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Assessing Graduate Student Satisfaction with E-Learning: A Case Study of Sichuan Conservatory of Music

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Abstract

Purpose: This study examines key determinants of graduate student satisfaction with the e-learning system at Sichuan Conservatory of Music, aiming to enhance e-learning effectiveness and outcomes. **Research design, data and methodology:** This research adopts a quantitative approach grounded in Expectation Confirmation Theory and the DeLone and McLean Information System Success Model. A structured questionnaire comprising 27 items based on a 5-point Likert scale was administered to 500 senior students, selected through a combination of judgment, stratified random, and convenience sampling. Data were analyzed using Structural Equation Modeling (SEM) and Confirmatory Factor Analysis (CFA) to validate the proposed model and assess relationships among variables. **Results:** Information quality, perceived usefulness, and service quality significantly influenced student satisfaction. Course content quality also positively affected perceived usefulness. However, system quality, perceived ease of use, and course design quality showed no significant impact on satisfaction. **Conclusions:** The study identifies key factors shaping e-learning satisfaction and highlights the critical role of information quality, perceived usefulness, and service quality. Recommendations are proposed to improve content delivery, system support, and service responsiveness. These insights not only guide future improvements at Sichuan Conservatory but also offer a valuable reference for other institutions seeking to enhance student engagement and outcomes in digital learning environments.

Keywords: Information Quality, Perceived Usefulness, Service Quality, Satisfaction, E-learning

JEL Classification Code: A23, I23, L86, O30

1. Introduction

In the era of rapid digital transformation, the integration of technology into education, commonly framed as "Internet+Education" has significantly reshaped teaching and learning environments across the globe. This trend was further accelerated by the COVID-19 pandemic, which prompted institutions to shift swiftly toward online teaching models, making e-learning systems essential components of modern higher education (Zhu & Liu, 2022). E-learning offers numerous benefits, including flexibility, accessibility, and scalability. However, a critical problem persists as online learning often results in lower engagement, high dropout rates, and reduced course completion compared to

traditional formats (Xu & Jaggars, 2013). These issues raise important concerns about student satisfaction and the effectiveness of e-learning systems.

At institutions like the Sichuan Conservatory of Music, where disciplines involve not only theoretical learning but also performance-based and practical components, the challenge of delivering a satisfying e-learning experience is especially pronounced. While numerous studies have explored e-learning satisfaction, many focus on general education settings, with limited attention paid to specialized institutions such as music conservatories (Zhang & Yang, 2023). This highlights a significant research gap in understanding how e-learning systems function within performance-intensive academic contexts.

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Moreover, although existing literature has examined factors such as system quality, information quality, and service quality, few studies have integrated these with constructs like perceived ease of use, perceived usefulness, course content quality, and course design quality within a unified analytical framework.

This study is significant as it addresses both the theoretical and practical voids by focusing on a unique educational environment, graduate music education and exploring a comprehensive set of factors influencing student satisfaction with e-learning.

The objective of this research is to identify and analyze the key determinants that shape graduate student satisfaction with the e-learning system at Sichuan Conservatory of Music. Specifically, the study aims to (1) evaluate the structural relationships among constructs such as perceived usefulness, course content quality, information quality, service quality, and other system-related factors; (2) validate an integrated conceptual model grounded in Expectation Confirmation Theory (ECT), the DeLone and McLean Information System Success Model, and the Technology Acceptance Model (TAM); and (3) provide data-driven and context-sensitive recommendations to enhance the effectiveness, accessibility, and learner-centered design of e-learning environments in specialized higher education contexts.

Ultimately, this study seeks to generate practical insights for improving digital learning at the Sichuan Conservatory and inform best practices for other higher education institutions with specialized teaching requirements.

2. Literature Review

2.1 Expectation Confirmation Theory (ECT)

Expectation Confirmation Theory (ECT), originally developed in consumer behavior research, explains user satisfaction as a function of expectation, perceived performance, and confirmation (Oliver, 1980). The theory posits that individuals form initial expectations about a product or system, compare them with actual performance, and then assess the extent to which those expectations were confirmed. Positive confirmation leads to satisfaction and continued use, while negative confirmation results in dissatisfaction and potential discontinuance.

Bhattacharjee (2001) extended ECT into the field of information systems, proposing the Expectation Confirmation Model (ECM) to explain continued IT usage. He identified four key constructs: expectation, confirmation, perceived usefulness, and satisfaction. In educational contexts, ECT has proven useful in evaluating how students' expectations about e-learning platforms align with their

actual experiences and how this alignment influences satisfaction and continuance intention (Roca et al., 2006).

By incorporating ECT into its framework, the present study aims to better understand how perceived usefulness and satisfaction emerge from students' post-usage evaluations of the e-learning system, providing a psychological basis for measuring user satisfaction in a digital learning environment.

2.2 DeLone and McLean Information System Success Model

The DeLone and McLean Information System Success Model is a widely adopted framework for evaluating the effectiveness of information systems. Originally proposed by DeLone and McLean (1992) and later updated in 2003, the model identifies six interrelated dimensions of success: system quality, information quality, service quality, use, user satisfaction, and net benefits. These elements are intended to capture both the technical and experiential aspects of system use.

The revised model emphasizes the importance of system quality (e.g., reliability, ease of use), information quality (e.g., accuracy, relevance), and service quality (e.g., responsiveness and support) as key antecedents of user satisfaction and system usage (DeLone & McLean, 2003). In the context of e-learning, this model offers a robust structure for evaluating how the performance of an online learning platform contributes to user satisfaction and educational outcomes (Petter et al., 2008).

This study adopts the DeLone and McLean model to assess the impact of system, information, and service quality on graduate students' satisfaction with the e-learning system, offering an integrated view of technological and user experience factors.

2.3 Perceived Ease of Use (PEU)

Perceived ease of use refers to the degree to which individuals believe that using a system requires minimal effort (Davis, 1989). This concept is central to understanding technology acceptance, especially in educational contexts. Russo (2000) emphasized that students who are comfortable navigating online platforms are more likely to perceive them as user-friendly, which supports more effective learning.

Weston (1996) noted that systems delivering quick results tend to enhance user enjoyment and perceived value. Similarly, Sun et al. (2007) found that in online shopping, ease of use contributes to positive user attitudes by increasing perceived value. This connection between ease of use and perceived value has been supported across different digital domains. For example, Ren and Si (2018) observed

that ease of use increases the likelihood of adopting mobile payment systems, while Sheng et al. (2021) found that it positively influences perceived value among students using video platforms.

These studies consistently show that perceived ease of use influences how users assess and engage with digital systems. In this study, perceived ease of use is explored as a key factor affecting graduate students' satisfaction with the e-learning system at Sichuan Conservatory of Music, leading to the following hypothesis:

H1: Perceived ease of use has a significant influence on satisfaction.

2.4 Perceived Usefulness (PU)

Perceived usefulness is a core concept in understanding how individuals accept and adopt technology. Davis (1989) defined perceived usefulness as the degree to which a person believes that using a system will enhance their job performance. This foundational idea has since guided numerous studies on technology use in both professional and educational contexts.

Bhattacharjee (2001) extended the concept by suggesting that perceived usefulness encompasses benefits not only to work or study but also to broader aspects of daily life. In online education, perceived usefulness refers to the extent to which students believe that using an e-learning system helps them achieve their academic goals (Pituch & Lee, 2006). This definition underscores the importance of goal alignment in shaping learners' technology perceptions.

Davis (1989) also emphasized that perceived gains in efficiency and productivity are strong motivators for adopting new technologies. Venkatesh et al. (2003) further demonstrated that perceived usefulness significantly influences users' intention to adopt and continue using digital systems. Supporting this, Xu and Zhao (2018) found a positive relationship between perceived usefulness and perceived value on paid knowledge platforms, linking it directly to user satisfaction and engagement.

Given its established role in shaping user behavior, this study examines how perceived usefulness affects graduate students' satisfaction with the e-learning system at Sichuan Conservatory of Music, leading to the following hypothesis:

H2: Perceived usefulness has a significant influence on satisfaction.

2.5 Quality of course content (CCQ)

The quality of course content refers to the value, relevance, and effectiveness of instructional materials in supporting meaningful learning. Smith (1998), through text analysis, identified three key dimensions: alignment with learners' needs, engagement or enjoyment, and impact on

motivation. Relevant content increases learner motivation, while engaging material encourages deeper interaction, contributing to higher satisfaction and improved learning outcomes.

Building on this, Emran and Shaalan (2014) emphasized the need for multi-dimensional evaluation standards in assessing online course effectiveness. They proposed a framework grounded in both local and international benchmarks, highlighting indicators such as content accuracy, clarity, and pedagogical value. Tenório et al. (2016) further categorized the evaluation of online learning into four dimensions: course resources, course applications, learning satisfaction, and support mechanisms. Within course resources, content quality, instructional design, and teaching effectiveness were central components.

International organizations also stress content quality in online learning standards. For example, the American Society for Training and Development and China's Information Technology Standardization Committee emphasize course content and structure in evaluating e-learning programs (UNESCO, 2020).

Given its recognized role in shaping learner perceptions, this study examines how the quality of course content influences students' perceived usefulness of e-learning systems, leading to the following hypothesis:

H3: Course content quality has a significant influence on perceived usefulness.

2.6 Course design quality (CDQ)

Course design quality refers to the structured planning and organization of instructional activities, including aspects such as content sequencing, workload, task complexity, and scheduling. Wasserstein et al. (2019) identified these components as essential to effective course design, with task difficulty and volume being particularly influential. Hawkins et al. (2008) cautioned that overly complex or burdensome tasks can reduce learning efficiency and outcomes. In contrast, Critser (2003) argued that when academic challenges are well-balanced, students are more likely to achieve their learning goals within a constrained timeframe.

Recent developments in curriculum design emphasize a learner-centered approach, aiming to align course delivery with student needs and expectations. Carmona (2004) noted that learner satisfaction is a critical indicator of teaching quality and is frequently used to evaluate course effectiveness. In support of this view, Bao (2020) and UNESCO (2020) affirmed that student perception surveys are widely accepted as reliable tools for evaluating online course quality. Similarly, Yanovski and Yanovski (2002) linked learning satisfaction to both motivation and engagement, reinforcing its role in assessing instructional

design.

In this context, the present study investigates whether course design quality influences students' perceived usefulness of the e-learning system, resulting in the following hypothesis:

H4: Course design quality has a significant influence on perceived usefulness.

2.7 System Quality (SYQ)

System quality plays a vital role in determining the effectiveness and overall user experience of an information system. DeLone and McLean (2003) define system quality based on attributes such as accessibility, response speed, reliability, and flexibility. These characteristics form a foundation for evaluating how well a system performs from both technical and usability perspectives.

Expanding on this, Shih (2004) and Kim et al. (2008) identified six core dimensions of system quality: accuracy, reliability, convenience, responsiveness, efficiency, and flexibility. These aspects are especially relevant when assessing the functionality of e-learning platforms. Cheng (2012) further highlighted the importance of user interface design and system responsiveness, noting that intuitive interaction also contributes significantly to perceived quality.

Earlier, DeLone and McLean (1992) emphasized that system quality is closely linked to a system's technical robustness and adherence to performance standards. This view is supported by Teo et al. (2003) and Ahn et al. (2007), who found system quality to be a critical factor in user satisfaction across virtual communities and e-business environments. Wilson and Hewitt (2001) also identified system quality as a predictor of perceived usefulness, reinforcing its influence on user evaluations.

Given its importance, this study examines how system quality affects students' satisfaction with the e-learning system, leading to the following hypothesis:

H5: System quality has a significant influence on satisfaction.

2.8 Information Quality (IQ)

Information quality is a key factor that influences user satisfaction and system effectiveness. DeLone and McLean (1992) were among the first to define information quality, describing it as users' trust in the relevance, accuracy, clarity, and integration of system-generated information. Their work highlighted the importance of how well information meets users' needs, particularly in enterprise systems.

Edmunds and Morris (2000) expanded this view by focusing on three essential attributes: accuracy, timeliness, and relevance, stressing the value of reliable and up-to-date information for informed decision-making. Wang and Lin

(2012) introduced a communicative perspective, suggesting that information quality reflects a system's ability to convey meaning effectively, emphasizing user interpretation over raw data characteristics.

Cao et al. (2005) also noted that high-quality information is essential for successful system performance, particularly in organizational settings. In the context of digital platforms, Lin (2007) identified information quality as a critical success factor in virtual communities. Similarly, Lin and Lu (2000) found that information quality significantly shapes users' perception of system usefulness, reinforcing its role in enhancing satisfaction.

Based on these findings, this study examines how information quality influences students' satisfaction with the e-learning system and the following hypothesis is proposed:

H6: Information quality has a significant influence on satisfaction.

2.9 Service Quality (SQ)

Service quality is a critical dimension in evaluating user experience with information systems, especially in online and virtual settings. Saeed et al. (2003) defined service quality as the effectiveness of services delivered by providers, establishing a foundational understanding of how support influences user perceptions. Expanding on this, Santos (2003) emphasized users' overall evaluations of service performance in digital environments, highlighting responsiveness, reliability, and customer care.

DeLone and McLean (2003) refined the concept by defining service quality as the consistency with which service providers deliver support, stressing the importance of reliability in ongoing service interactions. While earlier models of system success focused primarily on system quality and information quality, Kettinger and Lee (1994) argued that service quality should also be included as a core component when evaluating system acceptance and user satisfaction.

Empirical studies reinforce this view. Ahn et al. (2007) found that service quality significantly affects both perceived usefulness and user satisfaction. Similarly, Cao et al. (2005) demonstrated that positive perceptions of service quality increase users' willingness to engage with a system.

Based on these findings, this study examines the influence of service quality on students' satisfaction with the e-learning system, leading to the following hypothesis:

H7: Service quality has a significant influence on satisfaction.

2.10 Satisfaction

Satisfaction is commonly understood as a psychological state that arises when an individual's expectations are met. Hong (2020) described satisfaction as an emotional experience of pleasure resulting from the fulfillment of needs or desires. Similarly, McDuffie and Miller (2002) defined it as an emotional response, ranging from pleasure to disappointment based on the comparison between expected and actual outcomes.

Originating in consumer behavior, the concept has been adapted to education through the notion of learning satisfaction. Kim and Gurvitch (2020) argued that learning satisfaction reflects students' emotional responses after completing a learning process, based on whether outcomes align with their initial expectations. This student-centered perspective shifts the focus from instruction alone to the learner's holistic experience.

Perez (2006) highlighted that learning satisfaction also depends on broader institutional factors, such as support systems and the cultural learning environment. Adnan and Anwar (2020) emphasized that elements like campus facilities and extracurricular offerings contribute meaningfully to students' overall academic and personal development.

While definitions vary, Schlechty (1997) offered a comprehensive view, defining learning satisfaction as students' subjective evaluations of course content, instructional quality, learning environment, and achieved outcomes. This holistic framework is particularly relevant for assessing satisfaction within e-learning systems.

3. Research Methods and Materials

3.1 Research Framework

The research framework of this study is developed through the integration of three established models: the American Customer Satisfaction Index (ACSI) model, the China Customer Satisfaction Index (CCSI) model, and Expectation Confirmation Theory (ECT). Together, these models offer a comprehensive foundation for analyzing the factors that influence student satisfaction with e-learning systems.

The ACSI model, proposed by Fornell et al. (1996), highlights the influence of individual learning environments and learner characteristics on satisfaction and usage intentions. It emphasizes mediating variables such as perceived ease of use, perceived effectiveness, and perceived usefulness, thereby underscoring the importance of user experience and technology interaction in shaping attitudes toward digital learning platforms.

The CCSI model extends traditional acceptance frameworks by incorporating external factors such as course content quality, course design quality, and interactivity. These variables affect satisfaction and continued usage both directly and indirectly through perceived usefulness and expectation confirmation. The model offers a more context-specific understanding of how course-related features impact student engagement.

Expectation Confirmation Theory, introduced by Oliver (1980), explains satisfaction as the result of comparing initial expectations with actual performance. When performance meets or exceeds expectations, users experience positive confirmation, which increases satisfaction and the likelihood of continued system use.

Based on these theoretical foundations, the present study proposes a conceptual model that positions student satisfaction at the center. It suggests that perceived ease of use, perceived usefulness, course content quality, course design quality, system quality, information quality, and service quality all contribute to satisfaction, either directly or through mediating relationships. This integrated framework provides both theoretical insight and practical guidance for enhancing the design and delivery of e-learning systems.

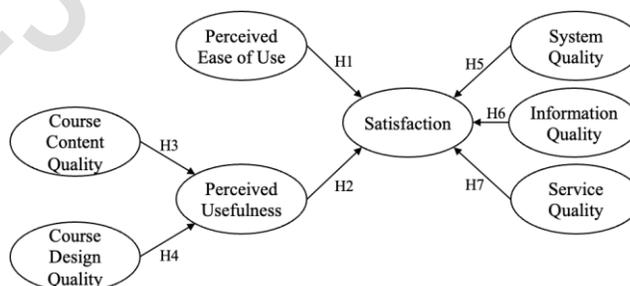


Figure 1: Conceptual Framework

3.2 Research Methodology

This study adopted a mixed-methods approach, combining quantitative and qualitative techniques to examine student satisfaction with the e-learning system. The primary data collection tool was a structured questionnaire distributed to 500 graduate students at Sichuan Conservatory of Music. Participants were selected using a combination of judgmental, stratified random, and convenience sampling to ensure diversity across disciplines. To supplement survey results, semi-structured interviews were conducted with selected students to provide deeper contextual insights.

Prior to the main survey, content validity was assessed through an Item-Objective Congruence (IOC) test. Three experts evaluated each item for relevance using a 3-point

scale. All items recorded IOC scores above 0.67, meeting the minimum threshold for acceptability (Rovinelli & Hambleton, 1977). A pilot test was then conducted with 30 graduate students not included in the final sample. Reliability analysis showed all constructs achieved Cronbach's Alpha values above 0.70, confirming internal consistency (Nunnally & Bernstein, 1994).

Following full data collection, Structural Equation Modeling (SEM) was employed to test the hypothesized model, while Confirmatory Factor Analysis (CFA) was used to validate the measurement model. Data analysis was performed using SPSS and AMOS. This methodology ensured a rigorous evaluation of the conceptual framework and the relationships among the key variables influencing student satisfaction.

3.3 Population and Sample Size

The target population for this study consisted of graduate students at Sichuan Conservatory of Music, located in Chengdu, Sichuan Province, China. As one of the country's premier music institutions, the conservatory offers a relevant setting for exploring satisfaction with e-learning among students engaged in both theoretical and performance-based education. Participants were eligible if they had completed at least one year of graduate study.

In line with Comrey and Lee's (2013) guideline that a sample of 500 is considered very good for factor analysis, this study selected 500 graduate students to ensure sufficient statistical power for structural equation modeling. All distributed questionnaires were fully completed and valid, resulting in 500 usable responses for analysis.

3.4 Sampling Technique

To ensure data quality and representativeness, this study adopted a combined sampling approach using both stratified random sampling and convenience sampling. The sampling units were graduate students from two key faculties at the Sichuan Conservatory of Music: The College of Music Performance and the College of Musicology. A multi-stage sampling method was used to ensure proportionate representation and accessibility.

First, stratified random sampling was employed to select students proportionally from each college. The total graduate student population was divided into two strata based on college enrollment as illustrated in Table 1, forming a stratified sample of 500. This ensured that the sample reflected the actual distribution of students across both faculties.

Second, convenience sampling was applied within each stratum to identify participants who were readily available and willing to take part. This included students recruited

during class visits, via announcements through faculty communication channels, and through voluntary participation in WeChat groups and the university's e-learning platform. Convenience sampling facilitated timely and efficient data collection, especially in cases where random selection was not feasible due to scheduling or accessibility constraints.

Data collection occurred from October to December 2023 through both online and offline channels. Online surveys were distributed via WeChat-integrated WPS documents and Wenjuanxing, while offline surveys were completed in classrooms with support from faculty and counselors. This mixed-mode strategy enhanced participation and streamlined data processing.

Table 1: Sample Units and Sample Size

Colleges	Population Size	Proportional Sample Size
College of Music Performance	918	408
College of Musicology	206	92
Total	1,124	500

4. Results and Discussion

4.1 Demographic Information

Table 2 provides a summary of the demographic characteristics of the 500 graduate students who participated in this study. The gender distribution was relatively balanced, with a slight majority of female respondents. Most participants were between the ages of 22 and 24, reflecting the typical age range of graduate students, while smaller proportions fell into younger and older age groups.

In terms of learning mode preferences, hybrid learning which combines online and face-to-face instruction, emerged as the most favored approach among students. This suggests a strong interest in flexible and blended educational models. Fewer students preferred cloud-based e-learning or traditional in-person classes, indicating a shift toward mixed-mode learning environments in higher education.

These demographic insights offer important context for interpreting subsequent findings, especially in understanding how learner characteristics may relate to satisfaction with e-learning systems.

Table 2: Demographic Information

Demographic and General Data (N=500)		Frequency	Percentage
Gender	Male	243	48.6
	Female	257	51.4
Age	18-21 years old	180	36.0
	22-24 years old	225	45.0
	Over 24 years old	95	19.0
Preference	Cloud-based e-learning	130	26.0

Demographic and General Data (N=500)		Frequency	Percentage
	Traditional courses	50	10.0
	Hybrid courses	320	64.0

4.2 Confirmatory Factor Analysis (CFA)

This section presents the results of the Confirmatory Factor Analysis (CFA), which assesses the reliability and validity of the constructs used in the study, including Course Content Quality, Course Design Quality, and others. In terms of reliability, all constructs demonstrated Cronbach’s Alpha values greater than .70, indicating strong internal consistency (Nunnally & Bernstein, 1994). Factor loadings for all measurement items exceeded the recommended threshold of .50, confirming that each item adequately

reflects its corresponding construct (Hair et al., 2010). For internal consistency and convergent validity, Composite Reliability (CR) values for all constructs were above .70, satisfying the recommended standard for high internal consistency (Fornell & Larcker, 1981). Average Variance Extracted (AVE) values were generally above .50, which suggests acceptable convergent validity, although some values were slightly below this benchmark but still close enough to be considered marginally acceptable in exploratory studies (Fornell & Larcker, 1981).

The statistical indicators confirm that the measurement model used in this study demonstrates satisfactory reliability and validity. These results support the soundness of the constructs and provide a solid foundation for subsequent structural analysis.

Table 3: Confirmatory Factor Analysis (CFA), Composite Reliability (CR), and Average Variance Extracted (AVE) Results

Variable	Source of Questionnaire (Measurement Indicator)	No. of Item	Cronbach’s Alpha	Factor Loading	CR	AVE
Perceived Ease of Use (PEU)	Cheng (2012)	3	0.70	0.71-0.74	0.76	0.52
Perceived Usefulness (PU)	Davis (1989)	4	0.80	0.75-0.80	0.86	0.60
Course Content Quality (CCQ)	Barberà et al. (2013)	3	0.70	0.71-0.72	0.78	0.54
Course Design Quality (CDQ)	Eom and Ashill (2018)	4	0.80	0.66-0.83	0.84	0.56
Service Quality (SQ)	Saeed et al. (2003)	3	0.70	0.66-0.81	0.80	0.57
Information Quality (IQ)	Wang and Lin (2012)	3	0.70	0.68-0.78	0.76	0.52
System Quality (SYQ)	DeLone and McLean (2003)	3	0.80	0.82-0.87	0.89	0.73
Satisfaction (SAT)	Chung and Cho (2022)	4	0.70	0.54-0.76	0.77	0.46

Note: CR = Composite Reliability, AVE = Average Variance Extracted

Model fit was assessed using multiple indices. The χ^2/df ratio was 2.06, below the recommended cutoff of 5.00 (Al-Mamary & Shamsuddin, 2015; Awang, 2012), indicating an acceptable fit. Goodness-of-Fit Index (GFI = .92), Comparative Fit Index (CFI = .94), Tucker-Lewis Index (TLI = .93), and other indicators all surpassed accepted thresholds (typically $\geq .85$). RMSEA was .05, well within the recommended limit of .08, indicating a good fit (Pedroso et al., 2016).

Table 4: Goodness of Fit for Measurement Model

Index	Criterion	Statistical Value
CMIN/DF	< 5.00 (Al-Mamary & Shamsuddin, 2015; Awang, 2012)	2.06
GFI	≥ 0.85 (Sica & Ghisi, 2007)	0.92
AGFI	≥ 0.80 (Sica & Ghisi, 2007)	0.94
NFI	≥ 0.80 (Wu & Wang, 2006)	0.89
CFI	≥ 0.80 (Bentler, 1990)	0.94
TLI	≥ 0.80 (Sharma et al., 2005)	0.93
RMSEA	< 0.08 (Pedroso et al., 2016)	0.05

Note: CMIN/DF = The ratio of the chi-square value to degree of freedom, GFI = goodness-of-fit index, AGFI = adjusted goodness-of-fit index, NFI = normalized fit index, CFI = comparative fit index, TLI = Tucker Lewis index and RMSEA = root mean square error of approximation

As shown in Table 5, the discriminant validity of the measurement model is well supported. The square root of the Average Variance Extracted (AVE) for each construct

(presented on the diagonal) is greater than the correlation coefficients between that construct and all other constructs (Fornell & Larcker, 1981). These results confirm that each construct is distinct from the others, indicating a strong degree of discriminant validity. This supports the conclusion that the model’s latent variables effectively capture unique aspects of the e-learning experience and are not redundant in meaning or measurement.

Table 5: Discriminant Validity

Variable	Factor Correlations							
	PEU	PU	CCQ	CDQ	SQ	IQ	SYQ	SAT
PEU	0.72							
PU	0.13	0.77						
CCQ	0.27	0.12	0.74					
CDQ	0.10	0.09	0.11	0.75				
SQ	0.13	0.31	0.14	0.34	0.75			
IQ	0.12	0.34	0.20	0.22	0.50	0.72		
SYQ	0.30	0.09	0.35	0.10	0.14	0.20	0.85	
SAT	0.01	0.21	0.09	0.12	0.22	0.22	0.06	0.68

Note: The diagonally listed value is the AVE square roots of the variables

4.3 Structural Equation Model (SEM)

Structural Equation Modeling (SEM) was used to test the relationships among multiple latent variables and to assess the overall model fit. SEM provides several advantages over traditional regression methods, particularly in analyzing

complex theoretical models that include both observed and unobserved variables (Tarka, 2018).

The goodness-of-fit indices for the structural model are presented in Table 6. The χ^2/df ratio was 3.31, which falls below the upper threshold of 5.00, indicating an acceptable fit (Al-Mamary & Shamsuddin, 2015; Awang, 2012). Other indices, GFI = .86, AGFI = .83, NFI = .82, CFI = .86, and TLI = .85, met or exceeded the recommended thresholds of .80 or .85. The RMSEA value of .07 remained below the maximum recommended value of .08 (Pedroso et al., 2016), confirming a good level of model fit.

These results suggest that the structural model fits the observed data well and is suitable for hypothesis testing.

Table 6: Goodness of Fit for Structural Model

Index	Criterion	Statistical Value
CMIN/DF	< 5.00 (Al-Mamary & Shamsuddin, 2015; Awang, 2012)	3.31
GFI	≥ 0.85 (Sica & Ghisi, 2007)	0.86
AGFI	≥ 0.80 (Sica & Ghisi, 2007)	0.83
NFI	≥ 0.80 (Wu & Wang, 2006)	0.82
CFI	≥ 0.80 (Bentler, 1990)	0.86
TLI	≥ 0.80 (Sharma et al., 2005)	0.85
RMSEA	< 0.08 (Pedroso et al., 2016)	0.07

Note: CMIN/DF = The ratio of the chi-square value to degree of freedom, GFI = goodness-of-fit index, AGFI = adjusted goodness-of-fit index, NFI = normalized fit index, CFI = comparative fit index, TLI = Tucker Lewis index and RMSEA = root mean square error of approximation

4.4 Research Hypothesis Testing Result

The hypotheses were tested using the standardized path coefficients (β) and corresponding t-values obtained from SEM analysis. A t-value greater than ± 1.96 indicates statistical significance at the .05 level. The results are shown in Table 7.

Out of eight hypotheses, four were supported. Perceived usefulness, information quality, service quality, and course content quality showed significant positive effects on student satisfaction. Conversely, perceived ease of use, course design quality, and system quality did not have a significant impact.

Table 7: Hypothesis Testing Result

Hypothesis	Standardized path coefficients (β)	t-value	Test Result
H1: PEU \rightarrow SAT	-.07	-1.15	Not Supported
H2: PU \rightarrow SAT	.17	3.11*	Supported
H3: CCQ \rightarrow PU	.13	2.45*	Supported
H4: CDQ \rightarrow PU	.10	1.87	Not Supported
H5: SQ \rightarrow SAT	.02	0.28	Not Supported
H6: IQ \rightarrow SAT	.19	3.17*	Supported
H7: SYQ \rightarrow SAT	.15	2.69*	Supported

Note: * $t > 1.96$ = significant at $p < .05$

H1: This hypothesis was not supported ($\beta = -.07, t = -1.15$), suggesting that perceived ease of use does not significantly impact student satisfaction in this context. While Davis (1989) and Venkatesh et al. (2003) emphasized perceived ease of use as a central construct in technology adoption models, its influence may be diminished when users are already proficient in navigating online systems. Sheng et al. (2021) also found a positive relationship between ease of use and perceived value, but this study's result implies that functionality alone may not determine satisfaction among experienced users.

H2: This relationship was supported ($\beta = .17, t = 3.11$), reaffirming that students are more satisfied when they perceive the system as beneficial to their academic progress. This finding is consistent with Davis (1989), Venkatesh et al. (2003), and Xu and Zhao (2018), all of whom identified perceived usefulness as a strong predictor of user satisfaction and continued system use.

H3: The hypothesis was supported ($\beta = .13, t = 2.45$), indicating that well-developed course content contributes positively to how useful students perceive the system to be. This aligns with Smith (1998) and Tenório et al. (2016), who highlighted that content relevance and clarity significantly affect learning motivation and value perception.

H4: Although the path coefficient was positive, the result was not statistically significant ($\beta = .10, t = 1.87$). Carmona (2004) and Bao (2020) emphasized the importance of learner-centered design in promoting satisfaction, but this result may suggest that course design alone does not directly influence perceptions of usefulness unless supported by other factors such as interactivity or instructor engagement.

H5: This hypothesis was not supported ($\beta = .02, t = 0.29$), suggesting that system performance and technical robustness have limited influence on satisfaction in this sample. This contrasts with DeLone and McLean (2003) and Wilson and Hewitt (2001), who found system quality to be a significant factor in user evaluations. In this context, it may be that students view system functionality as a baseline expectation rather than a factor contributing to satisfaction.

H6: This relationship was supported ($\beta = .19, t = 3.17$), confirming that clear, accurate, and relevant information significantly enhances student satisfaction. These results are in line with Edmunds and Morris (2000) and Lin and Lu (2000), who argued that high-quality information is essential for supporting decision-making and improving user experience.

H7: This hypothesis was supported ($\beta = .15, t = 2.69$), showing that timely, reliable, and responsive service delivery positively influences satisfaction. This supports findings from Santos (2003) and Ahn et al. (2007), who found that service quality enhances perceived system value and satisfaction in both educational and commercial digital environments.

The results highlight perceived usefulness, information quality, service quality, and course content quality as key drivers of student satisfaction. In contrast, perceived ease of use, course design quality, and system quality did not show significant effects. The limited influence of course design quality may be due to the relatively low interactivity of the learning modules, which primarily included video lectures and static materials with few opportunities for real-time engagement or active learning. Without interactive features such as live discussions, quizzes, or collaborative tools, students may have found the course structure less impactful on their perceived usefulness. This reflects prior studies suggesting that well-designed content alone may be insufficient without interactive, learner-centered delivery (Bao, 2020; Carmona, 2004).

These insights suggest that while system features provide necessary infrastructure, satisfaction is more strongly shaped by perceived academic value, content relevance, and support quality. Enhancing interactivity could further improve the effectiveness of e-learning environments.

5. Conclusions and Recommendation

5.1 Conclusions

This study employed a mixed-methods approach, integrating qualitative interviews and quantitative survey data to examine the key factors influencing graduate students' satisfaction with the e-learning system at Sichuan Conservatory of Music. Drawing on the Technology Acceptance Model (TAM), the DeLone and McLean Information System Success Model, and Expectation Confirmation Theory (ECT), a conceptual model was developed to explore the interrelationships among multiple constructs.

The model was validated through Confirmatory Factor Analysis (CFA) and Structural Equation Modeling (SEM), confirming acceptable levels of reliability, validity, and model fit. These statistical procedures provide strong empirical support for the proposed framework, ensuring that the findings are both methodologically sound and theoretically grounded.

The results reveal that perceived usefulness, course content quality, information quality, and service quality significantly influence student satisfaction. These findings underscore the importance of relevant content, clear communication, and responsive support in enhancing the educational experience. In contrast, perceived ease of use, course design quality, and system quality did not demonstrate significant effects, suggesting that students may

view usability and system performance as minimum expectations, especially within the context of music education where the focus is often on content mastery and instructional support.

This study contributes new insights by showing that course design quality, typically considered a strong predictor of satisfaction may have limited impact when interactive features are lacking. This nuance is particularly relevant in specialized fields such as music education, where traditional course structures may not fully meet students' expectations for engagement.

By integrating TAM, ECT, and the DeLone & McLean model in a single framework applied to an arts-focused institution, this study fills a research gap in the literature, which has largely focused on general education settings. The findings offer additional theoretical clarity by demonstrating that the influence of certain constructs, such as perceived ease of use and system quality, may vary depending on user familiarity with technology and the nature of the learning content.

These insights refine existing models by contextualizing them within performance-based disciplines, thereby extending their applicability beyond general e-learning environments. They also provide actionable guidance for institutional improvement, emphasizing the need to prioritize content relevance, ensure the accuracy and clarity of information, and strengthen student support services.

In summary, this study not only validates established theoretical relationships but also offers a more context-sensitive understanding of satisfaction in digital learning. Future research should extend these findings across other specialized disciplines and institutions, and further explore variables such as instructional interactivity, learning preferences, and institutional infrastructure to deepen understanding of satisfaction in e-learning systems.

5.2 Recommendations

Based on the findings of this study, several strategic, policy, and practical recommendations are proposed to enhance the effectiveness of the e-learning system at Sichuan Conservatory of Music and similar institutions. These recommendations are grounded in the key results, which identified perceived usefulness, course content quality, information quality, and service quality as significant predictors of student satisfaction. In contrast, course design quality, system quality, and perceived ease of use showed no significant impact, revealing important contextual insights and filling research gaps in arts-based digital education.

New knowledge from this study highlights that static content delivery with limited interactivity may reduce the

perceived value of course design, even when structurally sound. This suggests that traditional instructional models must evolve to include more dynamic engagement strategies in performance-based disciplines like music.

To translate these insights into actionable strategies, the following recommendations are proposed for the institution's leadership and instructional design teams:

Develop a strategic plan to enhance e-learning delivery (Strategic): Create a multi-year roadmap focused on improving content relevance, learner engagement, and support systems. This plan should integrate the study's findings into institutional digital learning goals and allocate resources for content enhancement and staff training.

Invest in specialized online tools for music education (Strategic/Practical): Incorporate interactive technologies tailored to performance-based learning, such as virtual instruments, live-streamed masterclasses, and collaborative composition platforms. This addresses the gap in course design interactivity revealed in the findings and increases students' perceived usefulness of the system.

Improve support services for students (Policy/Practical): Strengthen 24/7 technical and academic support, including real-time chat assistance, dedicated help desks, and fast-track resolution systems. This recommendation directly responds to the importance of service quality in influencing student satisfaction.

Customize the e-learning experience for graduate music students (Policy): Design learner-specific content and support mechanisms that reflect the expectations, skill levels, and learning modes preferred by advanced music students. This includes offering adaptive content, discipline-specific resources, and flexible learning formats, filling a gap in localized model adaptation.

Establish a regular satisfaction monitoring and feedback loop (Policy/Practical): Implement systematic evaluations of student satisfaction each semester, using online surveys and focus groups. This data should inform ongoing improvements to course content, information clarity, and service responsiveness.

Adopt blended learning models where feasible (Strategic): Combine online content with in-person instruction to enhance interaction and engagement. Pre-class online preparation followed by interactive face-to-face sessions can enrich the learning experience, especially in subjects requiring performance and critique.

Localize e-learning implementation strategies (Policy): Adapt system features to accommodate varying levels of internet access and digital literacy, particularly for students in different regions. Offline access options and mobile-friendly formats can ensure equitable participation.

In summary, this study provides both theoretical clarity and practical guidance by demonstrating that content relevance, information quality, and support services

outweigh technical usability in shaping student satisfaction within music-based e-learning environments. These recommendations offer a roadmap for the management team at Sichuan Conservatory of Music to refine their digital learning systems and address the unique needs of graduate students in the performing arts.

5.3 Limitation and Further Study

Based on the research findings, several areas warrant further attention. To improve course content and information quality, the institution should invest in the development of high-quality learning materials by collaborating with experienced music educators. These materials should balance traditional music education with modern trends to meet diverse student needs. A dedicated team should also be responsible for regularly updating system content to ensure accuracy and relevance.

To enhance service quality, establishing 24/7 technical support through hotlines or online chat staffed by trained personnel is recommended. Additionally, administrative processes related to e-learning should be streamlined for better efficiency. Improving the platform's interface, usability, and technical performance such as system stability and response speed can also enhance the overall learning experience.

Other institutions can adopt these findings as a reference by adapting the validated theoretical model to their specific contexts. Future research should explore context-specific variables, test model extensions, and examine blended learning strategies to further increase student engagement and satisfaction in digital learning environments.

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