instructor quality were important determinants of e-learning success. Their findings demonstrate that students' evaluations of digital learning environments are multidimensional rather than dependent on a single technological characteristic.bSimilarly, Alzahrani and Seth (2021) found that multiple factors influenced students' satisfaction with continued use of LMS during the COVID-19 pandemic. Their study integrated the DeLone and McLean Information Systems Success Model with other theoretical perspectives, demonstrating the value of examining technological and user-related factors together.

Research conducted in different higher education contexts has continued to demonstrate the importance of digital-service characteristics. Li and Zhu (2022) found that system quality and information quality significantly influenced satisfaction with online learning platforms. Kundu (2022) reported that e-service-quality dimensions including efficiency, fulfilment, privacy and system availability influenced students' satisfaction and retention.

Similarly, Zeqiri et al. (2023) found that website-service quality contributed to e-service quality and student satisfaction in a higher education context. A systematic review by Limbu and Pham (2023) further demonstrated that e-learning service-quality dimensions were positively associated with student satisfaction. System quality was among the most frequently identified predictors, while perceived ease of use, website design, responsiveness, functionality, technical support and information quality were frequently examined dimensions.

Recent research continues to support these relationships. Mansor et al. (2025) examined information quality, system quality, service quality, perceived usefulness, perceived ease of use and cognitive absorption in relation to student satisfaction with an online learning platform in a Malaysian higher education institution. Vinueza-Martínez (2026), through a systematic review of 15 empirical studies involving 9,847 students across 10 countries, identified system quality, reliability, administrative support and interface-related factors among the important determinants of e-learning student satisfaction.

The Malaysian higher education environment is particularly relevant because institutions increasingly combine face-to-face, online and hybrid modes of learning. Rahman and Ilias (2024) demonstrated the continuing importance of service quality in Malaysian higher education, while Bukhori et al. (2025) examined the relationships between service quality, satisfaction, perceived value and loyalty in Malaysian private higher education institutions.

Despite this growing body of research, literature remains fragmented. Some studies focus on LMS quality, others on e-learning service quality, digital libraries, website quality or general higher education service quality. Therefore, this paper proposes a multidimensional conceptual framework integrating five digital-service characteristics—reliability, responsiveness, ease of use, information quality, and security and privacy to explain student satisfaction in higher education.

Background of the Study

Digital Transformation in Higher Education

Digital transformation has moved beyond the adoption of isolated technologies. Higher education institutions increasingly integrate digital technologies into teaching, administration, communication, assessment and student support. Hashim et al. (2021) argued that digital transformation requires higher education institutions to develop strategies involving technological, organizational and human dimensions. Similarly, Bygstad et al. (2022) described the emergence of digital learning spaces in higher education and highlighted the changing relationship between students, teachers and digital technologies.

Digital transformation initiatives may include LMS platforms, digital student records, online academic services, virtual classrooms, digital libraries, online payment systems, mobile applications and institutional

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websites. A multivocal literature review by Fernández et al. (2022) demonstrated that higher education institutions are implementing digital transformation initiatives involving processes, technologies, human resources and organizational strategies. The quality of these digital services therefore becomes important. A university may possess advanced technologies, but students may still experience dissatisfaction when systems are unreliable, information is inaccurate, interfaces are difficult to navigate or technical assistance is slow.

Student Satisfaction in Higher Education

Student satisfaction refers to students' overall evaluation of their educational and institutional experiences. It reflects the extent to which students perceive that their expectations and needs have been met. Student satisfaction has become an important performance indicator for higher education institutions because it may influence students' continued engagement, loyalty, institutional image and willingness to recommend an institution. De Silva (2026) found a significant relationship between higher education service quality and student satisfaction. Similarly, Hossain et al. (2025) demonstrated that different higher education service components influenced institutional image and student satisfaction. In digital environments, satisfaction may be influenced by students' interactions with technology. Students may evaluate the convenience, reliability, responsiveness and usefulness of online services as part of their overall institutional experience.

Problem Statement

Three major problems provide the rationale for this conceptual paper.

Continued Reliance on Traditional Service-Quality Models

Traditional service-quality frameworks such as SERVQUAL have been extensively used to evaluate higher education services. These frameworks emphasize dimensions such as tangibility, reliability, responsiveness, assurance and empathy. Although these dimensions remain relevant, digital services introduce additional considerations. Students interacting with a university portal or LMS may evaluate interface usability, system availability, information accuracy, privacy and technical support characteristics that cannot always be adequately represented through conventional service-quality dimensions. Recent higher education research has consequently developed digital and e-service-quality measures. Lupo and Buscarino (2021), for example, developed the Academic E-Service Quality (ACEQUAL) model to address the need for service-quality measurement specifically suited to higher education's digital environment.

Fragmentation of Digital-Service Research

A second problem is that existing studies often investigate specific digital platforms rather than digital service quality as an integrated construct. For example, research has examined LMS satisfaction (Widyaningrum et al., 2024), online learning platforms (Li & Zhu, 2022), digital libraries (Azib et al., 2025), e-learning services (Limbu & Pham, 2023) and university websites (Zeqiri et al., 2023). These studies provide valuable findings, but the fragmentation makes it difficult to develop a common conceptual understanding of digital service quality across different university services.

Insufficient Integration of Key Digital-Service Characteristics

A third problem concerns the lack of integration between traditional service-quality characteristics and information-system quality characteristics. The DeLone and McLean model provides a strong foundation through system quality, information quality and service quality. However, contemporary digital higher education environments also require attention to ease of use and security/privacy. Therefore, there is a need for a framework that integrates these characteristics into a parsimonious model specifically focused on student satisfaction.

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Research Gap

The research gap is positioned at four levels.

Gap 1: Conceptual Gap

Existing higher education service-quality research frequently applies traditional service-quality frameworks, whereas digital services require consideration of technology-specific attributes.

Gap 2: Dimensional Gap

Existing digital higher education studies use different combinations of dimensions. Some focus on system quality and information quality, while others focus on service quality, usability, technical support, privacy or website quality. For example, the systematic review by Limbu and Pham (2023) found substantial variation in the dimensions used to evaluate e-learning service quality. Vinueza-Martínez (2026) similarly identified methodological and conceptual heterogeneity across studies and highlighted the need for more integrated frameworks.

Gap 3: Contextual Gap

Although international research on digital and e-learning service quality is expanding, comparatively fewer studies integrate these dimensions into a broader digital-service framework within Malaysian higher education. Recent Malaysian research has examined conventional higher education service quality (Rahman & Ilias, 2024), online learning platforms (Mansor et al., 2025), and private higher education service quality (Bukhori et al., 2025). However, these studies do not fully establish a unified framework incorporating reliability, responsiveness, ease of use, information quality and security/privacy as dimensions of digital service quality.

Gap 4: Theoretical Gap

The DeLone and McLean Information Systems Success Model provides an established explanation of information-system success. However, its core dimensions can be extended conceptually to accommodate contemporary higher education service characteristics. The present paper therefore combines the information-systems perspective with e-service-quality literature to develop a multidimensional framework focused specifically on student satisfaction.

Accordingly, the central contribution of this study is:

Reliability + Responsiveness + Ease of Use + Information Quality + Security & Privacy → Student Satisfaction

This framework is sufficiently parsimonious for empirical testing while incorporating dimensions repeatedly identified in recent digital higher education research.

Research Objectives

RO1: To identify the major dimensions of digital service quality in higher education.

RO2: To examine the proposed effects of reliability, responsiveness, ease of use, information quality, and security and privacy on student satisfaction.

RO3: To develop an integrated conceptual framework explaining student satisfaction with digital services in higher education.

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Research Questions

RQ1: What dimensions constitute digital service quality in higher education?

RQ2: How do reliability, responsiveness, ease of use, information quality, and security and privacy influence student satisfaction?

RQ3: How can digital service quality be conceptualized as an integrated framework for explaining student satisfaction in higher education?

THEORETICAL FOUNDATION

Delone and Mclean Information Systems Success Model

The primary theoretical foundation of this study is the DeLone and McLean Information Systems Success Model. The updated model proposed by DeLone and McLean (2003) identifies six major dimensions: system quality, information quality, service quality, use/intention to use, user satisfaction and net benefits. The model is appropriate for the present study because digital university services are delivered through information systems. Students' perceptions of system performance, information accuracy and service support can therefore influence their satisfaction. Al-Fraihat et al. (2020) demonstrated the relevance of this theoretical perspective in e-learning by identifying system, information and service quality among important determinants of e-learning success. Alzahrani and Seth (2021) similarly integrated the DeLone and McLean model with social cognitive theory and expectation-confirmation theory to explain students' satisfaction and continued LMS use. Widyaningrum et al. (2024) further applied the DeLone and McLean model to LMS user satisfaction, demonstrating its continued relevance in contemporary digital education. The present conceptual framework therefore extends the model by incorporating five digital-service dimensions particularly relevant to student-facing higher education services.

Conceptualisation Of Digital Service Quality

Digital service quality refers to students' overall assessment of the quality, effectiveness and performance of services delivered through digital channels. In higher education, digital services may include learning management systems; student information systems; online registration; digital libraries; online assessment; virtual classrooms; student portals; online payment systems; institutional websites; and digital communication platforms. Five dimensions are proposed.

Reliability

Reliability refers to the ability of digital services to perform consistently, accurately and dependably. A reliable digital service should: function without frequent system failures; provide continuous access; process transactions accurately; provide services when required; and maintain consistent performance. Reliability is particularly important because students increasingly depend on digital platforms to complete academic and administrative activities. Vinueza-Martínez (2026) identified reliability as a moderate-level determinant of student satisfaction in the systematic review of e-learning service-quality studies. Furthermore, the comparative study by Choe et al. (2021) found reliability to be the strongest service-quality dimension affecting satisfaction among Thai students in online courses.

H1a

H1a: Reliability has a positive effect on student satisfaction in higher education.

Responsiveness

Responsiveness refers to the willingness and speed with which an institution responds to students' digital service needs. Responsiveness may include prompt technical support; quick responses to online enquiries;

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timely problem resolution; rapid communication; timely system updates; and assistance when digital services fail. In digital environments, students may become dissatisfied when technical or administrative problems remain unresolved. Research by Choe et al. (2021) found responsiveness to be an important predictor of online-course satisfaction. Limbu and Pham (2023) also identified responsiveness as one of the frequently examined system-related dimensions of e-learning service quality.

Therefore:

H1b

H1b: Responsiveness has a positive effect on student satisfaction in higher education.

Ease of Use

Ease of use refers to the extent to which students perceive digital services as simple, understandable and convenient to operate. A digital system may contain advanced features but still produce dissatisfaction if students cannot easily navigate it. Ease of use includes simple navigation; understandable menus; clear instructions; intuitive interfaces; easy access to information; and low effort required to complete tasks. Mansor et al. (2025) specifically examined perceived ease of use in relation to student satisfaction with an online learning platform in a Malaysian higher education institution. Limbu and Pham (2023) also identified perceived ease of use as one of the frequently examined dimensions of e-learning service quality. Li and Zhu (2022) further demonstrated that system and information quality affect student satisfaction with online learning platforms.

Therefore:

H1c

H1c: Ease of use has a positive effect on student satisfaction in higher education.

Information Quality

Information quality refers to the accuracy, relevance, completeness, timeliness and usefulness of information provided through digital services. Students depend on digital platforms for information concerning course schedules; assessment deadlines; examination information; academic announcements; grades; learning materials; registration; fees; and institutional procedures. Inaccurate or outdated information can create confusion and dissatisfaction even when the underlying digital system is technically reliable. Information quality is one of the core dimensions of the DeLone and McLean model. Al-Fraihat et al. (2020) identified information quality as an important determinant of e-learning success. Li and Zhu (2022) found that information quality significantly influenced satisfaction with online learning platforms. Similarly, Mansor et al. (2025) included information quality as an important factor associated with student satisfaction.

Therefore:

H1d

H1d: Information quality has a positive effect on student satisfaction in higher education.

Security and Privacy

Security and privacy refer to students' perceptions that their personal, academic and financial information is protected when using university digital services. Higher education institutions collect substantial amounts of sensitive student information, including personal identification details; academic records; examination results; financial information; payment information; and communication records. Students may therefore evaluate not only whether a digital service is convenient but also whether it provides confidence that their information is protected. Kundu (2022) found privacy to be one of the e-service-quality dimensions

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identified by students in relation to satisfaction and retention. Digital service-quality research therefore needs to recognise security and privacy as important components of students' evaluations.

Accordingly:

H1e

H1e: Security and privacy have a positive effect on student satisfaction in higher education.

Student Satisfaction

Student satisfaction represents the dependent variable in the proposed framework. It refers to students' overall positive evaluation of the digital services provided by their higher education institution. Students may experience higher satisfaction when digital services: meet expectations; are convenient; function reliably; provide accurate information; respond quickly; are easy to navigate; and protect personal information. Research consistently demonstrates that digital-service characteristics are associated with student satisfaction. Al-Fraihat et al. (2020) found significant relationships between e-learning quality factors and satisfaction. Alzahrani and Seth (2021) examined determinants of satisfaction with continued LMS use. Li and Zhu (2022) demonstrated the importance of system and information quality. Kundu (2022) found e-service quality to influence satisfaction and retention. More recent evidence from Malaysia has similarly examined information quality, system quality, service quality and ease of use in relation to student satisfaction (Mansor et al., 2025).

CONCEPTUAL FRAMEWORK

The proposed conceptual framework consists of five independent variables and one dependent variable.

Figure 1. Proposed conceptual framework

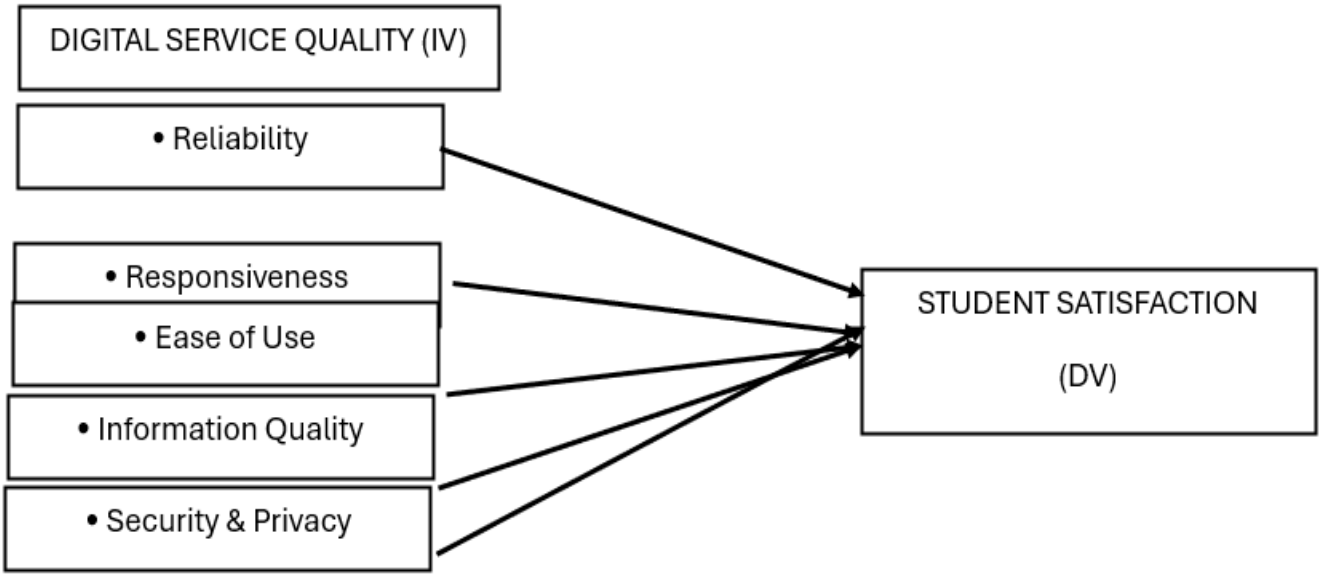


Figure 1 interpretation

Independent Variables (IVs):

1. Reliability
2. Responsiveness
3. Ease of Use

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4. Information Quality
5. Security and Privacy

Dependent Variable (DV):

Student Satisfaction

The model proposes that each dimension of digital service quality has a positive direct effect on student satisfaction.

Hypothesis Summary

Hypothesis	**Proposed relationship**
H1a	Reliability → Student Satisfaction
H1b	Responsiveness → Student Satisfaction
H1c	Ease of Use → Student Satisfaction
H1d	Information Quality → Student Satisfaction
H1e	Security & Privacy → Student Satisfaction

The five hypotheses provide a more detailed empirical model than a single Digital Service Quality → Student Satisfaction relationship.

Theoretical Implications

The proposed framework contributes to literature in three ways. First, it extends the application of the DeLone and McLean Information Systems Success Model to contemporary higher education service environments. Second, it integrates information-system quality and e-service-quality perspectives. Rather than treating digital services solely as learning technologies, the framework recognizes them as institutional service-delivery channels. Third, the framework provides a multidimensional explanation of student satisfaction. Instead of assuming that digital service quality is a single homogeneous construct, the model identifies five specific dimensions that can be independently tested. This provides an opportunity for future researchers to determine which dimensions have the strongest influence on student satisfaction.

Practical Implications

The proposed framework has several implications for higher education administrators.

Improve Reliability

Universities should ensure that LMS platforms, student portals and online administrative systems are stable and accessible. System downtime can disrupt learning, assessment and administrative processes.

Improve Responsiveness

Institutions should establish clear digital support mechanisms, including technical-help channels, online enquiry systems and rapid problem-resolution procedures.

Improve Ease of Use

Digital services should be designed from the students' perspective. Simple navigation, clear instructions and

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user-friendly interfaces can reduce unnecessary effort.

Improve Information Quality

Institutions should ensure that digital information is accurate, current, complete and consistent across different platforms.

Strengthen Security and Privacy

Universities should ensure that student information is appropriately protected and that students understand how their personal information is collected, stored and used.

Limitations of the Conceptual Paper

This study is conceptual and does not present primary empirical findings. The proposed relationships are derived from previous research and theoretical reasoning. Second, the framework focuses on five digital-service dimensions and does not include other potentially relevant factors such as perceived usefulness, trust, digital literacy, accessibility, perceived value or student engagement. Third, the framework focuses on student satisfaction as the main outcome. Future studies may extend the framework to include loyalty, retention intention, institutional image, continuance intention and word-of-mouth behavior. Finally, the framework is particularly relevant to higher education institutions but may require adaptation across different institutional contexts and student populations.

Future Research

Future researchers should empirically test the proposed framework using quantitative methods. A questionnaire could be developed using established measurement scales for reliability, responsiveness, ease of use, information quality, security/privacy and student satisfaction. A sample of students from Malaysian higher education institutions could be surveyed using a five-point Likert scale. PLS-SEM would be appropriate because the proposed framework contains multiple independent constructs and is intended to explain student satisfaction. Future research could also compare public and private universities; undergraduate and postgraduate students; domestic and international students; fully online and blended-learning students; and different types of digital platforms. Researchers may additionally introduce mediating or moderating variables such as trust, perceived usefulness, digital literacy, perceived value and student engagement.

CONCLUSION

Digital transformation has fundamentally changed the way higher education institutions deliver services. Students increasingly depend on digital platforms for learning, registration, assessment, communication, library access and administrative activities. Consequently, the quality of digital services represents an important component of contemporary student experience. Although existing research has demonstrated relationships between service quality, e-learning quality and student satisfaction, the literature remains fragmented across traditional service-quality models, individual digital platforms and different conceptualizations of e-service quality. This paper addresses this gap by proposing an integrated framework based on five dimensions: reliability, responsiveness, ease of use, information quality, and security and privacy. The framework is primarily grounded in the DeLone and McLean Information Systems Success Model and supported by recent research on e-learning service quality, digital transformation and higher education service quality. Five hypotheses are proposed. Reliability, responsiveness, ease of use, information quality, and security and privacy are expected to have positive effects on student satisfaction.

The framework provides a relatively simple and empirically testable model for future research in Malaysian higher education. It also provides practical guidance for university administrators seeking to improve students' digital experiences. Ultimately, the proposed framework suggests that successful digital transformation in higher education should not be evaluated merely by the adoption of technology. Instead,

institutions should consider whether digital services are reliable, responsive, easy to use, informative and secure. These qualities may determine whether students perceive digital transformation as a genuinely positive improvement in their higher education experience.

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