International Students' Online Learning Satisfaction Model Construction, Validation and Affecting Factors Analysis

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Abstract

Online learning modality has played a crucial role since the 2020 COVID-19 pandemic. It enabled international students located in different countries to continue with their learning. Students' satisfaction is a key criterion for measuring teaching quality as it can reflect students' learning achievements. Based on satisfaction theory, learning condition theory and teaching system elements theory, as well as existing online learning satisfaction model, this study constructed an online learning satisfaction model for international students, developed a questionnaire and administrated an empirical study. The results of SPSS25.0 indicated that international students were satisfied with online learning in general; teaching design could predict online learning satisfaction mostly; then came students' individual factors, external supports, online interactions and online class characteristics. In addition to that, international students' major, nationality and current residential location could significantly affect their online learning satisfaction; while gender and former online learning experience could not. This study also discussed factors that affected international students' satisfactory level with collected qualitative data, and concluded by presenting strategies on how to promote online learning satisfaction and teaching quality.

Keywords

Online Learning Satisfaction, Model, Affecting Factors, International Students

1. Introduction

The COVID-19 pandemic has brought a significant influence on education, and online teaching has become an important teaching modality in international education. After the delivery of online courses over one year, there is an urgent

need to know whether students are satisfied with the quality of online courses. Research of this kind has provided valuable experience for us to reflect on and improve online teaching quality in the future (Liang et al., 2020; Ma & Cao, 2020; Abu Hantash, Abu Younis, & Assaf, 2020; Zhu, Wang, & Du, 2020). However, little attention has been paid to online learners learning Chinese as a second language, resulting in their learning satisfaction level unknown. Thus, the present study is designed to fill this gap.

2. Theories and Literature Review

2.1. Theories

The theoretical framework of this study is inspired by Fornell's customer satisfaction index model (ACSI), learning condition theory and teaching process hypothesis. ACSI model believes that satisfaction is in a causal system of each factor involved. It can indicate the relationship between consumption process, satisfaction and predict the level of satisfaction in advance. After introducing this theory into education, research scope has expanded to schools, teachers and student satisfaction. In the e-learning environment, the connotation of learning satisfaction includes academic performance, interpersonal gain evaluation and post-learning intentional feedback (Li et al., 2020). Gagne's learning condition theory holds that the factors affecting learning can be divided into two categories: internal conditions and external conditions. Internal conditions refer to factors such as students' inherent learning motivation, various abilities and original knowledge. External conditions refer to the forms of input stimulus to students, and external factors such as teaching methods and teaching environment based on which educational activities are carried out. This theory is proposed for traditional classroom learning, but it also provides a basis for online teaching (Wang & Li, 2020). Teachers, students and curriculum (such as textbook or teaching content) are the three core elements in the teaching process. In online classes, teachers, students and curriculum are in a virtual learning setting, and they are faced with more complex interactions in the teaching process, thus make teaching activities different from traditional ones.

2.2. Variables Affecting Online Learning Satisfaction

Empirical studies reveal that learners' learning satisfaction is influenced by a variety of learner internal and external variables. Research of this strand have been carried out mainly from two aspects. Firstly, investigations have been made into revealing the influences of various factors affecting learners' online learning satisfaction (Zhang & Zhang, 2009). For example, Zhu, Wang and Du (2020) evaluated the online learning satisfaction with 6709 freshmen to seniors in universities based on the results-oriented education and constructivist learning theory. The results of regression analysis showed that students' satisfaction was mainly affected by course introduction, learning objectives, teacher-student interaction, positive value transmission, teachers' attention to students' progress, knowledge system construction, and achievement degree of independent learning ability cultivation. The

second strand of study has been carried out from one single dimension that impacts learning satisfaction. Ma and Cao (2020) focused on the impact of interaction on course satisfaction. They found that online learning effected all students higher than expected, and the relationship between learning satisfaction and classroom interaction was not linear: students who were moderately active in interaction had higher satisfaction, followed by students who were more active, and then students who were less active. Wang and Li (2020) investigated the influence of region on online learning satisfaction with Chinese college students. The findings showed that students in the east were most satisfied, followed by students in the middle and then came students in the west. The regional gap of technology platform was the most influential factor contributing to students' satisfaction.

In addition to the above dimensions, individual characteristics of students, such as age, gender, education level and learning styles in the online environment have also been studied (Wang, Shannon, & Ross, 2013). Unfortunately, due to the complexity of online learning environment, there is no consensus on the impact of individual factors on online learning satisfaction. Li et al. (2020) constructed an online learning satisfaction model for college students, which included task value perception, education and teaching quality, self-efficacy, online learning interaction, internal learning motivation, social support, external learning motivation and internet literacy. They also found that the satisfaction degree of male students was higher than that of female students; the satisfaction degree of students with online learning experience was higher than those without online learning experience; and the satisfaction degree of undergraduates was higher than that of junior college students; online live broadcasting was more popular.

To sum up, existing studies have demonstrated a lot about students' online learning satisfaction; however, the group of interactional students studying Chinese as a second language has been overlooked. Therefore, this study is designed to construct a satisfaction model of online learning effects on students studying Chinese as a second languagein the global context, and investigates the influence of each dimension of the model on satisfaction, as well as the influence of individual factors such as gender, major, nationality, current residence and online learning experience. The theoretical framework of this research is shown in Figure 1.
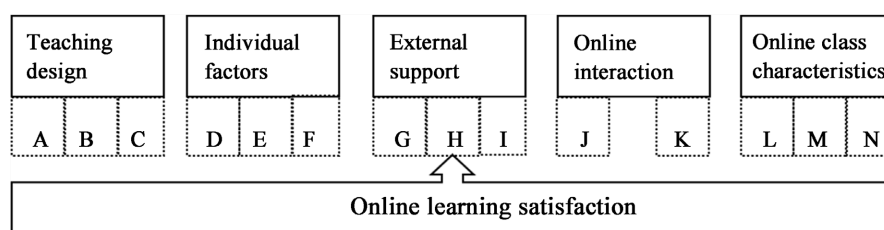
Note: "A" = pre-class preparation, "B" = delivery process, "C" = review, "D" = online course attitude, "E" = enthusiasm, "F" = concentration, "G" = network connection, "H" = APP, "I" = time difference, "J" = interaction attitude, "K" = anxiety, "L" = teaching quality, "M" = interaction chance, "N" = fun.

Figure 1. Online learning satisfaction model.

3. Research Design

3.1. Questionnaire

Based on the theoretical model and existing research, this questionnaire used in the present study was developed by soliciting the opinions of relevant experts and teachers, and combined with the actual teaching situation during online teaching. The questionnaire contained three parts: the first part was the demographic information of participants, including gender, age, major, online course experience and living in China/abroad; the second part was online course satisfaction questionnaire, including 30 questions that reflected five dimensions in the theoretical model: teaching design, individual factors, external support, online interaction and online class characteristics. These questions were measure by Likert 5-point scale: 1 = strongly agree, 2 = agree, 3 = neither agree nor disagree, 4 = disagree, 5 = strongly disagree; the third part consisted of two open questions, "please write down your most satisfaction with online courses and the reasons for it" and "please write down your most dissatisfaction with online courses and the reasons for it".

3.2. Data Collection and Sample Description

The questionnaires of this study were distributed in 2021, via Survey Star (Changsha Ranxing Science and Technology, Shanghai, China). The researcher forwarded the link of this study to her students and asked them to invite their friends to participate in this survey. Finally, 252 copies of the questionnaires were collected, and the questionnaires with the same answer choice and the accumulated answer time less than 200 seconds were regarded as invalid. The final valid questionnaires were 227 copies, 90% effective rate. In addition to that, around 10,000 words of text data were collected based on two open questions to enrich our understanding of the quantitative analysis results. Demographic information of participants is shown in Table 1.

4. Model test and Correlation Analysis Results

4.1. Reliability and Validity

The questionnaire was pre-surveyed and modified before it was officially issued,

Table 1. Demographic information of participants.

Item	Option	No.	Per.	Item	Option	No.	Per.
Gender	M	143	63	Major	Arts	118	52
	F	84	37		Science	41	18.1
Location	Domestic	79	34.9		Engineering	68	29.9
	Oversea	148	65.1	Nationality	Asia	147	64.8
Online course experience	Much	85	37.4		Africa	68	29.9
	Some	50	22		Europe	7	3.1
	None	92	45.6		America	5	2.2

which showed good content validity. The Cronbach coefficient of this questionnaire was 0.936, higher than the reference standard of 0.8, indicating that the questionnaire had high reliability and stability. The KMO value of factor analysis was 0.930, and the significance Sig value was 0.000, which met bartlett's sphericity test and met the prerequisite conditions of factor analysis with good structural validity.

In this study, exploratory factor analysis was conducted on 35 items in the questionnaire of influencing factors, and the common factors were extracted by principal component analysis (the extraction principle is eigenvalue > 1 and absolute value of factor load > 0.4). Finally, 28 items were determined, corresponding to 5 common factors, and the cumulative variance contribution rate was 60.21% (see Table 2).

According to the results of exploratory factor analysis, we conducted a descriptive analysis of the five dimensions of the questionnaire (see Table 3) and found that the average degree of satisfaction of online learning was 3.27. Since the questionnaire was scored on a 5-level Likert scale with a median of 3, which indicated that international students tended to be satisfied with online courses. Meanwhile, international students also scored more than 3 points in the four aspects of teacher's teaching design, student's individual factors, external support and online interactions, indicating that they had high satisfaction level in these four aspects.

4.2. Results of Individual Differences and Behavioral Characteristic Variables

Satisfaction was taken as dependent variable Y and individual characteristics of students as independent variable X. Independent sample T test and one-way ANOVA were used to conduct statistical analysis of variables and difference analysis of various dimensions (Tables 3-5). Among them, "gender" and "online course experience" had no significant impact on satisfaction; "location", "major" and "nationality" had significant influences on satisfaction. In the dimension of online interaction, there was a significant difference between the satisfaction of domestic and foreign students, and the satisfaction score of domestic students was higher than that of overseas students. There were significant differences in the scores of overseas students from different majors in four aspects: total satisfaction, teaching design, students' academic emotion and external support. The total score of satisfaction of engineering students was higher than that of arts students and science students. In the aspect of teaching design, the score of arts students was higher than that of engineering students and science students. In terms of students' academic emotion and external support, engineering students scored higher than arts students and science students. There were significant differences in the scores of international students from different countries in terms of external support and online interaction. In terms of support, international students from Europe scored higher than those from America, Asia and

Table 2. Results of exploratory factor analysis.

Common Factor	Item	Factor-loading	Eigenvalue	Variance contribution rate	Cumulative variance contribution rate
Teaching design	10	0.416			
	15	0.482			
	17	0.679			
	18	0.526			
	19	0.652			
	20	0.607	11.18	39.92%	39.92%
	21	0.555			
	22	0.684			
	24	0.609			
	25	0.601			
	26	0.628			
Individual factors	1	0.596			
	3	0.591			
	4	0.584			
	5	0.686	1.76	6.27%	46.19%
	6	0.645			
	11	0.599			
	12	0.542			
Online Class characteristics	9	0.733			
	13	0.780	1.46	5.22%	51.41%
	23	0.583			
	27	0.734			
	28	0.530			
External supports	2	0.641			
	14	0.691	1.39	4.97%	56.38%
	16	0.714			

Table 3. Analysis of international students' satisfaction with online courses.

Dimensions	N	Mean	Standard deviation
Teaching design	227	3.37	0.68
Individual factors	227	3.37	0.82
Online class characteristics	227	2.79	0.91
External support	227	3.26	0.70
Online interactions	227	3.44	0.77
Total	227	3.25	0.64

Africa. Students from Africa scored higher on the online interaction than students from Asia, Europe and the America.

4.3. Variables Affecting Online Learning Satisfaction

4.3.1. Correlation Analysis

Pearson correlation analysis was used to analyze online learning satisfaction (shown in Table 4). The correlation coefficient between teaching design and online learning satisfaction was the largest (R = 0.92), followed by students' academic emotion (R = 0.90) and online course characteristics (R = 0.85). Therefore, it could be inferred that teachers could arrange classroom activities satisfactorily, and present rich teaching contents in combination with the characteristics of online courses, both of which could stimulate students' positive academic emotions and made them satisfied.

4.3.2. Normalized Regression Equation

This study took the total score of international students' satisfaction as the dependent variable; and teachers' teaching design, individual factors, characteristics of online learning, external support and online interaction as independent variables to carry out step-to-step multiple linear regression. It can be seen from Table 5 and Figure 2 that VIF was less than 10, indicating that there was no collinearity problem and the regression result was stable with high reliability. The normalized residual scatter diagram (Figure 1) showed that the residual values

Table 4. Pearson correlation analysis of online course satisfaction.

	Mean	SD	1	2	3	4	5	6
Total 1	3.26	0.64	-					
Teaching design 2	3.37	0.68	0.92***	-				
Individual factors 3	3.37	0.82	0.90***	0.74***	-			
Online class characteristics 4	2.79	0.91	0.85***	0.70***	0.69***	-		
External supports 5	3.26	0.70	0.63***	0.54***	0.48***	0.45***	-	
Online interaction 6	3.44	0.77	0.52***	0.38***	0.46***	0.42***	0.22**	-

*Means significant at 0.05 level, **Means significant at 0.01 level, and ***Means significant at 0.001 level.

Table 5. Stepwise multiple regression analysis of influencing factors.

	Correlation coefficient (R)	Determination coefficient (R^2)	Adjusted coefficient (R^2)	F	B	β (standardization)	VIF
Teaching design	0.923	0.852	0.852	1300.235***	0.877	0.923	1
Academic emotion	0.896	0.803	0.803	919.379***	0.706	0.896	1
Online course characteristics	0.852	0.726	0.725	597.393***	0.601	0.852	1
External support	0.627	0.393	0.391	145.841***	0.576	0.627	1
Online interaction	0.522	0.273	0.269	84.33***	0.438	0.522	1

*Means significant at 0.05 level, **Means significant at 0.01 level, and ***Means significant at 0.001 level.
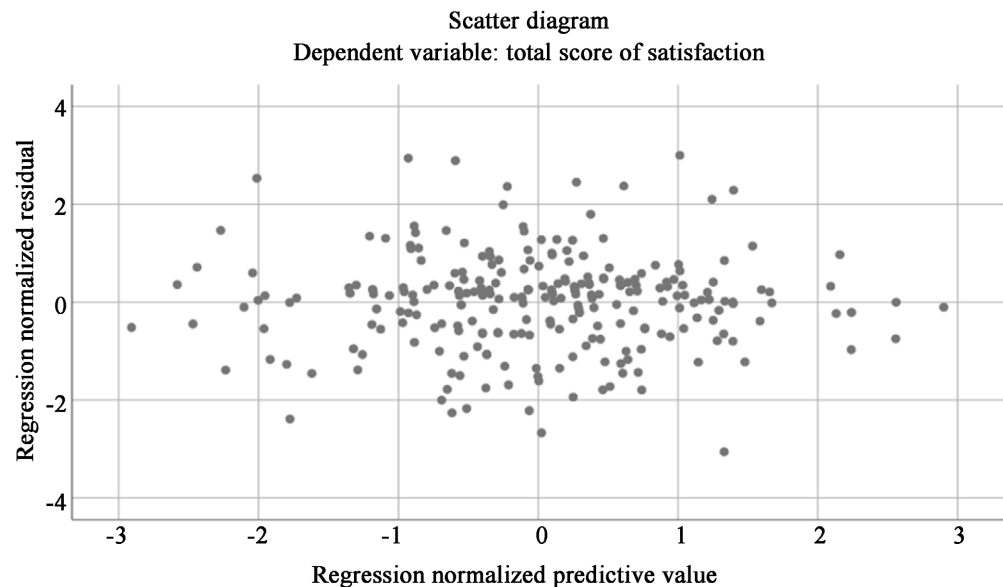
Figure 2. Normalized residual scatter diagram.

were between −2 and +2, which could explain most of the predicted values, indicating that the regression equation was valid. The multivariate correlation coefficient R between independent variables and dependent variables was 0.994, and determinant coefficient R^2 was 0.988. The final integrity test of regression model F value was 4137.059 (P = 0.000), and independent variables could effectively explain 98.8% variation of dependent variables.

Seen from the perspective of predictive power, the most predictive independent variable of international students' online course satisfaction was "teacher's teaching design", which explained 85.2% variation; followed by "student's individual factor", which explained 80.3% variation. The other three independent variables explained the variations were online course characteristics (72.5%), external support (39.1%) and online interaction (26.9%).

Seen from the standardized regression coefficient, the β values of the five predictive variables in the regression model were 0.923, 0.896, 0.852, 0.627 and 0.522 respectively. All these five factors had positive influences on the satisfaction of overseas students with online learning. The standardized regression equation was as follows:

$$y = 0.923 * a + 0.896 * b + 0.852 * c + 0.627 * d + 0.522 * e.$$

(a = teacher's teaching design, b = student's academic emotion, c = characteristics of online courses, d = external support, e = online interaction).

5. Discussion

Statistical results in the previous section indicated that the proposed model was reliable in predicting international students' learning satisfaction in an online environment. Variables such as students' major, nationality and current residential location had significant impacts on their online learning satisfaction.

International students tended to be satisfied with online courses, with a satisfaction score of 3.25 (higher than the median of 3). They also scored more than 3 points in teacher's teaching design, academic emotion, external support and online interaction, indicating that they had high satisfaction in these four aspects. At the same time, they scored 2.79 in the dimension of online course characteristics (less than the median of 3), indicating that they were still more inclined to traditional classes. The results of multiple linear regression analysis showed that teacher's teaching design, students' academic emotion, online course characteristics, external support and online interaction could significantly predict international students' online learning satisfaction. Compared with the satisfaction model of online courses for Chinese college students established by Li et al. (2020), external support and characteristics of online courses had more impact on the satisfaction of online learning for international students.

The impact of external support on satisfaction was more evident with international students. This study showed that overall, international students could get support from their families and teachers, and they were familiar with various learning platforms and could use various Apps appropriately. Engineering students could get significantly more external support than those in the discipline of liberal arts and science, which might be due to their higher information literacy. In addition, students living abroad had to overcome the difficulty of studying late at night caused by time differences, which affected their classroom experience. Infrastructure configuration, an important factor affecting the quality of students' online courses, refers to the network condition of students. Teachers should prepare various plans to deal with any possible sudden poor network connection conditions. Information literacy mainly refers to students' ability to obtain information resources. Existing online courses mostly use free platforms, such as Tencent Classroom, Tencent Conference and enterprise WeChat. International students were required to find these applications from internet, install, download and debug them before course commencement. Due to language and APP variations home and abroad, some students were not able to download APPs, which affected their class attendance. Such incidence often happened in online courses, so teachers should prepare alternative plans. The other fact was that students were in different time zones around the world, which made a bunch of them hard to participate classes at late night. We suggest that teaching institutions should break the boundaries of administrative classes, and arrange students in similar time zones and levels to have classes together, so that they can devote themselves to learning with full enthusiasm to achieve better learning results.

In terms of teaching modality, students expressed that both live broadcasting and recorded broadcasting were good. The teachers' teaching design was good, teaching content was clear and easy to understand, and after-class tutoring was timely and effective. Students mentioned that they were very happy to see the teacher in class and that they could consult the teacher easily if they didn't un-

derstand. Art students felt significantly more satisfaction than science and engineering students. Results of open questions showed that main problems were "some experiments cannot be done at home" or "homework cannot be corrected in time and feedback cannot be obtained" due to the requirements of engineering discipline. In terms of academic emotion, students generally believed that online classes increased their enthusiasm for learning, made them more focused in class, and they were happy to see teachers in live classes. The main sources of dissatisfaction were "more time spent on preparation and revision" and "sometimes not understand". In terms of the interaction dimension of online courses, students generally reported that they were more relaxed when answering questions than offline courses. Preparation made their classes learning more efficient. Students living inside China were more satisfied with classroom interaction than those living outside China. The main reasons were that internet connection was smoother for domestic students, APP was easier to obtain and install, and there was no impact of time differences. When comparing with traditional face-to-face courses, although international students generally showed positive attitudes towards online courses, they still preferred traditional classroom teaching, especially engineering students, emphasizing that some experiments could not be done in online class. In the dimension of online course characteristics, international students had the lowest satisfaction, and they still thought traditional classroom more effective.

6. Conclusion and Implication

Learning satisfaction directly reflects students' feelings or attitudes towards learning activities and is one of the important factors indicating whether students will continue online courses or not. The COVID-19 pandemic has had a profound impact on the teaching modality of international education. It is the consensus of the academic community that the combination of online and offline courses will become the new modality of international education in the future. Our results show that international students have higher overall satisfaction with online courses. The model of international students' satisfaction with online courses constructed in this study can effectively predict international students' satisfaction with online courses from five dimensions: teacher's teaching design, individual factors of students, external support, online interaction and characteristics of online courses.

This study also leaves us with two implications. Firstly, teachers function differently with online courses. Teachers are no longer the only source of academic knowledge as learning resources are easily accessible. They act more as a learning guide, assistant and evaluator, and their roles as a teacher have been challenged (Jia, 2019). Secondly, teaching institutions should enforce online education administration, without which online teaching would be a mess of sand (Li, 2020). This study implies that effective organization will greatly improve students' course satisfaction; and evaluation will help teachers improve the course

quality continuously.

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Conflicts of Interest

The author declares no conflicts of interest regarding the publication of this paper.

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