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Determinants of Satisfaction with Superstar Learning System of Undergraduates Majoring in Environmental Design in Non-Normal Universities, Sichuan, China

Bi Yu*

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Abstract

Purpose: This study investigates the satisfaction and learning attitude of students majoring in environmental design within non-normal universities in Sichuan Province who engage with 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:** Employing quantitative methods, the index of item-objective congruence and Cronbach's Alpha are measures to ensure survey tool content validity and reliability. Questionnaires were distributed to undergraduate students majoring in environmental design at Chengdu University, Yibin University, and Sichuan University for Nationalities. The collected data underwent confirmatory factor analysis and structural equation modeling to rigorously analyze and confirm the causal relationships between variables and conduct hypothesis testing. **Results:** The findings indicate that the research conceptual model effectively predicts and explains students' attitudes and satisfaction levels using the Superstar learning system. Nevertheless, system quality has no significant impact on perceived usefulness. **Conclusions:** This study significantly contributes to understanding the experiences and satisfaction of environmental design students in blended learning environments. Furthermore, it offers valuable insights that can guide educational practices and contribute to formulating policies to enhance the utilization of educational technologies, such as the Superstar learning systems.

Keywords: Blended Learning, Superstar Learning Systems, Perceived Ease Of Use, Perceived Enjoyment, Satisfaction

JEL Classification Code: E44, F31, F37, G15

1. Introduction

The Blended learning model introduces innovative educational approaches that provide students greater flexibility in their educational journey. This model gives students the autonomy to choose when, where, and how to interact with peers, teachers, and course content in the network environment, saving valuable time for teachers and students and increasing learning flexibility (Yanes, 2004). Graham et al. (2006) formally defines blended learning as an educational approach characterized by students completing educational courses through online learning for a portion of their time. This approach enables students to master the time, place, path, and learning speed more effectively. Over time, this definition has been elaborated in various versions in various academic journal articles (Nortvig et al., 2018; Uziak et al., 2018). In China, the government and education authorities are actively promoting the development of blended learning to adapt to the modern education system's continuous changes and innovation needs. Blended learning improves the efficiency and effectiveness of students' learning and plays an important role in improving students' comprehensive quality and coping with future needs.

Blended learning combines multiple modes of learning, including group learning in the classroom, collaborative learning in a group setting, and individual learning by

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

students. These different learning modes correspond to diverse teaching methods and processes, providing learners with a comprehensive and rich educational experience (He, 2004).

The environmental design major mainly adopts the collective teaching method centered on educators' teaching.

This approach originates from the traditional teaching model, which focuses on teaching professional courses in front of teachers and students. In addition, this approach also integrates various forms of teaching, such as MOOCs, superstar learning systems, and other online environments, to achieve a collective learning experience similar to traditional teaching. This enables students to participate in traditional courses not limited by numbers, time, or place, whether in real time or non-real time, synchronous or asynchronous (He, 2004).

Concept-based group teaching cooperation for environmental design majors. This approach includes using PowerPoint presentations, flipped classrooms (Seery, 2015; Zainuddin & Perera, 2019), and introducing course topics (Blatti & Snowdon, 2016; Stuckey & Eilks, 2014). Modern teaching strategies (Gul & Rafique, 2017) and cooperative learning (Shachar & Fischer, 2004) are some of the methods used by teachers in hybrid teaching strategies to enhance students' motivation in the learning process.

The environmental design major adopts the teaching form based on independent learning. Based on traditional teaching methods based on various courses of environmental design major, teachers and students can communicate with each other through network channels, such as E-mail (non-synchronous and non-real-time), Online13 (real-time) and question banks designed by teachers stored in the network system and China Super Star platform, etc., to develop the teaching mode with students' independent learning as the core. This provides strong learning support for students (Huang et al., 2007).

Blended learning provides a more flexible and diverse learning experience that combines the strengths of traditional teaching and online learning. It emphasizes active student engagement and collaborative learning and utilizes technology tools to provide additional learning resources and support. Blended learning can cater to students with different learning styles and needs, thereby enhancing students' learning effectiveness and satisfaction.

2. Literature Review

2.1 Information Quality

In the educational environment, information quality is defined as transforming information into teachers' teaching activities, aiming to improve the effectiveness of teachers' teaching practice (Chen & Cheng, 2009; Davis et al., 1992). In the context of learning management systems, information quality describes the high-quality characteristics of teaching content in teaching courses, which mainly includes the elements of accuracy, completeness, accessibility, comprehensibility, and timeliness of the content (Cheng, 2011).

DeLone and McLean (2003) pointed out that the overall quality of an online system is mainly determined by three key elements: information quality, system quality, and service quality. They are critical to assessing the effectiveness and superiority of information systems. Information quality is extremely important to realize the virtual system's success in the electronic social platform. In the absence of face-to-face communication, accurate, complete, and relevant information needs can be obtained. This is crucial to promote information sharing and exchange in the electronic virtual space. Effective information transfer enhances comprehension and communication skills. User-generated content is increasingly recognized in e-commerce research, especially user-generated information content that effectively evaluates website systems (Cao et al., 2005; Negash et al., 2003). In a secure information medium, information quality significantly affects users' initial trust (Zahedi & Song, 2008). The criteria for evaluating information quality include authenticity, completeness, uniqueness, timeliness, relevance, accuracy, etc. (Webber, 2010). Therefore, this study proposes a hypothesis:

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

2.2 System Quality

SQ is regarded as a subjective assessment of the utility of an information system. In the information system research field, the system's functional quality is defined as system quality. They are evaluated by responsiveness, reliability, accuracy, and flexibility (DeLone & McLean, 2003; Lin, 2007). In the related research of network information systems, system quality is the key factor to distinguish the unique characteristics of information systems. These characteristics include system responsiveness, reliability, flexibility, ease of use, etc. (Eom & Stapleton, 2011). The importance of system quality is reflected in the user interface design, interactive experience, and functional design of information systems (Cheng, 2012).

In Volery and Lord's (2000) study, the system quality of online education is regarded as the key criterion to evaluate its success. Meanwhile, researchers also believe that system quality is one of the core factors for the success of online education. Lee and Chung (2009) also put forward a similar view that system quality is an important factor affecting user trust, especially in the context of technology acceptance. In

a network context, the effectiveness and popularity of a learning management system are largely dependent on the quality of the system and its components (Almarashdeh et al., 2010). Finally, from a different perspective, Hassanzadeh et al. (2012) pointed out that the system's quality significantly affects users' satisfaction and their intention to use the e-learning system. A high-quality system can improve the efficiency and effectiveness of users using the e-learning system. Therefore, this study proposes a hypothesis:
H2: System quality has a significant impact on perceived usefulness.

2.3 Attitude

According to Ajzen and Fishbein (1975), an attitude is a person's positive or negative feelings about a particular behavior and reaction to that behavior. Attitude is seen as a predictor of behavioral intent (Golnaz et al., 2010). Fishbein and Ajzen (2011) mainly studied the theory of planned behavior (TPB), in which attitude is the degree of an individual's positive or negative tendency to engage in a certain behavior.

Taylor and Gitsaki (2004) proposed in their research that their positive attitudes significantly influence learners' adoption of online learning systems. Similarly, in the theory of planned behavior, attitude is one of the key indicators of an individual's psychological response to a technological system. Positive usage attitudes must be enhanced by improving the user's status in the network community, especially when the user considers online communication enjoyable (Li, 2011). Finally, their attitudes influence individuals' views on things (Kim et al., 2015), and learners' learning intentions are closely related to their attitudes (Amos et al., 2008; Li et al., 2020). Therefore, this study proposes a hypothesis:
H3: Perceived ease of use has a significant impact on attitude.

2.4 Perceived Ease of Use

Thompson et al. (1991) described the perceived ease of use as the complexity of the user in the process of using the system, while Moore and Benbasat (1991) used the term "ease of use" to make a related expression. Both categories measure the user's acceptance of innovative technologies when using the system. In addition, Pipitwanichakarn and Wongtada (2020) further defined perceived ease of use as users' perceived effort or cognitive assessment of learning new technologies and systems.

In the technology acceptance model (TAM), PEOU is a key variable indirectly affecting technology adoption (Szajna, 1996). The technology acceptance model is considered to be an indicator of the cognitive effort required to learn and adopt new technologies (Gefen et al., 2003). In addition, Stocchi et al. (2019) highlighted integrating mobile applications with specific functions to improve PEOU and PU, thereby influencing users' willingness to adopt technology. Therefore, this study proposes a hypothesis:
H4: Perceived ease of use has a significant impact on satisfaction.

2.5 Perceived Usefulness

Seddon (1997) highlighted the perceived benefits of using information technology systems through an opinion published in Decision Science. It reflects the individual's evaluation of IT systems and is often linked to their specific goals (Gefen et al., 2003). Mallin and DelVecchio (2008) describe the expected effect of perceived usefulness (PU) on using specific information technologies to improve the productivity of potential users.

As Agarwal and Prasad (1999) expressed, individual differences such as occupational environment, educational background, and cognitive style affect users' perceptions of usefulness. When users prepare to adopt a new IT system, perceived usefulness becomes a key consideration in the adoption process because technology adoption is based on their subjective evaluation and acceptance (Bhattacherjee & Sanford, 2006). In addition, Lwoga and Komba (2015) stated that in long-term teaching activities, perceived usefulness is a key condition for achieving teaching goals in the teaching process. Finally, many experts and scholars have explored the interrelation between perceived usefulness and attitude, emphasizing that perceived usefulness is an important and decisive element in forming students' attitudes toward online learning (Granić & Marangunić, 2019; Sivo et al., 2018). Therefore, this study proposes hypotheses:
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 Davis et al. (1992), perceived enjoyment can be understood as the pleasure an individual feels psychologically while using technology, in addition to any expected performance effects. In the study of Liaw and Huang (2011), the interpretation of perceived enjoyment is that it can improve the intention of college students to use e-learning systems. In addition, Moghavvemi et al. (2017) argue that perceived enjoyment, including the desire to help others, can be seen as a source of pleasure when using technology.

Previous studies have shown that perceived enjoyment is an important reason for forming behavioral intention to use technology (Van der Heijden, 2004). Researchers' research shows that perceived enjoyment is a key factor in

determining users' behaviors, such as mobile learning and device use (Wang & Li, 2012). Finally, Yoon et al. (2016) stated that perceived enjoyment does not influence users' learning attitudes. Different studies will reach conclusions due to the research direction and other reasons. Situational factors may influence the influence of perceived enjoyment on learning attitude. Therefore, this study proposes a hypothesis:

H7: Perceived enjoyment has a significant impact on satisfaction.

2.7 Satisfaction

According to the study of Doll et al. (1994), users' emotional attitude towards Internet applications is defined as the ultimate satisfaction. In the context of the Internet, satisfaction is the degree to which users' perceptions and needs for the information system are satisfied (Wang et al., 2009). Liao et al. (2015) describe satisfaction as the degree of satisfaction when users use technology to achieve a specific purpose, a prerequisite for continuous system use.

Oliver (1993) and Liao et al. (2009) argue that user satisfaction with an information system plays a crucial role in determining the system's acceptability in an organization. In addition, Lee et al. (1995) pointed out that user satisfaction depends on their degree of approval of the system and the ability of the system to meet their information needs. Petter et al. (2008) defined satisfaction as the degree to which users are satisfied with system services. Continued system use is often seen as an indicator of user satisfaction (Zhang, 2010). Again, we conclude from these previous studies that teachers' willingness to use e-learning systems is affected by their satisfaction, and there is a close correlation between learning motivation, impact, and satisfaction.

3. Research Methods and Materials

The researchers conducted a study of existing scientific research methods, mainly in order to build a conceptual framework for this study. Ravitch and Riggan (2017) defined conceptual framework as a graphical or textual description of key concepts and variables in the research, which is intended to guide the design and execution of the research. This framework helps to build a theoretical foundation that enables researchers to understand research questions better and interpret research results. Thomas (2017) believes that research theories are derived from research results based on theoretical objectives and are correlated/applied to the variables used. Through consulting, we know that the research theory is that the results are deduced according to the theoretical goal, and the correlation/application is generated with the variables used.

As shown in Figure 1, this research is based on the theory and theoretical framework of previous research results, from which the conceptual framework of this research is extracted. It revolves around two key research theories: DeLone and McLean's information systems success model and the technology acceptance model.

3.1. Research Framework

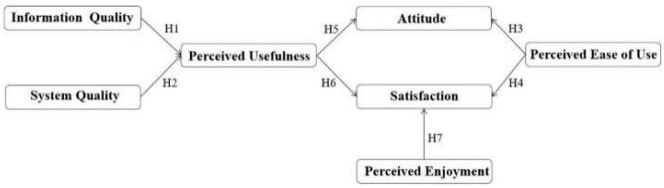

Figure 1: Conceptual Framework

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 uses quantitative research methods to explore in depth the various factors that affect the satisfaction and attitude of undergraduate students majoring in environmental design when the Superstar Learning System (SLS) is used in non-normal higher education. The study collected data from the target group through the design of a questionnaire, which involved the selection of respondents, sampling procedures, questionnaire development, validation and reliability testing, data collection process, confirmatory factor analysis (CFA), evaluation of fit indicators, and the use of structural equation models (SEM) to test the hypothesizing relationships between variables. The questionnaire was developed through Jiangshan Document, an online platform, to utilize its convenient and fast data distribution and collection capabilities. Three experts conducted an assessment of the Index of Item-Objective Congruence (IOC) to ensure that each item precisely measures its intended construct, thereby enhancing the validity of the assessment. In the pilot test involving 50 participants, the resulting Cronbach's Alpha score surpassed 0.7, confirming the reliable measurement of

the intended construct and strengthening the overall trustworthiness of the test results (Nunnally & Bernstein, 1994). The survey was completed online and involved undergraduates from six different types of universities, who made up the target group for the study. The quantitative data collected were then analyzed using statistical tools such as Jamovi and AMOS. These measures ensured the methodology could parse the complex network of factors affecting satisfaction and attitudes when SLS was adopted in non-normal higher education institutions in Sichuan Province, China.

3.3 Population and Sample Size

The target population of this study is selected from non-normal universities in Sichuan province, including Chengdu University, Yibin University, and Sichuan Minzu College. In her study, Saunders et al. (2016) highlighted the target group as an important factor in the overall population and emphasized its central position in building effective research design. The researchers selected schools that intentionally selected different degrees of SLS integration institutions from different regions that met specific size requirements. This strategy enhanced the applicability of the findings. The study sample consisted primarily of second - to fourth-year undergraduate students in environmental design who had at least one year of experience using the Superstar learning system to ensure that the sample was broadly representative. In subsequent sampling procedures, this study employed a methodology that combined probabilistic sampling and non-probabilistic sampling techniques to provide comprehensive and valuable insights into the factors that influence attitudes and satisfaction with adopting SLS in higher education settings. The minimum sample size for SEM analysis is 200. Therefore, this research determines 500 sample size for the analysis.

3.4 Sampling Technique

Sampling units play a central role in research because they form the basis for selecting samples from the population according to research objectives and criteria. Kabir (2016) discusses the importance of sampling units at length, stating that they are fundamental and must be well-defined, identifiable, and observable to be compatible with the research objectives. For judgmental sampling, the researchers identified 500 undergraduates majoring in environmental design from three universities, Chengdu University, Yibin University, and Sichuan University for Nationalities, as the target population. Table 1 shows stratified random sampling. For convenience sampling, the designed questionnaire was distributed directly by the researchers to the students of the designated universities, and the questionnaire was effectively conducted with the strong assistance of the full-time staff of the universities.

Table 1: Sample Units and Sample Size

Three normal universities	Population Size	Proportional Sample Size
Chengdu University	18000	209
Yibin University	13000	151
Sichuan MinzuCollege	12000	140
Total	**43000**	**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 three non-normal universities in Sichuan Province, and 500 samples were selected from them. Males are 118, accounting for 23.6%, whereas females are 382, or 76.4% of the sample. According to the year of the study, there are second year (30%), third year (25.8%), first year (24.6%), and fourth year (19.6%), respectively.

Table 2: Demographic Profile

Demographic and General Data (N=500)		Frequency	Percentage
Gender	Male	118	23.6%
	Female	382	76.4%
Year of the Study	Year 1	123	24.6%
	Year 2	150	30.0%
	Year 3	129	25.8%
	Year 4	98	19.6%

4.2 Confirmatory Factor Analysis (CFA)

Schreiber et al. (2006) define Confirmatory Factor Analysis as a statistical approach designed to test if a set of observed variables correspond to the expected number of constructs or factors the researcher theorizes. The outcomes of CFA typically encompass estimates of factor loadings that indicate the associations between observed variables and their latent constructs alongside a range of fit indices that evaluate the congruence of the proposed model with the empirical data. Table 3 shows this study's confirmatory factor analysis results, demonstrating the psychometric properties of the measuring instruments. Cronbach's Alpha, factor load, T-value, composite reliability, and mean-variance extraction are included for studies conducted at non-normal universities to demonstrate the reliability and validity of the structures within the measurement models used in the studies. Information Quality: It has high internal consistency (CA = 0.875), composite reliability (CR = 0.828), and AVE of 0.555,

higher than the generally accepted threshold of 0.5, indicating sufficient convergence validity. System Quality: Also shows high reliability (CA = 0.861, CR = 0.866) and 0.622 AVE, indicating a high variance level for construct capture. Perceived Ease of Use: It has high reliability (CA = 0.901, CR = 0.907), AVE is the highest (0.665), and it has strong convergence validity. Perceived usefulness: excellent reliability (CA = 0.917, CR = 0.919), excellent convergence validity (AVE = 0.740). Perceived enjoyment: Similar to PU, with high reliability (CA = 0.895, CR = 0.895) and convergence validity (AVE = 0.739). Attitude (ATT): has very high reliability (CA = 0.907, CR = 0.911) and AVE of 0.675, reflecting well-defined structural validity. Satisfaction: High reliability (CA = 0.907, CR = 0.912) and AVE = 0.569, indicating satisfactory convergence validity. The load of all factors is significant at above 0.5, as indicated by the asterisk, which indicates that all observed variables are relevant indicators of the underlying construct they are intended to measure. In the description, CA stands for Cronbach's Alpha, CR stands for composite reliability, AVE stands for average variance extraction, and the asterisk indicates that the p-value is less than 0.05.

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	0.875	0.600-0.953	0.828	0.555
System Quality (SYQ)	DeLone and McLean (1992)	4	0.861	0.734-0.901	0.866	0.622
Perceived Ease of Use (PEOU)	Davis (1989)	5	0.901	0.636-0.926	0.907	0.665
Perceived Usefulness (PU)	Davis et al. (1989)	4	0.917	0.808-0.920	0.919	0.740
Perceived Enjoyment (PE)	Venkatesh et al. (2002)	3	0.895	0.852-0.875	0.895	0.739
Attitude (ATT)	Breer and Locke (1965)	5	0.907	0.643-0.928	0.911	0.675
Satisfaction (SAT)	Oliver and Swan (1989)	8	0.907	0.623-0.885	0.912	0.569

As shown in Table 4, goodness of fit for measurement models, the statistical value of the fit index meets the acceptable criteria for proper model fitting: CMIN/DF (Chi-square to freedom ratio) of 2.607, which is less than the acceptable criteria of 5.00. This indicates a good fit between the model and the data. The GFI (Goodness of Fit Index) is 0.870, above the threshold of 0.85, indicating a good fit. The AGFI (Adjusted Goodness of Fit Index) was 0.846, which met the standard above 0.80. The Specification Fit Index (NFI) was 0.898, above the acceptable level of 0.80. The CFI (Comparative et al.) is 0.934, well above the standard of 0.80. The TLI (Tuck-Lewis Index) was 0.927, also above the threshold of 0.80. RMSEA (Root et al. of Approximation) is 0.057, lower than the maximum 0.08, indicating good fitting.

Table 4: Goodness of Fit for Measurement Model

Fit Index	Acceptable Criteria	Statistical Values
CMIN/DF	< 5.00 (Al-Mamary & Shamsuddin, 2015; Awang, 2012)	1235.947/474or 2.607
GFI	≥ 0.85 (Sica & Ghisi , 2007)	0.870
AGFI	≥ 0.80 (Sica & Ghisi, 2007)	0.846
NFI	≥ 0.80 (Wu & Wang, 2006)	0.898
CFI	≥ 0.80 (Bentler, 1990)	0.934
TLI	≥ 0.80 (Sharma et al., 2005)	0.927
RMSEA	< 0.08 (Pedroso et al., 2016)	0.057
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 discriminant validity of various potential factors such as information quality, system quality, perceived ease of use, perceived usefulness, perceived enjoyment, attitude, and the correlation between satisfaction was measured in non-normal universities. In Table 5, the diagonal entries represent the square root of the extracted mean-variance (AVE), reflecting the degree to which each structure is related. So, a value of 1 indicates perfect correlation. Non-diagonal elements are correlations between structures. The value on the diagonal (AVE) is higher than the correlation on the diagonal, demonstrating discriminant validity, meaning that each structure is different and captures a unique variance that other structures cannot explain. This model supports the idea that constructs are sufficiently differentiated to satisfy an important condition for discriminant validity.

Table 5: Discriminant Validity

	IQ	SYQ	PEOU	PU	PE	ATT	SAT
IQ	**0.745**						
SYQ	0.482	**0.789**					
PEOU	0.425	0.333	**0.815**				
PU	0.385	0.236	0.259	**0.860**			
PE	0.421	0.301	0.274	0.242	**0.860**		
ATT	0.498	0.365	0.386	0.345	0.33	**0.822**	
SAT	0.428	0.284	0.328	0.272	0.259	0.349	**0.754**

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

4.3 Structural Equation Model (SEM)

Kline (2015) describes structural equation modeling (SEM) as a comprehensive statistical method to test assumptions about the relationship between observed and latent variables. SEM integrates multiple models such as confirmatory factor analysis, path analysis, and potential

growth models. It facilitates the estimation of multiple interrelated elements in a separate analysis while incorporating measurement errors into the estimation process to provide a more accurate understanding of data relationships. As shown in Table 6, the refinement of the fitting index of the structural model in a non-normal university environment compares the pre - and post-adjustment values with the established fitting thresholds. CMIN/DF increased from 3.496 to 3.022, indicating that the model adjustment enhanced its consistency with the data. After adjustment, GFI crossed the acceptable threshold from 0.831 to 0.850, and AGFI also increased, indicating a good model fit. The NFI, CFI, and TLI indexes are all higher than the 0.80 standard, further confirming the model adjustment's validity. RMSEA saw a reduction, further indicating a better fit. Overall, the model was considered unacceptable before the adjustment but reached an acceptable standard after the adjustment.

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)	1705.880/488 or 3.496	1441.276/477 or 3.022
GFI	≥ 0.85 (Sica & Ghisi, 2007)	0.831	0.850
AGFI	≥ 0.80 (Sica & Ghisi, 2007)	0.806	0.824
NFI	≥ 0.80 (Wu & Wang, 2006)	0.859	0.881
CFI	≥ 0.80 (Bentler, 1990)	0.895	0.917
TLI	≥ 0.80 (Sharma et al., 2005)	0.886	0.908
RMSEA	< 0.08 (Pedroso et al., 2016)	0.071	0.064
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

The results of hypothesis testing for the non-normal college structural model are shown in Table 10, with each hypothesis related to the effects of various system qualities on the perceived usefulness, attitude, and satisfaction of the Superstar learning system (SLS).

Table 7: Hypothesis Results of the Structural Equation Modeling

Hypothesis	(β)	t-value	Result
H1: IQ→PU	0.325	6.784*	Supported
H2: SYQ→PU	0.092	1.463	Not Supported
H3: PEOU→ATT	0.337	7.411*	Supported
H4: PEOU→SAT	0.248	5.523*	Supported
H5: PU→ATT	0.275	6.147*	Supported
H6: PU→ATT	0.172	3.891*	Supported
H7: PE→SAT	0.152	3.359*	Supported

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

H1: supports the hypothesis that information quality significantly affects the perceived usefulness of SLS, with a normalization coefficient (β) of 0.325 and a T-value of 6.784, which are statistically significant.

H2: The hypothesis that system mass significantly affects the perceived usefulness of SLS is not supported, with a low T-value of 1.463.

H3: The influence of perceived ease of use on SLS attitude is supported; the standardization coefficient is 0.337, and the T-value is 7.411.

H4: Perceived ease of use significantly impacts SLS satisfaction, with a standardization coefficient of 0.248 and a T-value of 5.523.

H5: The hypothesis that perceived usefulness significantly affects SLS attitudes is supported by a normalization coefficient of 0.275 and a T-value of 6.147.

H6: Perceived usefulness also significantly affects SLS satisfaction, with a normalization coefficient of 0.172 and a T-value of 3.891 to support the hypothesis.

H7: Perceived enjoyment significantly impacts SLS satisfaction, with a standardization coefficient of 0.152 and a T-value of 3.359.

5. Conclusion and Recommendation

5.1 Conclusion and Discussion

The study on satisfaction and learning attitudes of students majoring in environmental design within non-normal universities in Sichuan Province, particularly regarding their engagement with the Superstar learning system in a blended learning environment, offers intriguing insights into the effectiveness of such educational tools. The conceptual framework employed in the research, which includes factors such as information quality, system quality, perceived usefulness, perceived ease of use, perceived enjoyment, attitude, and satisfaction, provides a comprehensive lens through which to analyze the dynamics

at play.

One notable aspect of the research design is its use of quantitative methods, including measures such as the index of item-objective congruence and Cronbach's Alpha, to ensure the validity and reliability of the survey tools. This demonstrates a commitment to rigorous methodology, which is essential for drawing robust conclusions from the data collected.

The distribution of questionnaires to undergraduate students majoring in environmental design at different universities in Sichuan Province adds depth and breadth to the study, allowing for a more comprehensive understanding of how students from various academic backgrounds perceive and interact with the Superstar learning system.

The use of confirmatory factor analysis and structural equation modeling to analyze the collected data further strengthens the study's credibility by providing a systematic approach to testing the relationships between variables and hypotheses.

The results of the study, particularly the finding that the research conceptual model effectively predicts and explains students' attitudes and satisfaction levels using the Superstar learning system, are significant. They suggest that the factors included in the conceptual framework indeed play a crucial role in shaping students' experiences with the learning system.

However, the finding that system quality does not have a significant impact on perceived usefulness raises interesting questions. It prompts further exploration into the specific aspects of system quality that may influence students' perceptions of usefulness and how these factors can be optimized to enhance the overall learning experience.

Overall, this study contributes valuable insights to the field of educational technology and highlights the importance of considering multiple factors, including system quality, in designing and implementing effective blended learning environments. It also underscores the need for continued research to refine our understanding of the complex interplay between technology and learning outcomes.

5.2 Recommendation

Based on the findings of the study on satisfaction and learning attitudes of students majoring in environmental design within non-normal universities in Sichuan Province, and their engagement with the Superstar learning system, several recommendations can be made to enhance the effectiveness of blended learning environments and educational technology implementation:

Enhance System Quality: While the study found that system quality did not significantly impact perceived usefulness, it's crucial to identify specific areas for improvement. Conducting usability testing and gathering feedback from students can help pinpoint usability issues or technical glitches that may hinder their learning experience. Investing in system upgrades or user interface redesigns based on this feedback can enhance system quality and ultimately improve student satisfaction.

Focus on Information Quality: Since information quality was identified as a significant factor influencing students' attitudes and satisfaction levels, it's essential to ensure that the content delivered through the Superstar learning system is accurate, relevant, and engaging. Collaborating with subject matter experts and updating course materials regularly can help maintain high standards of information quality and keep students motivated and engaged with the learning process.

Promote Perceived Enjoyment: The study highlighted perceived enjoyment as a key determinant of students' attitudes towards the Superstar learning system. Educators and instructional designers should explore ways to make the learning experience more enjoyable and interactive. Incorporating gamification elements, multimedia resources, and collaborative activities can enhance student engagement and foster a positive learning environment.

Provide Training and Support: Since perceived ease of use significantly influences students' attitudes and satisfaction levels, providing comprehensive training and support resources is crucial. Offering tutorials, user guides, and technical assistance can help students navigate the Superstar learning system more effectively and feel more confident in using its features. Additionally, fostering a supportive learning community where students can share tips and troubleshoot issues collaboratively can further enhance perceived ease of use.

Tailor Instructional Design: Recognizing that perceived usefulness is influenced by various factors, including instructional design, educators should tailor their teaching strategies to align with students' learning preferences and goals. Employing diverse instructional methods, such as case studies, simulations, and hands-on projects, can cater to different learning styles and enhance the perceived usefulness of the Superstar learning system for a broader range of students.

Continuous Evaluation and Improvement: Finally, it's essential to adopt a continuous improvement approach by regularly evaluating the effectiveness of the Superstar learning system and incorporating feedback from students and instructors. Conducting periodic assessments, surveys, and focus groups can provide valuable insights into areas for refinement and innovation, ensuring that the learning environment remains dynamic, relevant, and responsive to evolving educational needs.

By implementing these recommendations, educational institutions can optimize the use of blended learning

environments and educational technology platforms like the Superstar learning system, ultimately enhancing student satisfaction, engagement, and learning outcomes.

5.3 Limitation and Further Study

The samples of this study were selected from undergraduates majoring in environmental design at Chengdu University, Yibin University, and Sichuan Minzu College in three regions of Sichuan Province. Some important universities with certain characteristics (such as specialized arts universities) were excluded from 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. In addition, the selection and design of the research method of this study may also have limitations, which have a certain impact on the evaluation of student satisfaction. The questionnaire used in the research process may be subjective, and the evaluation of students' satisfaction may be affected by their subjective feelings, expectation level, personal preference, and other factors. Finally, 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, some factors considered to have important influence and value are not included in the conceptual framework of this study. Therefore, we can further discuss from three angles: Expand the research scope to other provinces and regions in China. More research methods can be considered. More research variables can be mined to support the development of the research framework.

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