pISSN: 1906 - 6406 The Scholar: Human Sciences
eISSN: 2586 - 9388 The Scholar: Human Sciences
https://assumptionjournal.au.edu/index.php/Scholar

# Exploring Undergraduate Satisfaction with E-Learning System at Sichuan Conservatory of Music

**Li Yuwen*, Yongqiang Wu, John Barnes**

**Received: April 12, 2025. Revised: June 5, 2025. Accepted: July 1, 2025**

## Abstract

**Purpose:** This study examines the key factors influencing undergraduate students' satisfaction with the e-learning system at Sichuan Conservatory of Music in China**. Research design, data and methodology:** Using a quantitative research design, data were collected through structured questionnaires from 500 undergraduate students selected via a mixed sampling strategy that combined judgment, stratified random, and convenience methods. The research framework was based on Expectation-Confirmation Theory and the DeLone and McLean Information System Success Model. Content validity and internal consistency were confirmed using the index of item-objective congruence (IOC) and Cronbach's Alpha. Structural Equation Modeling (SEM) and Confirmatory Factor Analysis (CFA) were conducted using SPSS and AMOS. **Results:** The results reveal that information quality has the strongest positive effect on student satisfaction, followed by service quality, perceived usefulness, and system quality. In contrast, perceived ease of use and course design quality were not found to have significant effects. These findings highlight the importance of maintaining accurate, relevant, and up-to-date content, reliable system performance, and responsive support services. **Conclusions:** The targeted improvements in these areas can significantly enhance student satisfaction and engagement in online learning. For institutions specializing in arts and music education, these results offer valuable guidance for strengthening digital learning environments and ensuring their sustainable effectiveness.

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

**JEL Classification Code:** A23, I23, L86, O30

## 1. Introduction

The COVID-19 pandemic has profoundly reshaped the landscape of education, creating a research problem centered around the persistent challenges of ensuring student satisfaction, engagement, and course completion in digital learning environments. This shift accelerated the transition from traditional classroom settings to digital learning platforms across universities, secondary schools, and primary institutions worldwide (Adedoyin & Soykan, 2020; Zhu & Liu, 2020). As education systems enter the post-pandemic era, online learning is expected to remain an essential component of higher education delivery (Gopal et al., 2021). However, many institutions continue to struggle with high dropout rates, limited engagement, and low course completion rates, which directly impact the quality and effectiveness of online learning systems (Maqableh et al., 2021). These challenges highlight the critical need to understand and enhance students' satisfaction with e-learning systems as a key determinant of their sustained engagement and academic success.

Although a substantial body of research has examined factors influencing satisfaction with e-learning systems such as system quality, service responsiveness, and perceived usefulness most studies have concentrated on general academic contexts and often overlook the unique demands

1*Li Yuwen, PhD.TEM, School of Business and Advanced Technology Management, Assumption University, Thailand. Email: 1046342040@qq.com
2 Yongqiang Wu, Ph.D. Graduate School of Business and Advanced Technology Management, Assumption University. Email: yongqiangwu@au.edu
3 John Barnes, Ph.D., Graduate School of Business and Advanced Technology Management, Assumption University, Email: barnesjohn2010@gmail.com

of discipline-specific needs, particularly in arts and music education (Santoso et al., 2021). Additionally, there is a lack of empirical research that systematically validates the interrelationships among technical, pedagogical, and psychological factors through integrated theoretical models. This gap presents a research opportunity to investigate the specific factors influencing student satisfaction with e-learning in specialized fields, where creative disciplines like music require tailored pedagogical approaches and high-quality digital content.

To address this gap, the present study investigates the factors affecting undergraduate students' satisfaction with the e-learning system at Sichuan Conservatory of Music. Drawing upon the Expectation-Confirmation Theory (Bhattacherjee, 2001) and the DeLone and McLean Information System Success Model (DeLone & McLean, 2003), this study develops a conceptual framework to explore key constructs including perceived ease of use, perceived usefulness, course content quality, course design quality, system quality, information quality, and service quality. A quantitative research approach was employed, using a structured questionnaire distributed to 500 senior undergraduate students. A mixed sampling strategy combining judgmental, stratified random, and convenience sampling ensured diversity and representativeness in participant selection. The collected data were analyzed using SPSS and AMOS, with Confirmatory Factor Analysis (CFA) and Structural Equation Modeling (SEM) applied to validate the measurement model and assess causal relationships.

This research aims to provide theoretical insights and practical recommendations for improving e-learning satisfaction, with specific relevance to institutions focused on music and arts education. Although the study does not account for individual learner differences, instructor characteristics, or platform usage patterns, its findings offer valuable guidance for enhancing the quality and effectiveness of digital learning systems in specialized academic contexts.

## 2. Literature Review

### 2.1 Perceived Ease of Use (PEU)

Perceived ease of use (PEU), a core construct of the Technology Acceptance Model (TAM), refers to the degree to which an individual believes that using a particular system would be free of effort (Davis, 1989). Numerous studies have confirmed the significance of PEU in predicting user satisfaction in e-learning environments. For instance, Lee et al. (2021) found that intuitive system navigation and minimal technical complexity significantly enhanced student satisfaction with online learning platforms during the COVID-19 pandemic. Similarly, Al-Fraihat et al. (2020) reported that ease of use directly contributed to learners' satisfaction across multiple digital learning systems, highlighting its role in reducing frustration and promoting positive user experiences.

Zhao et al. (2022) further observed that systems perceived as easy to use improve learners' engagement and comfort, which in turn elevate overall satisfaction. These findings are consistent with the results of Escobar-Rodríguez and Monge-Lozano (2012), who emphasized that when students perceive an e-learning platform as user-friendly, they are more likely to experience higher satisfaction due to reduced cognitive load and increased confidence in system interaction. In the context of music education, where learners may be less familiar with digital platforms, system usability becomes even more critical for fostering a satisfying learning experience. Given this body of evidence, it is reasonable to hypothesize that perceived ease of use exerts a significant positive influence on students' satisfaction with e-learning systems.

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

### 2.2 Perceived Usefulness (PU)

Perceived usefulness (PU), a central construct in the Technology Acceptance Model (TAM), refers to the extent to which a user believes that using a particular system will enhance their learning performance (Davis, 1989). In the context of e-learning, this construct has been widely recognized as a key determinant of student satisfaction. Empirical research has consistently shown that when learners perceive an online system as effective in improving knowledge acquisition, skill development, and academic performance, their satisfaction with the system increases significantly.

For instance, Liu and Chen (2019) found that students who recognized the utility of digital learning platforms reported higher satisfaction levels due to the alignment between perceived benefits and academic expectations. Similarly, Zhang and Xiao (2020) confirmed that PU significantly influenced university students' acceptance of digital systems, with perceived usefulness acting as a key driver of overall satisfaction and continued usage. In higher education settings, where learning outcomes are a primary concern, systems perceived as useful are more likely to yield positive evaluations from students.

These findings are consistent with the broader literature on educational technology adoption, which emphasizes that perceived usefulness not only enhances behavioral intention but also fosters satisfaction by reinforcing learners' beliefs in the value of the system (Escobar-Rodríguez & Monge-

Lozano, 2012; Ko et al., 2005). Given this body of evidence, it is hypothesized that perceived usefulness has a significant positive influence on students' satisfaction with e-learning systems.

**H2:** Perceived usefulness has a significant influence on satisfaction.

## 2.3 Course Content Quality (CCQ)

Course content quality (CCQ) is a central factor influencing students' perceptions of the usefulness of e-learning systems. High-quality content, characterized by relevance, organization, depth, and alignment with learning objectives, enhances the learning experience and contributes significantly to students' perceived usefulness of the platform (Li & Moore, 2018). In contrast, poorly structured or irrelevant content can hinder motivation and diminish the system's perceived value (Martin et al., 2020).

Recent research further highlights that learner-content interaction is a primary predictor of perceived usefulness and satisfaction, particularly in digital learning contexts (Chen et al., 2021). Courses that provide well-curated materials, multimedia resources, and opportunities for active learning allow students to engage more meaningfully, which in turn enhances their perception of the system's educational value (Al-Fraihat et al., 2020). Furthermore, excessive or unbalanced content may overwhelm learners and negatively affect completion rates, underscoring the importance of instructional design that emphasizes clarity and coherence (Adarkwah, 2021). Collectively, these findings support the assertion that course content quality plays a vital role in shaping students' perceptions of the usefulness of e-learning systems.

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

## 2.4. Course Design Quality (CDQ)

Course design quality (CDQ) is a fundamental element of effective online education and plays a significant role in shaping students' perceptions of a system's usefulness. Well-structured course design can optimize cognitive processing, reduce unnecessary mental load, and improve knowledge retention, factors that directly impact learners' evaluation of how beneficial an e-learning system is (Tadesse & Muluye, 2020).

Effective course design typically incorporates clear learning objectives, logical module sequencing, appropriate workload distribution, and accessible content presentation. Mukute et al. (2020) emphasized that balanced curriculum difficulty and task volume foster engagement by minimizing cognitive overload. Similarly, modular course structures, designed to simplify navigation and facilitate coherent progression from foundational to advanced topics have been shown to enhance perceived utility by improving cognitive fluency and knowledge integration (Shea et al., 2018).

Flexibility in instructional scheduling also plays a key role. When courses allow students to learn asynchronously or adjust their study pace, perceived usefulness tends to rise due to the accommodation of diverse learner needs (Adarkwah, 2021). Conversely, overly rigid or overly complex course structures can hinder students' ability to extract value from the platform, ultimately reducing their satisfaction and engagement. Collectively, the literature suggests that coherent, adaptable, and cognitively aligned course design significantly enhances students' perception of the usefulness of e-learning systems.

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

## 2.5 System Quality (SYQ)

System quality (SYQ) refers to the performance, reliability, responsiveness, and technical functionality of an information system. In the context of e-learning, it plays a critical role in determining how users evaluate and interact with the platform, directly influencing their satisfaction. According to the updated DeLone and McLean Information System Success Model (2003), system quality is one of the primary antecedents of user satisfaction and perceived usefulness.

Lederer et al. (2000) emphasized that users' subjective judgments about system quality including ease of access, error-free operation, and fast response time are strongly correlated with their evaluation of the system's usefulness. Lee and Chung (2009) further supported this by highlighting that high system quality fosters user trust, which is essential for satisfaction in technology adoption environments. In e-learning platforms, trust in system stability and reliability increases user confidence and satisfaction, especially when learners rely on uninterrupted access for assessments, lectures, and interactions.

Recent empirical findings confirm that system quality positively affects students' overall satisfaction with online learning systems. Al-Fraihat et al. (2020), for example, found that system reliability, user interface design, and system speed significantly contributed to student satisfaction and continued use intention in digital education contexts. Given this body of evidence, it is reasonable to hypothesize that system quality significantly influences students' satisfaction with e-learning platforms.

**H5:** System quality has a significant influence on satisfaction.

## 2.6 Information Quality (IQ)

Information quality (IQ) refers to the extent to which the content provided by an information system is accurate, timely, complete, and relevant to the users' needs. In the context of e-learning, high-quality information is essential for supporting learners' academic tasks and positively shaping their system evaluation and satisfaction.

Nelson et al. (2005) conceptualized information quality through dimensions such as accuracy, precision, format, and consistency, emphasizing that these attributes define the value of system output. VanBirgelen et al. (2008) further identified relevance, reliability, and timeliness as key components, all of which are particularly vital in dynamic online learning environments. These qualities ensure that students receive content that is not only factually correct but also up-to-date and aligned with their academic objectives.

In education-specific contexts, Lin (2007) demonstrated that information quality significantly influences students' perceptions of usefulness and satisfaction, suggesting that poor content delivery such as outdated resources or unclear instructional materials can diminish learners' trust and engagement. Similarly, Rotchanakitumnuai and Speece (2009) found that in electronic service platforms, perceived information quality is a direct predictor of user satisfaction, underscoring its importance in content-driven systems such as e-learning. Therefore, ensuring high standards of information quality is critical for fostering positive learner experiences and overall satisfaction with e-learning platforms.

**H6:** Information quality has a significant influence on satisfaction.

## 2.7 Service Quality (SQ)

Service quality (SQ) in e-learning refers to students' perceptions of the effectiveness, responsiveness, and reliability of the support services provided alongside the learning system. These services include both technical assistance and instructional support, which together contribute significantly to students' satisfaction and overall user experience.

Roca et al. (2006) conceptualize service quality in online learning environments as the technical and pedagogical support students receive, which directly influences their willingness to adopt and continue using the system. Chiu et al. (2009) reinforce this by defining service quality as the extent to which services meet or exceed user expectations, an essential determinant in shaping learners' overall satisfaction.

DeLone and McLean (2003) position service quality as one of the three key dimensions in their updated Information System Success Model, arguing that it is critical to evaluating system performance, particularly in service-intensive digital environments. Empirical studies further support this claim: Ozkan and Koseler (2009) found that combined instructional and technical support significantly impacts student satisfaction in e-learning systems, while Ahn et al. (2007) demonstrated that responsive support services enhance perceived system usefulness, which in turn contributes to satisfaction. These findings suggest that service quality is a multidimensional construct that influences how learners assess the value and effectiveness of online education systems.

**H7:** Service quality has a significant influence on satisfaction.

## 2.8 Satisfaction (SAT)

Satisfaction is commonly defined as an individual's affective response resulting from a comparison between expectations and actual experiences with a product or service. In consumer research, this expectation-confirmation process has long been recognized as a key mechanism influencing satisfaction judgments (Oliver, 1980). When actual performance meets or exceeds initial expectations, individuals are likely to experience satisfaction; conversely, discrepancies may lead to dissatisfaction.

In educational settings, particularly in online learning environments, the concept of satisfaction has been adapted from consumer behavior models to reflect learners' subjective evaluations of their digital learning experiences. DeLone and McLean (2003) positioned satisfaction as a central outcome variable in their updated Information System Success Model, highlighting its importance in assessing the effectiveness of e-learning systems.

Recent studies have demonstrated that learning satisfaction is not only a key indicator of students' contentment with course delivery, but also a predictor of continued use, engagement, and academic persistence. For example, Al-Fraihat et al. (2020) found that satisfaction with e-learning systems significantly influenced students' intention to continue using the platform and served as a mediating factor between system attributes (e.g., content, service, and system quality) and learning success. In this context, learning satisfaction serves as both a reflection of perceived educational quality and a determinant of learners' behavioral outcomes in online education.

In summary, this literature review has identified key factors influencing students' satisfaction with e-learning systems: perceived ease of use, perceived usefulness, course content quality, course design quality, system quality, information quality, and service quality. Drawing from Expectation Confirmation Theory (ECT) and the Technology Acceptance Model (TAM), the review

highlights how user satisfaction emerges from the interplay between technical, pedagogical, and experiential factors. Compared with previous research, this study's integrated approach, tailored to the context of music education, advances the academic conversation by aligning constructivist principles, ECT, and TAM within a unified framework. This contribution deepens the understanding of how system quality, content, and design shape satisfaction in digital learning environments, offering valuable guidance for future interdisciplinary research and educational practice

## 3. Research Methods and Materials

### 3.1 Research Framework

The research framework, illustrated in Figure 1, integrates Constructivism Theory, Expectation Confirmation Theory (ECT), and the Technology Acceptance Model (TAM) to systematically analyze the factors influencing undergraduate students' satisfaction with the e-learning system at Sichuan Conservatory of Music. Constructivism emphasizes the active construction of knowledge through learner interaction with the environment (Piaget, 2000), while ECT (Oliver, 1980) and TAM (Davis, 1989) explain satisfaction as an outcome of comparing pre-usage expectations with post-usage perceptions of system utility and usability.

Drawing from DeLone and McLean's (2003) Information System Success Model, the framework incorporates system quality (e.g., reliability, accessibility), information quality (e.g., accuracy, relevance), and service quality (e.g., responsiveness, technical support) as direct determinants of satisfaction. In addition, course content quality (Barberà et al., 2013; Oliveira et al., 2021) and course design quality (Carmona, 2004; Eom & Ashill, 2016) are posited to influence perceived usefulness (PU), which, along with perceived ease of use (PEOU), acts as a mediator of student satisfaction (Joo et al., 2016; Lee, 2010). This framework is consistent with prior empirical studies (Shin & Kang, 2015; Zhu, 2019) and proposes that while system, information, and service quality exert direct effects on satisfaction, course content and design qualities impact satisfaction indirectly via perceived usefulness.

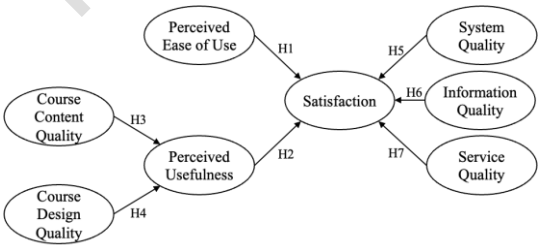


**Figure 1:** Conceptual Framework

### 3.2 Research Methodology

This section outlines the research design, including the selection of the sampling unit, determination of sample size, and identification of the target demographic. A quantitative approach was adopted, with data collected through a structured questionnaire administered to the defined population. The procedures for data collection and statistical analysis are also detailed.

Prior to data collection, content validity was assessed using the Item-Objective Congruence (IOC) index, and internal consistency reliability was examined through Cronbach's Alpha. Ethical approval for the study was obtained from the Institutional Review Board (IRB) of Sichuan Conservatory of Music, ensuring adherence to ethical guidelines and protection of participants' rights. Following data collection, Structural Equation Modeling (SEM) was employed to verify the relationships among the study variables, as it is considered an effective technique for analyzing complex causal models in behavioral research.

The methodology section comprises eight components: research method, respondent and sampling strategy, research instruments (questionnaire), validation and reliability of the instrument, data collection procedures, Confirmatory Factor Analysis (CFA), model fit indices, and SEM to assess the influence of variables. Statistical analysis was conducted using SPSS and AMOS software. The proposed conceptual framework and hypothesized variable relationships were empirically tested through CFA and SEM, and the results were evaluated to determine model adequacy and explanatory power.

### 3.3 Population and Sample Size

In research, the target population represents a critical component, comprising a subset of the broader population that includes individuals, records, or events relevant to the study (Cooper & Schindler, 2011; Saunders et al., 2016). Malhotra et al. (2017) further note that the sample serves as a representation of this target population, allowing for generalization of findings. In this study, the target population consisted of undergraduate students at the Sichuan Conservatory of Music in China who had completed at least one year of academic study. Located in Chengdu, Sichuan Province, the institution is recognized as a prominent music conservatory in China.

Determining an appropriate sample size is essential to ensuring the reliability of statistical analysis. Comrey and Lee (2013) suggest that sample sizes of 300, 500, and 1000 can be classified as good, very good, and excellent, respectively, for conducting factor analysis. Based on these guidelines and existing literature, a total of 500 students were selected as the sample for this study to enhance the

robustness of the results.

Questionnaires were distributed simultaneously to all selected participants. Upon review, all 500 responses were deemed valid, resulting in a 100% valid response rate for data analysis.

### 3.4 Sampling Technique

This study employed a multi-stage sampling strategy to select 500 undergraduate students from the Sichuan Conservatory of Music. The approach combined judgmental, stratified random, and convenience sampling techniques to ensure both representativeness and feasibility.

In the first stage, judgmental sampling was applied to intentionally include Music students with over three years of experience using the e-learning system. This subgroup was selected for their familiarity and expertise, which were deemed valuable for evaluating the system's effectiveness.

In the second stage, stratified random sampling was used as presented in Table 1 to ensure proportional representation of students across academic disciplines. The undergraduate student population (N = 4,043) was stratified into two groups: Music Performance and Musicology. From the Music Performance group (population size: 3,316), 410 students (82.0%) were selected; from the Musicology group (population size: 727), 90 students (18.0%) were selected. This proportional allocation mirrored each discipline's distribution within the overall student population, thereby enhancing generalizability.

**Table 1:** Sample Units and Sample Size

| Colleges | Population Size | Proportional Sample Size |
|---|---|---|
| College of Music Performance | 3,316 | 410 |
| College of Musicology | 727 | 90 |
| **Total** | **4,043** | **500** |

In the third stage, convenience sampling was employed to distribute questionnaires via social media platforms such as WeChat and QQ, prioritizing accessibility and student willingness to participate. This approach allowed the researchers to maximize response rates while maintaining practical feasibility.

The final sample of 500 students was validated with SEM-specific power analysis using Soper's (2006) calculator. The sample size was found to be adequate for detecting medium effect sizes and appropriate for Structural Equation Modeling (SEM), in line with Hair et al.'s (2010) recommendations.

This integrated sampling approach balanced methodological rigor with practical accessibility, ensuring that the sample was both representative and robust for advanced statistical analysis.

## 4. Results and Discussion

### 4.1 Demographic Profile

The demographic profile of the 500 respondents reveals a gender distribution slightly skewed toward females (59.8%), reflecting either the actual population structure or a sampling bias aligned with gender representation in music education. The majority of participants (57.4%) were enrolled in the Music Performance major, with the remainder in Musicology, indicating strong representation from both core disciplines relevant to the study. Most students (75%) fell within the 18-21 age group, representing the primary undergraduate cohort and confirming the suitability of the sample for assessing student satisfaction in higher education. In terms of learning format preferences, a clear majority (67.6%) favored hybrid learning models over purely cloud-based or traditional classroom formats, suggesting students' inclination toward flexible, blended approaches in post-pandemic education.

**Table 2:** Demographic Profile

| Demographic and General Data (N=500) | | Frequency | Percentage |
|---|---|---|---|
| Gender | Male | 201 | 40.2 |
| | Female | 299 | 59.8 |
| Age | 18-21 years old | 375 | 75.0 |
| | 22-24 years old | 95 | 19.0 |
| | Over 24 years old | 30 | 6.0 |
| Preference | Cloud-based e-learning | 100 | 20.0 |
| | Traditional courses | 62 | 12.4 |
| | Hybrid courses | 338 | 67.6 |

### 4.2 Confirmatory Factor Analysis (CFA)

Confirmatory Factor Analysis (CFA) was conducted to evaluate the reliability and convergent validity of the measurement model. As shown in Table 3, all constructs met the recommended thresholds for construct reliability and validity.

Across all constructs, standardized factor loadings exceeded the acceptable threshold of 0.50 and were statistically significant at $p < 0.05$. Most items loaded above 0.70, demonstrating strong indicator reliability (Hair et al., 2010). Composite Reliability (CR) values ranged from 0.703 to 0.892, and Cronbach's Alpha (α) values ranged from 0.701 to 0.885, both exceeding the minimum acceptable level of 0.70 (Nunnally & Bernstein, 1994). These results indicate satisfactory to high internal consistency for all constructs. Specifically, System Quality (SYQ) exhibited the strongest reliability (CR = 0.892, $\alpha \approx 0.885$), while Satisfaction (SAT) and Course Content Quality (CCQ) demonstrated acceptable but slightly lower reliability (CR = 0.703 and 0.780; $\alpha \approx 0.701$ and 0.765,

respectively). Average Variance Extracted (AVE) values ranged from 0.507 to 0.734, all meeting or surpassing the 0.50 threshold (Fornell & Larcker, 1981), indicating adequate convergent validity i.e., over half the variance in each construct's indicators is explained by the underlying factor.

The CFA results confirm that the measurement model possesses acceptable reliability (based on Cronbach's Alpha and CR) and convergent validity (based on AVE), supporting its suitability for subsequent Structural Equation Modeling (SEM).

**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 | 0.750 | 0.710-0.735 | 0.765 | 0.520 |
| Perceived Usefulness (PU) | Davis (1989) | 4 | 0.845 | 0.745-0.804 | 0.857 | 0.601 |
| Course Content Quality (CCQ) | Barberà et al. (2013) | 3 | 0.765 | 0.709-0.781 | 0.780 | 0.542 |
| Course Design Quality (CDQ) | Eom and Ashill (2016) | 4 | 0.825 | 0.656-0.830 | 0.837 | 0.563 |
| Service Quality (SQ) | Saeed et al. (2003) | 3 | 0.785 | 0.659-0.806 | 0.798 | 0.570 |
| Information Quality (IQ) | Wang and Lin (2012) | 3 | 0.748 | 0.683-0.783 | 0.764 | 0.520 |
| System Quality (SYQ) | DeLone and McLean (2003) | 3 | 0.885 | 0.828-0.876 | 0.892 | 0.734 |
| Satisfaction (SAT) | Chung and Cho (2022) | 4 | 0.701 | 0.636-0.796 | 0.703 | 0.507 |

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

The results of the Confirmatory Factor Analysis (CFA) indicate that the measurement model demonstrates a satisfactory fit with the observed data. All key fit indices, including CMIN/DF, GFI, IFI, NFI, CFI, TLI, and RMSEA, fall within acceptable thresholds recommended in the literature as presented in Table 4. These results suggest that the hypothesized model structure is consistent with the sample data and adequately represents the relationships among the observed variables and their respective latent constructs.

The goodness-of-fit outcomes reflect the adequacy of the model from multiple dimensions, absolute, incremental, and parsimonious confirming that the model is well-calibrated and empirically supported. As such, the model can be considered statistically appropriate for further construct validation.

While the current results support the overall fit of the measurement model, further examination of discriminant validity is necessary to ensure that each construct is distinct and non-redundant before proceeding to structural model testing.

**Table 4:** Goodness of Fit for Measurement Model

| Index | Criterion | Statistical Value |
|---|---|---|
| CMIN/DF | < 5.00 (Al-Mamary & Shamsuddin, 2015; Awang, 2012) | 2.391 |
| GFI | ≥ 0.85 (Sica & Ghisi, 2007) | 0.907 |
| AGFI | ≥ 0.80 (Sica & Ghisi, 2007) | 0.928 |
| NFI | ≥ 0.80 (Wu & Wang, 2006) | 0.883 |
| CFI | ≥ 0.80 (Bentler, 1990) | 0.927 |
| TLI | ≥ 0.80 (Sharma et al., 2005) | 0.914 |
| RMSEA | < 0.08 (Pedroso et al., 2016) | 0.053 |

**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

Discriminant validity was assessed using the Fornell-Larcker criterion, which compares the square root of the Average Variance Extracted (AVE) for each construct with the correlation coefficients between that construct and all others. As shown in Table 5, the square roots of AVE (presented on the diagonal) are greater than the corresponding inter-construct correlation values in their respective rows and columns. This result confirms that each construct shares more variance with its own indicators than with other constructs in the model.

These findings indicate that the latent constructs are empirically distinct and conceptually independent from one another, thereby supporting the adequacy of the measurement model in differentiating between theoretically related but separate concepts.

**Table 5:** Discriminant Validity

| Variable | Factor Correlations | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | PEU | PU | CCQ | CDQ | SQ | IQ | SYQ | SAT |
| **PEU** | **0.721** | | | | | | | |
| **PU** | 0.134 | **0.775** | | | | | | |
| **CCQ** | 0.273 | 0.120 | **0.736** | | | | | |
| **CDQ** | 0.097 | 0.093 | 0.114 | **0.750** | | | | |
| **SQ** | 0.132 | 0.307 | 0.142 | 0.341 | **0.754** | | | |
| **IQ** | 0.123 | 0.336 | 0.196 | 0.217 | 0.502 | **0.721** | | |
| **SYQ** | 0.307 | 0.078 | 0.356 | 0.089 | 0.130 | 0.176 | **0.856** | |
| **SAT** | 0.049 | 0.328 | 0.211 | 0.132 | 0.356 | 0.362 | 0.156 | **0.712** |

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

## 4.3 Structural Equation Model (SEM)

Structural Equation Modeling (SEM) was employed to evaluate the hypothesized relationships among latent constructs based on the proposed conceptual framework. As a comprehensive multivariate technique, SEM integrates confirmatory factor analysis with path analysis, enabling simultaneous examination of both measurement and

structural models (Shaheen et al., 2017). The model's overall fit was assessed using a range of commonly accepted goodness-of-fit indices, including CMIN/DF, GFI, AGFI, NFI, CFI, TLI, and RMSEA.

Initially, the structural model demonstrated marginally acceptable fit across most indices. Following model re-specification such as the removal of insignificant paths or the modification of covariances, improvements were observed across all fit indices. The adjusted model achieved acceptable values for absolute, incremental, and parsimonious fit indices, indicating that the structural model aligns well with the empirical data.

The post-adjustment results confirm that the model provides a satisfactory representation of the relationships among the variables, supporting its adequacy for hypothesis testing. These findings provide a sound statistical basis for further interpretation of the structural relationships and testing of the proposed hypotheses.

**Table 6:** Goodness of Fit for Structural Model

| Index | Criterion | Statistical Value |
|---|---|---|
| CMIN/DF | < 5.00 (Al-Mamary & Shamsuddin, 2015; Awang, 2012) | 3.270 |
| GFI | ≥ 0.85 (Sica & Ghisi, 2007) | 0.862 |
| AGFI | ≥ 0.80 (Sica & Ghisi, 2007) | 0.835 |
| NFI | ≥ 0.80 (Wu & Wang, 2006) | 0.829 |
| CFI | ≥ 0.80 (Bentler, 1990) | 0.874 |
| TLI | ≥ 0.80 (Sharma et al., 2005) | 0.860 |
| RMSEA | < 0.08 (Pedroso et al., 2016) | 0.067 |

**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

Structural Equation Modeling (SEM) was used to test the proposed hypotheses, with significance evaluated at the conventional level of $p < 0.05$. A hypothesis is considered statistically supported if its standardized path coefficient (β) is positive and its corresponding t-value exceeds the critical threshold (t-value > 1.96). Table 7 presents the outcomes of hypothesis testing, indicating which hypothesized relationships were supported based on the structural model.

The results show that five out of seven hypotheses were statistically supported, reflecting significant direct effects between constructs, while two hypotheses were not supported due to insignificant path coefficients and t-values.

**Table 7:** Hypothesis Result of the Structural Equation Modeling

| Hypothesis | Standardized path coefficients (β) | t-value | Test Result |
|---|---|---|---|
| H1: PEU → SAT | -0.050 | -0.956 | Not Supported |
| H2: PU → SAT | 0.213 | 4.084* | Supported |
| H3: CCQ → PU | 0.137 | 2.502* | Supported |
| H4: CDQ → PU | 0.097 | 1.859 | Not Supported |
| H5: SQ → SAT | 0.270 | 2.508* | Supported |
| H6: IQ → SAT | 0.303 | 5.163* | Supported |
| H7: SYQ → SAT | 0.270 | 4.900* | Supported |

**Note:** *=p-value<0.05

**H1:** This hypothesis was not supported (β = -0.050, t = -0.956). This finding contradicts earlier studies (e.g., Davis, 1989; Lee et al., 2021), which typically report a positive relationship between perceived ease of use (PEU) and user satisfaction. One possible explanation is that students at the Sichuan Conservatory of Music may already be familiar with digital systems, making ease of use less influential in determining satisfaction. When usability is taken for granted, students may instead prioritize content quality or system performance.

**H2:** This hypothesis was supported (β = 0.213, t = 4.084). The result confirms that students who perceive the e-learning system as beneficial to their academic performance are more likely to report higher satisfaction. This finding aligns with the Technology Acceptance Model (Davis, 1989) and related studies (e.g., Al-Fraihat et al., 2020; Roca et al., 2006), reinforcing the importance of usefulness in shaping learners' attitudes toward educational technologies.

**H3:** This hypothesis was supported (β = 0.137, t = 2.502). The result indicates that rich, relevant, and well-structured course content enhances students' perception of the system's usefulness. This finding is consistent with prior work (Barberà et al., 2013; Oliveira et al., 2021), which emphasized that high-quality instructional materials contribute positively to learners' perceived value of online education.

**H4:** This hypothesis was not supported (β = 0.097, t = 1.859). Contrary to expectations and previous findings (e.g., Carmona, 2004; Eom & Ashill, 2016), course design quality did not significantly affect perceived usefulness in this study. This may be due to the uniform instructional design across courses or limited awareness of design structure among students. It is also possible that learners prioritize content over design when evaluating usefulness.

**H5:** This hypothesis was supported (β = 0.270, t = 2.508). The result supports the DeLone and McLean IS Success Model (2003) and confirms that system reliability, speed, and accessibility significantly influence student satisfaction. This aligns with Lee and Chung (2009) and Al-Fraihat et al. (2020), who reported that technically robust systems foster user trust and satisfaction in digital learning environments.

**H6:** This hypothesis was supported (β = 0.303, t = 5.163). Among all predictors, information quality had the strongest positive effect on satisfaction. This finding is in line with Nelson et al. (2005) and Lin (2007), emphasizing that timely, accurate, and relevant information is essential for positive user experience and perceived system value.

**H7:** This hypothesis was supported (β = 0.270, t = 4.900).

This result confirms that high-quality support services, such as prompt technical help and accessible instructional assistance significantly enhance students' satisfaction. It supports findings by Roca et al. (2006), Chiu et al. (2009), and Ozkan and Koseler (2009), who have similarly highlighted the importance of service quality in sustaining satisfaction in online education.

## 5. Conclusions and Recommendation

### 5.1 Conclusions

This study employed a quantitative research design to investigate the factors influencing undergraduate students' satisfaction with the e-learning system at Sichuan Conservatory of Music. Guided by the Technology Acceptance Model (TAM), Expectation Confirmation Theory (ECT), and the DeLone and McLean Information System Success Model, the research tested a conceptual framework using data collected from 500 students. Measurement and structural models were validated through Confirmatory Factor Analysis (CFA) and Structural Equation Modeling (SEM), both of which demonstrated acceptable reliability, validity, and model fit.

The findings revealed that perceived usefulness, course content quality, information quality, system quality, and service quality had significant positive effects on students' satisfaction with the e-learning system. These results align with prior studies (e.g., Al-Fraihat et al., 2020; Davis, 1989; DeLone & McLean, 2003), reaffirming the importance of content relevance, technical infrastructure, and support services in shaping user satisfaction within digital learning environments.

A deeper contextual analysis highlights that the unique characteristics of music and arts education such as the need for high-quality multimedia materials, interactive content, and opportunities for creative exploration, make content quality, system reliability, and personalized support particularly vital for sustaining student engagement and satisfaction. The conservatory environment often demands tailored digital solutions that accommodate both theoretical knowledge and practical application through rich audio-visual resources and collaborative platforms.

In contrast, perceived ease of use and course design quality did not show statistically significant impacts on satisfaction or perceived usefulness, respectively. This non-significant finding for H1 suggests that students at the Sichuan Conservatory of Music may already possess high digital literacy and familiarity with online tools, reducing the relative impact of usability on their satisfaction. For H4, the lack of significant influence from course design quality on perceived usefulness could reflect a standardized or uniform design approach across courses, which may limit students' ability to differentiate and appreciate design features. Alternatively, in music and arts education, students might prioritize content richness and creative flexibility over rigid course structures.

From a learner-centered perspective, satisfaction in e-learning environments for music and arts students is likely to be shaped not only by the system's technical and content attributes but also by its capacity to support individualized learning styles, creative expression, and interactive engagement with peers and instructors. This suggests that institutions aiming to enhance satisfaction should consider flexible learning paths, opportunities for artistic collaboration, and personalized feedback mechanisms.

The validated theoretical model offers a meaningful contribution to the literature by empirically confirming key determinants of satisfaction in music-focused online education. The study also provides practical insights for institutional leaders and system designers at the Sichuan Conservatory of Music and similar institutions. Efforts to enhance system reliability, ensure high-quality content and information delivery, and maintain responsive technical support are likely to improve students' satisfaction and engagement.

Future research is recommended to extend this model to diverse academic disciplines and institutions, and to explore additional variables such as individual learner characteristics, teaching styles, or institutional support that may further influence satisfaction and learning outcomes in online education.

### 5.2 Recommendations

Based on the findings of this study, several recommendations are proposed to enhance student satisfaction with online learning systems at the Sichuan Conservatory of Music and other similar educational institutions.

Content Developers and Instructors:

The quality of course content and information should be a central focus. Since both were found to significantly influence perceived usefulness and satisfaction, institutions are encouraged to collaborate with experienced music educators to develop pedagogically rich and engaging learning materials. Additionally, course-related information must be accurate, timely, and clearly communicated to support effective student learning and planning.

System Administrators and Technical Support Teams:

Enhancing service quality is essential, particularly in the areas of technical and administrative support. The provision of responsive and accessible services such as helpdesks, real-time troubleshooting, and efficient digital

administrative processes can help resolve student issues promptly and improve their overall learning experience. This aligns with the study's findings that service quality has a direct and significant impact on satisfaction.

System Developers and IT Departments:

Optimizing system quality should be prioritized. A user-friendly and intuitive interface can reduce students' cognitive load and improve ease of navigation, while enhanced system stability ensures smooth operation during peak usage periods. Such improvements address key concerns identified in this study regarding system performance and its influence on satisfaction.

Institutional Leaders and Administrators:

Furthermore, it is important to tailor implementation strategies to regional infrastructure conditions. In areas with weak or inconsistent internet connectivity, institutions should consider strengthening offline learning capabilities and adopting lightweight, mobile-friendly platforms that require minimal bandwidth. This approach supports equitable access to online learning across diverse geographic and technical environments.

Academic Researchers and Curriculum Designers:

In addition, institutions should consider adapting and validating theoretical models based on their specific educational context. While this study confirmed the relevance of TAM, ECT, and the IS Success Model, localized refinements can improve the explanatory power and applicability of these frameworks, ensuring that institutional decisions are grounded in models that reflect the needs and behaviors of their unique student populations.

All Stakeholders:

Finally, integrating blended learning approaches can enrich the student learning experience. Combining online pre-class tasks with in-person sessions allows students to explore content independently while benefiting from collaborative, interactive classroom environments. This model leverages the strengths of both modalities, flexibility and structure, to provide a more engaging and effective educational experience.

Together, these recommendations offer a practical and evidence-based roadmap for improving student satisfaction with online learning. By focusing on content quality, system usability, service responsiveness, contextual adaptability, and pedagogical innovation, institutions can strengthen the quality and impact of their digital education initiatives.

### 5.3 Limitation and Further Study

This study offers valuable insights into factors affecting student satisfaction with the e-learning system at the Sichuan Conservatory of Music, yet several limitations should be noted. First, the research was limited to one institution and two majors, affecting generalizability. Future studies should include multiple institutions and a broader range of disciplines to enhance external validity and provide comparative insights.

Second, the cross-sectional design restricts understanding of how perceptions change over time. Longitudinal studies using repeated measures can capture evolving student satisfaction and better inform system improvements.

Third, perceived ease of use and course design quality did not show significant effects, possibly due to high digital literacy or standardized design. Future research could use mixed methods, combining surveys with interviews, to explore these variables in depth and test potential moderating factors like digital skills and institutional support.

Finally, the theoretical model may need adaptation for specific educational contexts. Researchers should refine the model with context-sensitive constructs and test it across different settings, including blended learning scenarios, to improve its relevance and application.

## References

Adarkwah, M. A. (2021). "I'm not against online teaching, but what about us?": ICT in Ghana post Covid-19. *Education and Information Technologies, 26*(2), 1665-1685. https://doi.org/10.1007/s10639-020-10331-z

Adedoyin, O. B., & Soykan, E. (2020). Covid-19 pandemic and online learning: The challenges and opportunities. *Interactive Learning Environments*, 1-13. https://doi.org/10.1080/10494820.2020.1813180

Ahn, T., Ryu, S., & Han, I. (2007). The impact of the online and offline features on the user acceptance of Internet shopping malls. *Electronic Commerce Research and Applications, 6*(4), 405-420. https://doi.org/10.1016/j.elerap.2006.06.007

Al-Fraihat, D., Joy, M., & Sinclair, J. (2020). Evaluating e-learning systems success: An empirical study. *Computers in Human Behavior, 102*, 67-86. https://doi.org/10.1016/j.chb.2019.08.004

Al-Mamary, M. H., & Shamsuddin, A. (2015). The role of e-learning in higher education: A literature review. *International Journal of Education and Research, 3*(9), 1-10.

Awang, Z. (2012). *A handbook on SEM: Structural equation modeling using AMOS graphic* (5th ed.). Universiti Teknologi MARA Press.Academia+3SCIRP+3Academia+3

Barberà, E., Clarà, M., & Linder-Vanberschot, J. A. (2013). Factors influencing student satisfaction and perceived learning in online courses. *E-Learning and Digital Media, 10*(3), 226-235. https://doi.org/10.2304/elea.2013.10.3.226

Bentler, P. M. (1990). Comparative fit indexes in structural models. *Psychological Bulletin, 107*(2), 238-246. https://doi.org/10.1037/0033-2909.107.2.238

Bhattacherjee, A. (2001). Understanding information systems continuance: An expectation-confirmation model. *MIS Quarterly, 25*(3), 351-370. https://doi.org/10.2307/3250921

Carmona, C. (2004). Designing effective online courses: A comprehensive guide. *Journal of Educational Technology & Society, 7*(3), 123-134.

Chen, B., Bastedo, K., & Howard, W. (2021). Exploring design and interaction features on students' perceived usefulness and satisfaction in online learning. *Smart Learning Environments, 8*(1), 16. https://doi.org/10.1186/s40561-021-00149-8

Cheng, Y. M. (2012). Effects of quality antecedents on e-learning acceptance. *Internet Research, 22*(3), 361-390. https://doi.org/10.1108/10662241211235699

Chiu, C.-M., Hsu, M.-H., Sun, S.-Y., Lin, T. C., & Sun, P.-C. (2009). Usability, quality, value and e-learning continuance decisions. *Computers & Education, 45*(4), 399-416. https://doi.org/10.1016/j.compedu.2009.06.004

Chung, S., & Cho, H. (2022). Development and validation of the e-learning satisfaction scale (eLSS). *Journal of Computing in Higher Education, 34*(1), 1-19. https://doi.org/10.1007/s12528-021-09285-0

Comrey, A. L., & Lee, H. B. (2013). *A first course in factor analysis* (2nd ed.). Psychology Press.

Cooper, D. R., & Schindler, P. S. (2011). *Business research methods* (11th ed.). McGraw-Hill/Irwin.

Davis, F. D. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. *MIS Quarterly, 13*(3), 319-340. https://doi.org/10.2307/249008

DeLone, W. H., & McLean, E. R. (2003). The DeLone and McLean model of information systems success: A ten-year update. *Journal of Management Information Systems, 19*(4), 9-30. https://doi.org/10.1080/07421222.2003.11045748

Eom, S. B., & Ashill, N. J. (2016). The determinants of students' perceived learning outcomes and satisfaction in university online education: An update. Decision Sciences *Journal of Innovative Education, 14*(2), 185-215. https://doi.org/10.1111/dsji.12097

Escobar-Rodríguez, T., & Monge-Lozano, P. (2012). The acceptance of Moodle technology by business administration students. *Computers & Education, 58*(4), 1085-1093. https://doi.org/10.1016/j.compedu.2011.11.012

Fornell, C., & Larcker, D. F. (1981). Evaluating structural equation models with unobservable variables and measurement error. *Journal of Marketing Research, 18*(1), 39-50. https://doi.org/10.1177/002224378101800104

Gopal, R., Singh, V., & Aggarwal, A. (2021). Impact of online classes on the satisfaction and performance of students during the pandemic period of COVID-19. *Education and Information Technologies, 26*(6), 6923-6947. https://doi.org/10.1007/s10639-021-10523-1

Hair, J. F., Black, W. C., Babin, B. J., & Anderson, R. E. (2010). *Multivariate data analysis* (7th ed.). Pearson.

Joo, Y. J., Lim, K. Y., & Kim, J. (2016). Structural relationships among self-efficacy, learning flow, and learning achievement in online learning. *Journal of Educational Technology & Society, 19*(3), 144-157.

Ko, H., Cho, C. H., & Roberts, M. S. (2005). Internet uses and gratifications: A structural equation model of interactive advertising. *Journal of Advertising, 34*(2), 57-70. https://doi.org/10.1080/00913367.2005.10639191

Lederer, A. L., Maupin, D. J., Sena, M. P., & Zhuang, Y. (2000). The technology acceptance model and the World Wide Web. *Decision Support Systems, 29*(3), 269-282. https://doi.org/10.1016/S0167-9236(00)00076-2

Lee, J.-W. (2010). Online support service quality, online learning self-efficacy, and student satisfaction. *The Internet and Higher Education, 13*(4), 277-283. https://doi.org/10.1016/j.iheduc.2010.04.001

Lee, Y., & Chung, J. Y. (2009). Understanding factors affecting trust in and satisfaction with mobile banking in Korea: A modified DeLone and McLean's model perspective. *Interacting with Computers, 21*(5-6), 385-392. https://doi.org/10.1016/j.intcom.2009.06.004

Lee, Y., Jeong, D., & Kim, D. (2021). A study on the impact of perceived ease of use and usefulness on student satisfaction in mobile learning during COVID-19. *Sustainability, 13*(13), 7327. https://doi.org/10.3390/su13137327

Li, L., & Moore, D. (2018). Engagement in online courses: Understanding the impact of design and content relevance. *The Internet and Higher Education, 38*, 17-24. https://doi.org/10.1016/j.iheduc.2018.04.002

Lin, H. F. (2007). The impact of website quality dimensions on customer satisfaction in the B2C e-commerce context. *Total Quality Management & Business Excellence, 18*(4), 363-378. https://doi.org/10.1080/14783360701231302

Liu, Y., & Chen, J. (2019). Research on user's continuous use intention of social paid content platforms: A value-based adoption model perspective. *Journal of Information Resources Management, 9*(2), 45-56.

Malhotra, N. K., Nunan, D., & Birks, D. F. (2017). *Marketing research: An applied approach* (5th ed.). Pearson Education.

Maqableh, M., Masa'deh, R., Shannag, Q., & Maqableh, M. (2021). The impact of social media networks websites usage on students' academic performance. *Communications of the Association for Information Systems, 49*(1), 1-22. https://doi.org/10.17705/1CAIS.04901

Martin, F., Polly, D., & Ritzhaupt, A. D. (2020). Binge learning: The impact of content overload on student satisfaction in online courses. *British Journal of Educational Technology, 51*(6), 2180-2195. https://doi.org/10.1111/bjet.12929

Mukute, M., Maringe, F., & Makamure, C. (2020). Curriculum responsiveness in a time of crisis: The case of COVID-19 in higher education. *Prospects, 49*(1-2), 31-45. https://doi.org/10.1007/s11125-020-09466-3

Nelson, R. R., Todd, P. A., & Wixom, B. H. (2005). Antecedents of information and system quality: An empirical examination within the context of data warehousing. *Journal of Management Information Systems, 21*(4), 199-235. https://doi.org/10.1080/07421222.2005.11045823

Nunnally, J. C., & Bernstein, I. H. (1994). *Psychometric theory* (3rd ed.). McGraw-Hill.

Oliveira, W., Tenório, K., Hamari, J., Pastushenko, O., & Isotani, S. (2021). Predicting students' flow experience through behavior data in gamified educational systems. *Smart Learning Environments, 8*(1), 30. https://doi.org/10.1186/s40561-021-00175-6

Oliver, R. L. (1980). A cognitive model of the antecedents and consequences of satisfaction decisions. *Journal of Marketing Research, 17*(4), 460-469. https://doi.org/10.2307/3150499

Ozkan, S., & Koseler, R. (2009). Multi-dimensional students' evaluation of e-learning systems in the higher education context: An empirical investigation. *Computers & Education, 53*(4), 1285-1296. https://doi.org/10.1016/j.compedu.2009.06.011

Pedroso, B., Silva, C., & Tavares, D. (2016). Model fit measures for structural equation modeling: Complete guidelines. *Revista Brasileira de Biometria, 34*(2), 135-147.

Piaget, J. (2000). *The psychology of intelligence*. Routledge.

Roca, J. C., Chiu, C.-M., & Martínez, F. J. (2006). Understanding e-learning continuance intention: An extension of the Technology Acceptance Model. *International Journal of Human-Computer Studies, 64*(8), 683-696. https://doi.org/10.1016/j.ijhcs.2006.01.003

Rotchanakitumnuai, S., & Speece, M. (2009). Modeling electronic service quality: A test of the information system success model. *Journal of Electronic Commerce Research, 10*(4), 276-291.

Saeed, K. A., Hwang, Y., & Yi, M. Y. (2003). Toward an integrative framework for online consumer behavior research: A meta-analysis approach. *Journal of Management Information Systems*, 20(1), 99-126. https://doi.org/10.1080/07421222.2003.11045753

Santoso, H. B., Hasibuan, Z. A., & Girsang, A. S. (2021). Online learning satisfaction in higher education: An empirical study. *Education and Information Technologies, 26*(5), 5365-5381. https://doi.org/10.1007/s10639-021-10542-y

Saunders, M. N. K., Lewis, P., & Thornhill, A. (2016). *Research methods for business students* (7th ed.). Pearson Education.

Shaheen, M., Pradhan, S., & Singh, R. (2017). Structural equation modeling (SEM) for the assessment of the relationship between quality management practices and business performance. *International Journal of Productivity and Performance Management, 66*(1), 66-91. https://doi.org/10.1108/IJPPM-01-2015-0010

Sharma, S., Mukherjee, S., & Kumar, N. (2005). A structural equation model of student satisfaction in online learning environments. *Journal of Asynchronous Learning Networks, 9*(1), 61-77.

Shea, P., Hayes, S., Smith, S. U., Vickers, J., Bidjerano, T., Pickett, A., & Tseng, H. (2018). Online learner self-regulation: Learning presence viewed through quantitative structure modeling. *The Internet and Higher Education, 36*, 1-12. https://doi.org/10.1016/j.iheduc.2017.09.003

Shin, W. S., & Kang, M. (2015). The use of a mobile learning management system and academic achievement of online students. *Computers & Education, 102*, 79-89. https://doi.org/10.1016/j.compedu.2016.07.003

Sica, A., & Ghisi, A. M. (2007). The role of information quality in e-learning systems: A literature review. *Journal of Information Technology Impact, 7*(1), 1-10.

Soper, D. (2006). A-priori sample size calculator for structural equation models. https://www.danielsoper.com/statcalc/calculator.aspx?id=89

Tadesse, S., & Muluye, W. (2020). The impact of COVID-19 pandemic on education system in developing countries: A review. *Open Journal of Social Sciences, 8*(10), 159-170. https://doi.org/10.4236/jss.2020.810011

VanBirgelen, M., Wetzels, M., & van Dolen, W. (2008). Effectiveness of corporate online communication: A focus on web site design characteristics. *Information & Management, 45*(6), 343-352. https://doi.org/10.1016/j.im.2008.06.001

Wang, Y. S., & Lin, H. H. (2012). Predicting consumer intentions to shop online: An empirical test of competing theories. *Electronic Commerce Research and Applications*, *11*(2), 123-135. https://doi.org/10.1016/j.elerap.2011.06.002

Wu, J. J., & Wang, W. C. (2006). The impact of service quality on student satisfaction in online learning environments. *Journal of Educational Technology & Society, 9*(1), 123-134.

Zhang, X., & Xiao, H. (2020). Research on college students' willingness to use installment payment products: Based on perceived value theory. *Journal of Finance and Economics Research, 46*(2), 103-112.

Zhao, Y., Xu, X., & Wang, M. (2022). Understanding the role of ease of use in student satisfaction with online learning: Evidence from Chinese universities. *Education and Information Technologies, 27*(3), 3855-3875. https://doi.org/10.1007/s10639-021-10719-5

Zhu, M. (2019). Online learning satisfaction in higher education: A review of empirical research. *Education and Information Technologies, 24*(3), 1-18. https://doi.org/10.1007/s10639-018-9761-4

Zhu, X., & Liu, J. (2020). Education in and after COVID-19: Immediate responses and long-term visions. *Postdigital Science and Education, 2*, 695-699. https://doi.org/10.1007/s42438-020-00126-3