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

The Influencing Factors of Satisfaction with Learning Management System of Students Majoring in Environmental Design: A Case Study of Normal Universities in Sichuan Province

Bi Yu*

Received: January 30, 2024. Revised: March 14, 2024. Accepted: February 18, 2025.

Abstract

Purpose: This study aimed to explore the satisfaction and attitude of environmental design students in Sichuan Normal universities when using the superstar learning system in a blended learning environment. The conceptual framework contains information quality, system quality, perceived usefulness, perceived ease of use, perceived enjoyment, attitude and satisfaction. **Research design, data, and methodology:** The researchers conducted a detailed survey of the student population, using questionnaires to collect data. The subjects of this survey are mainly undergraduates majoring in environmental design from three universities in Sichuan, namely Leshan Normal University, China West Normal University, and Mian Yang Teachers' College. The collected data was analyzed by rigorous confirmatory factor analysis and structural equation modeling to verify the fit of the study model and determine the causal relationship between the variables. **Results:** Information quality and system quality significantly impact perceived usefulness. Perceived ease of use significantly impacts attitude and satisfaction. Perceived usefulness has a significant impact on attitude, and satisfaction. In addition, perceived enjoyment has a significant impact on satisfaction. **Conclusions:** This study provides valuable guidance for improving undergraduate educational practice and, at the same time, helps to develop policies and strategies to promote the effective integration of education, technology, and management.

Keywords : Information Quality, System Quality, Perceived Ease of Use, Perceived Usefulness, Perceived Enjoyment

JEL Classification Code: E44, F31, F37, G15

1. Introduction

Blended learning, an educational model that harmoniously integrates different learning styles, is a simple combination of methods and a deep and integrated educational concept. It originated in e-learning and covers learning and teaching activities conducted via the Internet or other digital platforms. Blended learning takes full advantage of the rich resources of modern information technology and innovative communication mechanisms in the learning environment, leading to a revolution in education. This transformative teaching method not only reshapes the role of teachers but also changes the mode of interaction between teachers and students, thus transforming the traditional teaching structure and the nature of education (He, 2004). In China, blended learning has become a key educational technology prominent in education.

E-learning methods have become a core focus in university curricula (Harris et al., 2009). Past policies and programs regard blended learning as the "optimal choice" (Childs et al., 2005). In December 2000, the release of the White Paper on Educational Technology in the United States marked a major development in this field. Under the broad topic of e-learning, the report makes some key points. It points out that e-learning can enhance specific educational goals but is meant to replace traditional classroom

1*Bi Yu, School of Fine Arts and Design of Leshan Normal University, Email: 523461843@qq.com

instruction partially. The report further highlights that although e-learning will not replace the traditional school education system, it can significantly change the purpose and function of the classroom. This highlights that traditional face-to-face teaching and e-learning can coexist harmoniously and integrate effectively.

In environmental design education, the blended learning teaching strategy is specifically tailored to meet the unique needs of each student. This approach involves meticulously evaluating the subject matter's distinct qualities, the desired learning outcomes, and available resources and technological tools. For instance, in a classroom environment, group learning activities prove highly effective for introducing new concepts, sparking discussions, and fostering peer-to-peer interactions. Cooperative group learning enhances teamwork, bolsters problem-solving abilities, and enriches project-based learning experiences. Concurrently, personalized learning pathways empower students to progress at their own pace, engage in self-directed learning, and benefit from tailored feedback (He, 2004).

The blended learning teaching process covers four key components: curriculum introduction, activity coordination, learning assistance, and educational assessment. This approach requires educators to plan the curriculum and carefully coordinate the teaching agenda. At the same time, they must provide continuous tutoring and question-answering services throughout the teaching process. (Huang et al., 2007).

The Superstar Learning System is an innovative educational platform tailored to the needs of modern learners. It encompasses a diverse array of features including interactive multimedia content, collaborative tools, assessment modules, and personalized learning pathways. Built upon principles of user-centered design, the system prioritizes usability and accessibility, facilitating seamless navigation and interaction for students and instructors alike. Moreover, its adaptive learning capabilities enable personalized feedback and content delivery, catering to individual learning preferences and pacing.

In the realm of environmental design education, the Superstar Learning System holds significant promise. Its multimedia-rich environment offers dynamic opportunities for students to engage with course materials, fostering deeper understanding and retention. Through collaborative tools, students can participate in virtual design studios, exchanging ideas and feedback in real-time. The system's assessment modules enable instructors to gauge student progress accurately, providing timely interventions and support where needed. By exploring students' satisfaction and attitude towards this system, we can glean insights into its efficacy and identify areas for improvement, thus enhancing the overall learning experience in environmental design education.

2. Literature Review

2.1 Information Quality

Information Quality (IQ) covers a range of dimensions, including accuracy, completeness, timeliness, validity, relevance, scope, and so on. These dimensions collectively constitute key indicators for measuring the accuracy and reliability of information systems' information (DeLone & McLean, 1992,2003). The degree to which users perceive the quality of information, characterized by its accuracy, completeness, relevance, timeliness, and efficiency, plays a key role in determining information quality (Wixom & Todd, 2005). In addition, information quality (IQ) is a key factor influencing the adoption of new technologies and a key criterion for students choosing an online learning platform (Kim et al., 2011).

IQ plays a key role in the usefulness of a connected system and user perception. It acts as an intermediary, influencing users to evaluate the usefulness of the system based on the quality of information provided (Lin & Lu, 2000). The quality of information, the effectiveness, and the success of information technology are closely related, highlighting its unique importance in this field (Cao et al., 2005). In virtual environments, information quality directly affects users' perceived usefulness (Lin, 2007). The effectiveness of electronic services depends on the quality of information users receive (Rotchanakitumnuai & Speece, 2009). The criteria for measuring information quality (IQ) are authenticity, accuracy, completeness, uniqueness, timeliness, and conciseness (Webber, 2010). In the context of e-learning systems, information quality is important for students' perceived usefulness, and it also helps improve students' ease of use and satisfaction with the learning management system (Cheng, 2011). Thus, the study hypothesizes:

H1: Information quality has a significant impact on perceived usefulness.

2.2 System Quality

System quality refers to the attributes and characteristics of an information system and the quality of the information it produces. This involves a comprehensive assessment of the system's reliability, ease of use, security, and other related factors, which together determine the system's quality and output information (DeLone & McLean, 1992). System quality is considered a basic prerequisite for perceived usefulness (Lederer et al., 2000). System quality covers the core attributes and desirable characteristics provided by information systems. Its evaluation includes considering the system's features and capabilities to meet user needs and expectations. SQ pays special attention to the system's

performance in meeting user expectations and providing a satisfactory user experience (Petter et al., 2008).

SQ refers to the basic attributes and characteristics of an information system and the quality of the information it produces. This involves a comprehensive assessment of the system's reliability, ease of use, security, and other related factors, which together determine the quality of the system and its output information (DeLone & McLean, 1992). SQ is regarded as one of the basic premises of perceived usefulness (Lederer et al., 2000). System quality covers the core attributes and desirable characteristics provided by information systems. Its evaluation includes considering the features and capabilities provided by the system to meet user needs and expectations. SQ pays special attention to the system's performance in meeting user expectations and providing a satisfactory user experience (Petter et al., 2008). Thus, the study hypothesizes:

H2: System quality has a significant impact on perceived usefulness.

2.3 Attitude

Breer and Locke (1965) provided a relatively comprehensive explanation of individual attitude differences: differences between individuals may be due to family background, personal characteristics, experience background, defense mechanism, education and culture, economic income, occupation category, residence area, religious belief, etc. Personal factors such as intelligence, age, gender, interests, and talents are also factors to consider. Thus, an attitude is defined as a relatively persistent organization of beliefs or emotions around an object that predisposes an individual to react in a preferred way (Smith, 1971). In the technology acceptance model, attitudes are viewed as users' evaluations of the technology adopted and the degree to which they relate it to their work (Davis, 1993). If an individual has a positive attitude towards something, it is often easier to get the desired result. On the contrary, a negative attitude may lead to unsatisfactory results. An attitude can be defined as an overall evaluation of an entity (Al-Debei et al., 2015).

In the study of Armitage and Conner (2001), attitude is a subjective feeling towards something, such as love or dislike. This perspective emphasizes individual attitudes as a key element in constructing and promoting satisfaction (Golnaz et al., 2010). In addition, an individual's evaluation of the outcome of a behavior can be viewed as a mental attitude toward that behavior (Ajzen, 2012). Finally, Nwagwu and Famiyesin (2016) understand attitude as a psychological tendency characterized by an individual's positive/negative evaluation of certain things/phenomena. Thus, the study hypothesizes:

H3: Perceived ease of use has a significant impact on attitude.

2.4 Perceived Ease of Use

According to Bandura (1986) perceived ease of use is the intention of an expected behavioral outcome. Within the Technology Acceptance Model (TAM) framework, PEOU is understood as the concept that the use of new system technologies does not require significant physical or mental effort (Davis, 1989). Similarly, other studies have shed light on perceived ease of use. For example, Venkatesh et al. (2012) pointed out in their research on information systems that ease of perception and ease of learning and using the system are key factors.

Years of research have shown that perceived ease of use can effectively predict perceived usefulness and usage attitudes (Davis, 1989). The relationship between perceived ease of use and perceived usefulness can be understood as follows: If a network system is easy to use, it reduces learning time for all users. Other things being equal, this can promote a user's perception of the system's usefulness (Davis, 1993; Venkatesh & Davis, 2000). Perceived ease of use is a key factor affecting users' intention to adopt information technology (Chen et al., 2008; DeLone & McLean, 1992). Thus, the study hypothesizes:

H4: Perceived ease of use has a significant impact on satisfaction.

2.5 Perceived Usefulness

The concept of Perceived Usefulness (PU) is closely related to the desire of potential users to enhance productivity and efficiency through a specific application system (Davis et al., 1989). Moon and Kim (2001), in The Journal of the Association for Information Systems (Journal of The Association for Information Systems) research theory emphasizes that using systems can effectively improve work efficiency. In the networked digital world, perceived usefulness is understood as the ability of users to access information and services in a reliable online community environment and to participate in the exchange of ideas, thereby expanding their expressive power on digital platforms (Lin, 2007). Lin and Lin (2019) describe perceived usefulness as a condition where potential users believe they can achieve better results using a particular service technology.

Robey and Farrow (1982). Perceived usefulness (PU) can be divided into two aspects: the organizational aspect -- the economic return of the organization's use of new technology; the personal side - the return of improved ability to work and the incentive to adopt new technology. Bhattacherjee (2001) discovered that perceived usefulness affects users' intention to use a system, and continued use of the system over time indicates emotional satisfaction in the post-adoption usage phase.McKechnie et al. (2006) suggest that PU has a greater

impact on individual attitudes than perceived ease of use. Increasing perceived usefulness is seen as the most effective way to maintain user engagement, as stated by (Mainardes et al., 2017). Thus, the study hypothesizes:

H5: Perceived usefulness has a significant impact on attitude.

H6: Perceived usefulness has a significant impact on satisfaction.

2.6 Perceived Enjoyment

In the study of Deci et al. (1985), Perceived Enjoyment (PE) is described as a state of mind that reflects the desire and determination to experience pleasure when participating in an activity. This state embodies the psychological satisfaction derived from taking an interest in something, fueled by positive emotions such as happiness. Under the premise of e-learning research, the influence of perceived enjoyment on students' adoption of information technology has been widely studied. Punnoose (2012) argues that perceived enjoyment plays a crucial role in interpreting behavioral intentions related to the use of information systems.

PE plays a key role in user acceptance of technology, and many studies have demonstrated the correlation between supporting enjoyment and perceived ease of use (Mun & Hwang, 2003; Venkatesh et al., 2002). Perceived enjoyment is an internal feeling of individual students' acceptance of the learning experience (Huang et al., 2007). When students can feel the pleasure of the learning process, it reflects their enjoyment (Golnaz et al., 2010). One of the factors affecting perceived enjoyment is self-efficacy, which is also an important factor in determining human behavior (Huang & Lin, 2017). Thus, the study hypothesizes:

H7: Perceived enjoyment has a significant impact on satisfaction.

2.7 Satisfaction

First of all, as Oliver and Swan (1989) explained, satisfaction is the emotional evaluation made by individuals based on their experiences and beliefs. On this basis, Petter et al. (2008) further defined satisfaction as the degree to which system services meet user needs. Subsequently, according to Mohammadi (2015), satisfaction occurs when users' needs are met and their expectations and goals are achieved. Finally, Liao et al. (2014) and Xu et al. (2017) have pointed out that when users are satisfied with cloud computing services, they are more inclined to continue using them.

As Oliver and Swan (1989) described, satisfaction is the emotional consideration of an individual's experiences and beliefs. Doll et al. (1994) further interpreted final satisfaction as the emotional attitude computer applications evoke in users. Lin et al. (2005) points out that satisfaction with technology use is influenced by intrinsic motivation, which is often expressed by variables of flow theory. In the network context, satisfaction is seen as the user's perception of the information system, especially the degree to which it meets their needs (Sanchez-Franco, 2009). Studies by Al-Busaidi and Alshihi (2012) and Hayashi et al. (2004) show that computer courses help teachers accept and use online systems in teaching. Finally, according to Xu et al. (2017), user satisfaction is a key determinant of post-adoption behavior in an expectation confirmation model (ECM) context. In information systems, users' perceived usefulness of network computing services significantly affects their satisfaction with these services.

3. Research Methods and Materials

3.1 Research Framework

In this study, the authors constructed a conceptual framework to analyze the factors influencing the satisfaction and attitude of undergraduate students majoring in environmental design using the Superstar learning system in a blended learning environment in normal universities in Sichuan Province. The conceptual framework established in this study is based on Creswell (2014) definition: "A conceptual framework is a structure that connects key concepts, variables, and relationships, research questions, provides the theoretical guidance needed, and facilitates the researcher to make clear choices throughout the research process." The framework in this study synthesizes multiple theories and theoretical frameworks extracted from previous research literature, using two core research theories: (1) DeLone and McLean's Information Systems Success Model (D&MAISS) and (2) Technology Acceptance Model (TAM). As shown in Figure 1:

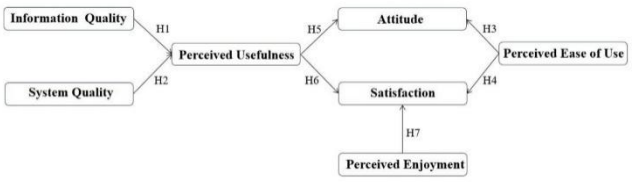

Figure 1: Conceptual Framework

H1: Information quality has a significant impact on perceived usefulness.

H2: System quality has a significant impact on perceived usefulness.

H3: Perceived ease of use has a significant impact on attitude.

H4: Perceived ease of use has a significant impact on satisfaction.
H5: Perceived usefulness has a significant impact on attitude.
H6: Perceived usefulness has a significant impact on satisfaction.
H7: Perceived enjoyment has a significant impact on satisfaction.

3.2 Research Methodology

This study aimed to explore the key factors influencing the satisfaction and attitude towards using the Superstar Learning System (SLS) among undergraduates majoring in environmental design in normal universities in Sichuan Province. The methods used in this study were quantitative studies, including the project-objective consistency (IOC) test and Cronbach's Alpha test. A group of three experts evaluated the Index of Item-Objective Congruence (IOC) to verify that each item accurately gauges its intended construct, thereby bolstering the assessment's validity. During the pilot test with 50 participants, the obtained Cronbach's Alpha score exceeded 0.7, affirming the dependable measurement of the targeted construct and fortifying the overall reliability of the test results (Nunnally & Bernstein, 1994). By collecting data from the target group through questionnaires, the researchers used confirmatory factor analysis (CFA) and structural equation modeling (SEM) to empirically test the relationship between the constructed theoretical framework and the hypothesized variables. They conducted an in-depth analysis of the results. The research follows a rigorous structure, including a research introduction, theoretical basis, literature review, theoretical model construction and development of relational hypotheses, questionnaire design and data collection, empirical analysis, discussion and interpretation of results, conclusion insights, and future research directions. This orderly research approach ensures a comprehensive exploration of the complex factors that influence environmental design students' attitudes and satisfaction with adopting SLS.

3.3 Population and Sample Size

Zikmund et al. (2013) define the target population as a collection of individuals who possess shared characteristics, emphasizing the communal attributes within the defined group. This study focuses on undergraduate students in normal colleges and universities in Sichuan Province, China, and selects Leshan Normal University, China West Normal University, and Mianyang Teachers' College as the research objects. Study participants were sophomore, junior, and senior-year undergraduates at the three institutions who were gender-diverse and had at least one year of experience using the Superstar Learning System (SLS). In order to ensure the wide representativeness of samples, this study combined probability sampling and non-probability sampling methods in the follow-up sampling process.

3.4 Sampling Technique

Hair et al. (2003) describes a sampling unit as an element carefully screened from a population that fits the research objective to ensure its relevance to the research objective. In judgmental sampling, the researchers clearly defined the target group, namely 500 undergraduate students majoring in environmental design from three representative teacher universities in Sichuan province: Leshan Normal University, China West Normal University, and Mianyang Teachers' College. For stratified random sampling, these students are selected to ensure that the sample represents the field. The researchers personally distributed the designed questionnaires to the designated universities to conduct the survey. With the active support and assistance of the professional staff of these universities, the investigation was carried out effectively. For convenience sampling, the online survey is distributed to accessible group of students.

Table 1: Sample Units and Sample Size

Three normal universities	Population Size	Proportional Sample Size
LeshanNormal University	13500	159
China West NormalUniversity	15500	182
MianyangTeachers' College	13500	159
Total	**42500**	**500**

Source: Constructed by author.

4. Results and Discussion

4.1 Demographic Information

The demographic characteristics of 500 respondents in this study were distributed in normal universities with 500 samples. The information is summarized in Table 2. 1, according to the gender distribution: the number of male participants is 125, accounting for 25% of the total respondents, and the number of female participants is 375, accounting for 75%. 2. According to the distribution of different universities, the number of participants in Leshan Normal University is 160, accounting for 32% of the total respondents; the number of participants in China West Normal University is 180, accounting for 36%; and the number of participants in Mianyang Teachers' College is 160, accounting for 32% of the total respondents.

Table 2: Demographic Profile

Demographic and General Data (N=500)		Frequency	Percentage
Gender	Male	125	25%
	Female	375	75%
University	Le Shan Normal University	160	32%
	China West Normal University	180	36%
	Mian yang Teachers' College	160	32%

4.2 Confirmatory Factor Analysis (CFA)

Confirmatory Factor Analysis (CFA) is a statistical method used within the broader framework of Structural Equation Modeling (SEM) and used to evaluate the consistency between the hypothesized factor structure and the observed data (Schreiber et al., 2006). In addition, as shown in Table 3, the result of a Confirmatory Factor Analysis (CFA), Composite Reliability (CR), and Average Variance Extracted (AVE) data are also included. Fit all applicable thresholds of the indicator, Information Quality (IQ), System Quality (SYQ), Perceived Ease of Use (PEOU), Perceived Usefulness (PU), Perceived Enjoyment (PE), Attitude (ATT), and Satisfaction (SAT) are the seven variables concerned in the study. Each variable contains several factors (for example, IQ contains IQ1, IQ2, IQ3, IQ4, etc.) Therefore, the goodness of fit metrics used in the CFA test in this study are all acceptable.

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

Variables	Source of Questionnaire (Measurement Indicator)	No. of Item	Cronbach's Alpha	Factors Loading	CR	AVE
Information Quality (IQ)	DeLone and McLean (1992)	4	0.872	0.611-0.925	0.849	0.589
System Quality (SYQ)	DeLone and McLean (1992)	4	0.863	0.684-0.892	0.868	0.624
Perceived Ease of Use (PEOU)	Davis (1989)	5	0.886	0.641-0.934	0.894	0.633
Perceived Usefulness (PU)	Davis et al. (1989)	4	0.889	0.728-0.895	0.891	0.674
Perceived Enjoyment (PE)	Venkatesh et al. (2002)	3	0.846	0.748-0.849	0.845	0.646
Attitude (ATT)	Breer and Locke (1965)	5	0.876	0.623-0.884	0.880	0.597
Satisfaction (SAT)	Oliver and Swan (1989)	8	0.917	0.628-0.873	0.919	0.590

In this study, the fit index of the measurement model in a normal university includes acceptable criteria and actual statistical values. The results show that the selected model meets the acceptable standard in many fitting degree indexes and fits well with the collected data.

Table 4: Goodness of Fit for Measurement Model

Fit Index	Acceptable Criteria	Statistical Values
CMIN/DF	< 5.00 (Al-Mamary & Shamsuddin, 2015; Awang, 2012)	1138.346/474or 2.402
GFI	≥ 0.85 (Sica & Ghisi , 2007)	0.937
AGFI	≥ 0.80 (Sica & Ghisi, 2007)	0.861
NFI	≥ 0.80 (Wu & Wang, 2006)	0.897
CFI	≥ 0.80 (Bentler, 1990)	0.882
TLI	≥ 0.80 (Sharma et al., 2005)	0.930
RMSEA	< 0.08 (Pedroso et al., 2016)	0.053
Model Summary		**Acceptable Model Fit**

Remark: 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 = Normed fit index, CFI = Comparative fit index, TLI = Tucker-Lewis index and RMSEA = Root mean square error of approximation

The correlation between different potential factors (such as information quality, system quality, perceived ease of use, perceived usefulness, perceived enjoyment, attitude, and satisfaction) was measured in normal universities (see Table 5). In confirmatory factor analysis (CFA), researchers usually focus on Discriminant Validity to ensure sufficient difference between the different potential factors measured. Discriminant validity can be assessed by looking at the correlation between each potential factor and other factors. In this matrix, the value on the diagonal is the correlation of each potential factor to itself, which is perfectly correlated. However, the value of the correlation coefficient could be a lot higher, which may indicate that discriminant validity is present.

Table 5: Discriminant Validity

	IQ	SYQ	PEOU	PU	PE	ATT	SAT
IQ	**0.767**						
SYQ	0.435	**0.790**					
PEOU	0.438	0.317	**0.796**				
PU	0.358	0.260	0.146	**0.821**			
PE	0.496	0.304	0.317	0.280	**0.804**		
ATT	0.445	0.324	0.299	0.285	0.321	**0.773**	
SAT	0.552	0.365	0.323	0.324	0.391	0.308	**0.768**

Note: The diagonally listed value is the AVE square roots of the variables
Source: Created by the author.

4.3 Structural Equation Model (SEM)

Structural equation modeling (SEM) is a statistical method used to model and analyze complex relationships between observed and latent variables. It combines the principles of factor analysis and regression analysis to explore the deep structure of data, allowing researchers to test and refine theoretical models. SEM has been applied in many disciplines, including psychology, sociology, economics, and education, to study causality, evaluate the validity of measurements, and verify the overall fit of proposed models (Joreskog, 1973). As shown in Table 6, the combination values of CMIN/DF, GFI, AGFI, CFI, NFI, TLI, RMSEA, and other fit indicators are all within the acceptable range, which provides evaluation results for the structural model fitting of normal colleges and universities.

Table 6: Goodness of Fit for Structural Model

Index	Acceptable	Before Adjustment Statistical Values	After Adjustment Statistical Values
CMIN/DF	< 5.00 (Al-Mamary & Shamsuddin, 2015; Awang, 2012)	1651.495/488or 3.384	1434.159/480 or 2.988
GFI	≥ 0.85 (Sica & Ghisi, 2007)	0.839	0.851
AGFI	≥ 0.80 (Sica & Ghisi, 2007)	0.815	0.825
NFI	≥ 0.80 (Wu & Wang, 2006)	0.851	0.870
CFI	≥ 0.80 (Bentler, 1990)	0.889	0.909
TLI	≥ 0.80 (Sharma et al., 2005)	0.880	0.900
RMSEA	< 0.08 (Pedroso et al., 2016)	0.069	0.063
Model Summary		**Unacceptable Model Fit**	**Acceptable Model Fit**

Remark: 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 = Normed fit index, CFI = Comparative fit index, TLI = Tucker-Lewis index and RMSEA = Root mean square error of approximation

4.4 Research Hypothesis Testing Result

As shown in Table 7 , the hypothesis testing results of the researchers' structural model show that factors such as information quality, system quality, perceived ease of use, perceived usefulness, and perceived enjoyment significantly affect many aspects of the learning system of normal university students. Here are the standardized coefficients, t-values, and test results for each hypothesis:

Table 7: Hypothesis Results of the Structural Equation Modeling

Hypothesis	(β)	t-value	Result
H1: IQ→PU	0.315	6.497*	Supported
H2: SYQ→PU	0.179	3.772*	Supported
H3: PEOU→ATT	0.257	5.622*	Supported
H4: PEOU→SAT	0.230	5.305*	Supported
H5: PU→ATT	0.283	6.049*	Supported
H6: PU→ATT	0.267	6.026*	Supported
H7: PE→SAT	0.269	5.751*	Supported

Note: * $p<0.05$
Source: Created by the author

H1: Information quality significantly impacts the perc eived usefulness of SLS. A positive beta value indicates a positive correlation. Significant T-values (normalization coefficient (β): 0.315, T-value:6.497) suggest that infor mation quality does have a substantial impact on the per ceived usefulness of student learning systems (SLS). Hig her information quality increases perceived usefulness. T here is support for this hypothesis.

H2: System quality has a significant effect on the per ceived usefulness of SLS. Positive beta values and signif icant T-values (Normalization coefficient (β): 0.179, t val ue:3.772) indicate that system quality significantly affects the perceived usefulness of SLS, and better system qual ity helps to improve the perceived usefulness. There is s upport for this hypothesis.

H3: Perceived ease of use has a significant impact on SLS attitudes. With a positive beta and a significant T-value (normalization coefficient (β): 0.257, T-value:5.62), it is clear that perceived ease of use plays a crucial role in shaping attitudes toward SLS. A system that is easier to use is associated with a more positive attitude. There is support for this hypothesis.

H4: Perceived ease of use has a significant impact on SLS satisfaction. Positive β and significant T-values (no rmalization coefficient (β): 0.230, T-value:5.305) indicate d that perceived ease of use contributed significantly to SLS satisfaction. A system that is easier to use leads to higher satisfaction. There is support for this hypothesis.

H5: Perceived usefulness significantly affects SLS atti tude, its standardization coefficient (β): 0.283, t value:6.0 49. Users who find the system useful tend to have a mo re positive attitude. There is support for this hypothesis.

H6: Perceived usefulness significantly impacts SLS sa tisfaction. Its standardization coefficient (β): 0.267, t val ue:6.026. Users who say SLS is useful are more likely t o be satisfied. There is support for this hypothesis.

H7: Perceived enjoyment has a significant impact on SLS satisfaction. Its standardization coefficient (β) is 0.2 69, and the t value is 5.751. Perceived enjoyment plays an important role in determining SLS satisfaction. Users

who find the system enjoyable are more likely to be sati sfied. There is support for this hypothesis.

5. Conclusion and Recommendation

5.1 Conclusion and Discussion

The main purpose of this study is to explore the factors affecting the satisfaction and attitude of environmental design students in Sichuan province who use the Superstar Learning System (SLS) in a mixed learning environment. The conceptual framework proposed by the researchers consists of seven assumptions: information quality, system quality, perceived ease of use, perceived usefulness, perceived enjoyment, attitude, and satisfaction. In this study, a scale was designed and distributed to 500 undergraduate students majoring in environmental design in normal schools, and they were asked to answer the questionnaire. Through these seven variables, how they interact with each other can be verified. In addition, the researchers used confirmatory factor analysis (CFA) to calculate and determine the reliability and validity of the conceptual framework, judging whether the data conforms to its measurement model. Finally, the collected data is rigorously analyzed using structural equation modeling (SEM) techniques, and these analytical tools are utilized to verify the goodness of fit of the research model and confirm causal relationships between variables for hypothesis testing. Thus, the researchers assessed the reliability and validity of the model, as well as the causal relationship between the variables. The results confirm that PU is the most influential predictor, directly or indirectly, of attitudes and satisfaction with SLS use. Importantly, PU is significantly affected by factors such as information quality and system quality.

5.2 Recommendation

To explore the factors influencing the satisfaction and attitude of environmental design students in Sichuan province using the Superstar Learning System (SLS) in a mixed learning environment. Based on the analysis of the results of this quantitative research, the following practical suggestions are put forward:

The practical benefits must be emphasized. By showing how e-learning can improve their understanding of film learning,

1. Improve teaching content and system quality:

In order to promote the participation of undergraduate students in the online teaching of professional courses, it is necessary to strengthen the relevance and practicability of the teaching content in SLS for environmental design majors and ensure that they meet the specific needs of environmental design majors. The course content is regularly updated to include the latest theoretical and practical cases to maintain the continuity of the course. Ensuring information quality, system quality, ease of use, and reducing technical problems play an important role in student satisfaction. Enhance the student experience. Regular assessment of student satisfaction with the Superstar learning system is key to the ongoing student experience.

2, enhance the sense of interaction and participation:

Student satisfaction is influenced by several underlying variables, the most important of which is perceived usefulness. Add interactive elements to the Superstar learning system, such as real-time discussion boards, group assignments, and interactive quizzes, to promote active student participation. Students are encouraged to share their design works and ideas in the system to increase peer interaction and feedback. PU is directly or indirectly measured by attitude and satisfaction with using SLS.

3. Personalized learning experience:

Use data analytics tools to personalize learning paths and adjust content and difficulty based on student progress and preferences. Provide various learning resources, such as videos, texts, charts, etc., to meet students' different learning styles' needs and improve their satisfaction.

4. Increase practical application opportunities:

In conjunction with practical environmental design projects, practical case studies are provided, allowing students to apply theoretical knowledge to practical situations. Establish collaborations with industry experts and conduct lectures or seminars to provide students with professional insights and guidance for career development.

5. Continuous feedback and support:

Provide regular and timely feedback to help students understand their learning progress and areas of improvement. Establish effective support systems, such as online counseling services, to help students solve problems encountered in the learning process so that students know that effective learning can be promoted through blended learning.

5.3 Limitation and Further Study

First of all, the research samples of this study are from 3 universities in 3 regions of Sichuan Province, and the research objects are undergraduates majoring in environmental design. Some important universities with certain characteristics (such as the University of Professional Arts) were not included in the research sample for this study. As a result, the entire student body is not representative of its views and perspectives, which may affect the generalization and generality of research findings.

Second, the selection and design of the research method of this study may also have limitations, which have a certain

impact on the evaluation of students' satisfaction. The questionnaire used in the research process may have a degree of subjectivity, and the evaluation of students' satisfaction may be affected by their subjective feelings, expectation level, personal preference, and other factors.

Third, the conceptual framework of this study contains a total of 7 variables, which directly or indirectly affect the analysis of student satisfaction in mixed teaching. At the same time, several factors considered to have important influence and value are not included in the conceptual framework of this study.

Therefore, we can discuss this from three angles: extend the research scope to other provinces and regions in China. Secondly, more research methods can be considered. Finally, more research variables can be mined to support the development of the research framework.

References

Ajzen, I. (2012). Attitudes and persuasion. In K. Deaux & M. Snyder (Eds.), *The Oxford handbook of personality and social psychology* (pp. 367-393). Oxford University Press. https://doi.org/10.1093/oxfordhb/9780195398991.013.0015

Al-Busaidi, K. A., & Alshihi, H. (2012). Key factors to instructors' satisfaction of learning management systems in blended learning. *Journal of Computing in Higher Education, 24*(1), 18-39. https://doi.org/10.1007/s12528-011-9051-x

Al-Debei, M. M., Akroush, M. N., & Ashouri, M. I. (2015). Consumer attitudes towards online shopping: The effects of trust, perceived benefits, and perceived web quality. *Internet Research, 25*(5), 707-733. https://doi.org/10.1108/intr-05-2014-0146

Al-Mamary, Y. H., & Shamsuddin, A. (2015). Testing of the Technology Acceptance Model in Context of Yemen. *Mediterranean Journal of Social Sciences, 6*(4), 268-273. https://doi.org/10.5901/mjss.2015.v6n4s1p268

Armitage, C. J., & Conner, M. (2001). Efficacy of the theory of planned behavior: A meta-analytic review. *British journal of social psychology, 40*(4), 471-499. https://doi.org/10.1348/014466601164939

Awang, Z. (2012). *Structural equation modeling using AMOS graphic* (1st ed.). Penerbit Universiti Teknologi MARA.

Bandura, A. (1986). *Social Foundations of Thought and Action: A Social Cognitive Theory* (1st ed.). Prentice Hall.

Bentler, P. M. (1990). *Comparative fit indexes in structural models* (1st ed.). Psychological

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

Breer, P. E., & Locke, E. A. (1965). *Task experience as a source of attitudes* (1st ed.). Dorsey.

Cao, J., Wu, F., Chow, J., Lee, S., Li, Y., Chen, S., An, Z., Fung, K., Watson, J., & Zhu, C. (2005). Characterization and source apportionment of atmospheric organic and elemental carbon during fall and winter of 2003 in Xi'an, China. *Atmospheric Chemistry and Physics, 5*(11), 3127-3137. https://doi.org/10.5194/acp-5-3127-2005

Chen, I. J., Yang, K.-F., Tang, F.-I., Huang, C.-H., & Yu, S. (2008). Applying the technology acceptance model to explore public health nurses' intentions towards web-based learning: A cross-sectional questionnaire survey. *International journal of nursing studies, 45*(6), 869-878. https://doi.org/10.1016/j.ijnurstu.2006.11.011

Cheng, J.-H. (2011). Inter-organizational relationships and information sharing in supply chains. *International Journal of Information Management, 31*(4), 374-384. https://doi.org/10.1016/j.ijinfomgt.2010.09.004

Childs, S., Blenkinsopp, E., Hall, A., & Walton, G. (2005). Effective e-learning for health professionals and students—barriers and their solutions. A systematic review of the literature—findings from the HeXL project. *Health Information & Libraries Journal, 22,* 20-32. https://doi.org/10.1111/j.1470-3327.2005.00614.x

Creswell, J. W. (2014). *Research Design: Qualitative, Quantitative and Mixed Methods Approaches* (4th ed.). Sage.

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

Davis, F. D. (1993). User acceptance of information technology: system characteristics, user perceptions and behavioral impacts. *International journal of man-machine studies, 38*(3), 475-487. https://doi.org/10.1006/imms.1993.1022

Davis, F. D., Bagozzi, R. P., & Warshaw, P. R. (1989). User acceptance of computer technology: A comparison of two theoretical models. *Management science, 35*(8), 982-1003. https://doi.org/10.1287/mnsc.35.8.982

Deci, E. L., Ryan, R. M., Deci, E. L., & Ryan, R. M. (1985). *Conceptualizations of intrinsic motivation and self-determination* (1st ed.). Intrinsic motivation and self-determination in human behavior.

DeLone, W. H., & McLean, E. R. (1992). Information systems success: The quest for the dependent variable. *Information systems research, 3*(1), 60-95. https://doi.org/10.1287/isre.3.1.60

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.

Doll, W. J., Xia, W., & Torkzadeh, G. (1994). A confirmatory factor analysis of the end-user computing satisfaction instrument. *MIS quarterly, 18*(4), 453-461. https://doi.org/10.2307/249524

Golnaz, R., Zainalabidin, M., Mad Nasir, S., & Eddie Chiew, F. (2010). Non-Muslims' awareness of Halal principles and related food products in Malaysia. *International food research journal, 17*(3), 667-674.

Hair, J. F., Bush, R. P., & Ortinau, D. J. (2003). *Marketing research: Within a changing information environment* (1st ed.). McGraw-Hill.

Harris, P., Connolly, J., & Feeney, L. (2009). Blended learning: Overview and recommendations for successful implementation. *Industrial and commercial training, 41*(3), 155-163. https://doi.org/10.1108/00197850910950961

Hayashi, Y., Al-Shalabi, L., & Mohd Ayub, A. F. (2004). Investigating the factors influencing the acceptance of internet courses in Japan, Malaysia, and Jordan: A comparative study. *International Journal of Instructional Media, 31*(1), 83-98.

He, K. K. (2004). The New Development of Educational Technology Theory through Blending Learning (Part 1). *Visual Education Research*, *1*(3), 1-6.

Huang, C.-K., & Lin, C.-Y. (2017). Flipping business education: Transformative use of team-based learning in human resource management classrooms. *Journal of Educational Technology & Society, 20*(1), 323-336.

Huang, J.-H., Liao, T.-L., Chang, S.-F., Su, C.-L., Chien, L.-J., Kuo, Y.-C., Yang, C.-F., Lin, C.-C., & Shu, P.-Y. (2007). Laboratory-based dengue surveillance in Taiwan, 2005: a molecular epidemiologic study. *The American journal of tropical medicine and hygiene, 77*(5), 903-909. https://doi.org/10.4269/ajtmh.2007.77.903

Joreskog, K. G. (1973). Analysis of covariance structures. In P. R. Krishnaiah (Ed.), *Multivariate Analysis-III ed.* (pp. 263-285). Academic Press.

Kim, Y., Sohn, D., & Choi, S. M. (2011). Cultural difference in motivations for using social network sites: A comparative study of American and Korean college students. *Computers in human behavior, 27*(1), 365-372. https://doi.org/10.1016/j.chb.2010.08.015

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

Liao, L., Luo, L., & Tang, Q. (2014). Gender Diversity, Board Independence, Environmental Committee and Greenhouse Gas Disclosure. *The British Accounting Review, 47*(4), 409-424. https://doi.org/10.1016/j.bar.2014.01.002

Lin, C. (2007). User attitudes toward computer networks and information quality. *Behaviour & Information Technology, 26*(6), 459-471. https://doi.org/10.1108/imds-12-2017-0589

Lin, C., & Lin, M. (2019). The determinants of using cloud supply chain adoption. *Industrial Management & Data Systems, 119*(2), 351-366.

Lin, C., Lu, H. P., & Chen, H. (2005). The influence of website quality on customer satisfaction and purchase intention: Study of e-commerce in Taiwan. *Total Quality Management & Business Excellence, 16*(3), 325-341.

Lin, J. C.-C., & Lu, H. (2000). Towards an understanding of the behavioural intention to use a web site. *International Journal of Information Management, 20*(3), 197-208. https://doi.org/10.1016/s0268-4012(00)00005-0

Mainardes, E. W., Teixeira, A., & Romano, P. C. d. S. (2017). Determinants of co-creation in banking services. *International journal of bank marketing, 35*(2), 187-204. https://doi.org/10.1108/ijbm-10-2015-0165

McKechnie, S., Winklhofer, H., & Ennew, C. (2006). Applying the technology acceptance model to the online retailing of financial services. *International Journal of Retail & Distribution Management, 34*(4/5), 388-410. https://doi.org/10.1108/09590550610660297

Mohammadi, H. (2015). A Study of Mobile Banking Usage in Iran. *International Journal of Bank Marketing, 33,* 733-759. https://doi.org/10.1108/IJBM-08-2014-0114

Moon, J. W., & Kim, Y. G. (2001). Extending the TAM for a World-Wide-Web Context. *Information and Management, 38,* 217-230. http://dx.doi.org/10.1016/S0378-7206(00)00061-6

Mun, Y. Y., & Hwang, Y. (2003). Predicting the use of web-based information systems: self-efficacy, enjoyment, learning goal orientation, and the technology acceptance model. *International journal of human-computer studies, 59*(4), 431-449. https://doi.org/10.1016/s1071-5819(03)00114-9

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

Nwagwu, W. E., & Famiyesin, B. (2016). Acceptance of mobile advertising by consumers in public service institutions in Lagos, Nigeria. *The Electronic Library, 34*(2), 265-288. https://doi.org/10.1108/el-09-2014-0169

Oliver, R. L., & Swan, J. E. (1989). Equity and disconfirmation perceptions as influences on merchant and product satisfaction. *Journal of consumer research, 16*(3), 372-383. https://doi.org/10.1086/209223

Pedroso, R., Zanetello, L., Guimaraes, L., Pettenon, M., Goncalves, V., Scherer, J., Kessler, F., & Pechansky, F. (2016). Confirmatory factor analysis (CFA) of the crack use relapse scale (CURS). *Archives of Clinical Psychiatry, 43*(3), 37-40. https://doi.org/10.1590/0101-60830000000081

Petter, S., DeLone, W., & McLean, E. (2008). Measuring information systems success: Models, dimensions, measures, and interrelationships. *European Journal of Information Systems, 17*(3), 236-263. https://doi.org/10.1057/ejis.2008.15

Punnoose, A. C. (2012). Determinants of intention to use eLearning based on the technology acceptance model. *Journal of Information Technology Education: Research, 11*(1), 301-337. https://doi.org/10.28945/1744

Robey, D., & Farrow, D. (1982). User involvement in information system development: A conflict model and empirical test. *Management science, 28*(1), 73-85. https://doi.org/10.1287/mnsc.28.1.73

Rotchanakitumnuai, S., & Speece, M. (2009). Modeling electronic service acceptance of an e-securities trading system. *Industrial Management & Data Systems, 109*(8), 1069-1084. https://doi.org/10.1108/02635570910991300

Sanchez-Franco, M. J. (2009). The moderating effects of involvement on the relationships between satisfaction, trust and commitment in e-banking. *Journal of Interactive Marketing, 23*(3), 247-258. https://doi.org/10.1016/j.intmar.2009.04.007

Schreiber, J. B., Stage, F. K., King, J., Nora, A., & Barlow, E. A. (2006). Reporting Structural Equation Modeling and Confirmatory Factor Analysis Results: A Review. *The Journal of Educational Research, 99*(6), 323-337. https://doi.org/10.3200/JOER.99.6.323-338

Sharma, G. P., Verma, R. C., & Pathare, P. (2005). Mathematical modeling of infrared radiation thin layer drying of onion slices. *Journal of Food Engineering, 71*(3), 282-286. https://doi.org/10.1016/j.jfoodeng.2005.02.010

Sica, C., & Ghisi, M. (2007). The Italian versions of the Beck Anxiety Inventory and the Beck Depression Inventory-II: Psychometric properties and discriminant power. In M. A. Lange (Ed.), *Leading-edge psychological tests and testing research* (pp. 27-50). Nova Science Publishers.

Smith, A. N. (1971). The importance of attitude in foreign language learning. *The Modern Language Journal, 55*(2), 82-88. https://doi.org/10.1111/j.1540-4781.1971.tb00916.x

Venkatesh, V., & Davis, F. D. (2000). A theoretical extension of the technology acceptance model: Four longitudinal field studies. *Management science, 46*(2), 186-204. https://doi.org/10.1287/mnsc.46.2.186.11926

Venkatesh, V., Speier, C., & Morris, M. G. (2002). User acceptance enablers in individual decision making about technology: Toward an integrated model. *Decision sciences, 33*(2), 297-316. https://doi.org/10.1111/j.1540-5915.2002.tb01646.x

Venkatesh, V., Thong, J., & Xu, X. (2012). Consumer Acceptance and Use of Information Technology: Extending the Unified Theory of Acceptance and Use of Technology. *MIS Quarterly. 36*(1), 157-178. https://doi.org/10.2307/41410412

Webber, W. E. (2010). Measurement in information retrieval evaluation University of Melbourne. *Department of Computer Science and Software Engineering,* 6(7), 1-248.

Wixom, B. H., & Todd, P. A. (2005). A theoretical integration of user satisfaction and technology acceptance. *Information systems research, 16*(1), 85-102. https://doi.org/10.1287/isre.1050.0042

Wu, J. H., & Wang, Y. M. (2006). Measuring KMS success: A specification of the DeLone and McLean's model. *Information and Management, 43*(6), 728-739. https://doi.org/10.1016/j.im.2006.05.002

Xu, Y., Wang, Y., & Xie, F. (2017). Understanding continued cloud computing usage: An expectation-confirmation model. *Industrial Management & Data Systems, 117*(10), 2218-2237.

Zikmund, W. G., Babin, B. J., Carr, J. C., & Griffin, M. (2013). *Business research methods* (1st ed.). Cengage learning.