



## Research on the satisfaction of online teaching for international students in universities during the COVID-19 epidemic

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### Abstract

With the outbreak of the COVID-19 epidemic, some universities in China have been closed, resulting in foreign students can only participate in online teaching in their respective countries, which has a certain impact on their studies and also brings some challenges to the school. This paper collects foreign students' thoughts and feelings about online teaching through a questionnaire survey, and then uses reliability analysis to judge the reliability of the collected data. Finally, by using principal component analysis, the 24 factors were reduced to 6 factors, which reduced the data overlap, and discussed the online teaching satisfaction and its influencing factors of foreign students in universities under the COVID-19 epidemic, and on this basis, provided relevant suggestions for universities to deal with emergencies.

**Keywords:** Novel coronavirus epidemic, online teaching, satisfaction, principal component analysis

### Introduction

At the beginning of 2020, affected by the COVID-19 epidemic, according to the needs of epidemic prevention and control, schools in China postponed the opening of school, and students could not attend school on time. In order not to affect students' learning, the Ministry of Education attaches great importance to this, requiring local education departments and schools to do a good job of "suspending classes without stopping learning" during the postponement of school opening, providing learning resources and learning support services for students, and helping to solve practical difficulties. For foreign students, it is even more difficult, because of the special circumstances of foreign students, online learning will encounter various problems, so the online learning situation of foreign students is worth studying<sup>[1-3]</sup>. This paper focuses on the online learning satisfaction of foreign students in Zhejiang University of Science and Technology, and mainly studies the situation of online teaching<sup>[4]</sup> after the beginning of the epidemic.

Online teaching is the inevitable product of the combination of the development of Internet technology and the reform of higher education. With the continuous improvement of China's international status, a large number of foreign students have been attracted to study, and the quality of foreign student education in colleges and universities has become an important theme. Students' satisfaction with teaching quality is related to the teaching quality level of colleges and universities, as well as the international competitiveness and reputation of higher education. Therefore, the study of online teaching satisfaction of foreign students during the epidemic period will help us understand the impact of online teaching on the teaching

level of Chinese universities and the international competitiveness of higher education, find out the problems of online teaching during the epidemic period, and also benefit the educational development of foreign students<sup>[5]</sup>.

### Models and indicators

#### 1. Model

Since the 1990s, scholars at home and abroad have constructed different customer satisfaction measurement models (SCSB). In 1985, Professor Zhao Ping of Tsinghua University established the China Customer Satisfaction Index (CCSI)<sup>[6]</sup>. In 1989, Sweden launched a nationwide customer satisfaction index model, which takes customer expectations, value perception, customer satisfaction, customer complaints and customer loyalty as variables. In 1996, Fornell *et al.* Established the American Customer Satisfaction Index (ACSI) model on the basis of SCSB, adding the variable of perceived quality. In 1996, Gronholdt *et al.* Established the European Customer Satisfaction Index Model (ECSI) based on the European situation.

This paper refers to the ACSI model, and considers the actual situation of online teaching during the epidemic period, adjusts the index system and scale, and establishes the online teaching satisfaction model of college students. The model has six variables: network influence, student expectation, perceived quality, student satisfaction, student complaint and student loyalty.

#### 2. The index system

According to the previous analysis, the online teaching satisfaction index system for foreign students in colleges and universities during the epidemic period is constructed (see Table 1).

**Table 1:** Online teaching satisfaction index system for international students in universities during the epidemic period

Level 1 indicator	Secondary indicators	Level 3 indicators	Evaluation point (variable)
Satisfaction of foreign students with online learning in foreign	Expectations of foreign students	Expectations of online courses	Q6. How high were your overall expectations for the course before it started?
		Teaching	Q7. Before the start of the course, how high do you think the

countries during the epidemic	Foreign students' perceived quality of learning	expectations	teaching quality of teachers' online courses will be?
		Teaching content	Q8. Teachers are well prepared for class and the teaching content is expanded. Q9. The amount of homework is moderate, and students' homework should be reviewed and feedback should be given in time.
		Teaching methods	Q10. Score the teaching form of the online course Q11. Interaction between teachers and students
		Teaching attitude	Q12. Teachers' friendliness and helpfulness to foreign students Q13. Do teachers treat students from different countries equally?
		Overall perception	Q14. Teachers have a wide range of knowledge and high academic level.
	Exotic network influence	Software impact	Q15 What apps do you use in class? Q16. Can the app used in class be opened in your country? Q17. Online course software scoring
		Internet speed affects	Q18. The Influence of Network Delay on Online Courses in Foreign Countries
	Satisfaction of foreign students	Quality of learning	Q19. Students have a high attendance rate in online classes and hardly violate classroom discipline. Q20. Class status when studying in a foreign country
		Classroom satisfaction	Q21. When studying in a foreign country, does jet lag affect the classroom state? Q22. The degree to which one's own customs and habits are respected in online classes
	Foreign students are loyal	Willingness to listen to online classes	Q23. Like the form of online classes, if allowed, more willing to take online classes.
		Students' feelings	Q24. How do you feel about not being able to learn and experience Chinese culture in China?

According to Table 1, the score of each question in the online teaching satisfaction scale for college students during the epidemic period is divided into 1-5 points. A total of 202 questionnaires were collected, of which 201 were valid, with an effective rate of 99.5%.

**Methodology and analysis**

Divide the scores into groups. The satisfaction score of 1-2 is divided into group 1, 2-3 is divided into group 2, 3-4 is divided into group 3, and 4-5 is divided into group 4 (the upper limit is not included, for example, 2 is in group 2, not in group 1). In general, scores in groups 1 and 2 indicate that students are not satisfied with online teaching, and scores in groups 3 and 4 indicate that students are satisfied with online teaching.

**1. Descriptive statistical analysis**

**1.1 Analysis of college students' satisfaction with online teaching from a gender perspective**

According to the questionnaire data, the satisfaction of foreign students of different genders to online teaching was obtained: the number of male students participating in the survey is nearly half more than that of female students, and the ratio of male to female is 6:4. There were 127 males and 75 females, and the number of males with satisfaction scores of 1-2 and 2-3 was 29, and the number of females was 16, and the number of males with satisfaction scores of 3-4 and 4-5 was 97, and the number of females was 59. Generally speaking, boys' satisfaction with online teaching is not much different from that of girls, and they are basically satisfied.

**1.2 Analysis of college students' satisfaction with online teaching from a national and regional perspective**

According to the questionnaire data, the satisfaction of foreign students from different countries and regions to online teaching is obtained. From the perspective of region, compared with foreign students from other regions, the proportion of foreign students from African countries who are not satisfied with the attitude of teachers is relatively high, and the proportion of students with satisfaction scores of 2-3 is 20.9% of the total number, while the satisfaction scores of other academic qualifications are 2-3, which is not much different from it. Generally speaking, 80% of the foreign students in all regions scored 3 and 4 points on the satisfaction of teachers' teaching attitude, indicating that the foreign students in each region are satisfied with teachers' teaching attitude. The reason for this situation may be that there are a large number of foreign students in Africa and Asia, and teachers can not take care of everyone, which leads to dissatisfaction among some foreign students, so some of the evaluation scores are low.

**1.3 Analysis of college students' satisfaction with online teaching from the perspective of software**

Table 2 is the average scores of foreign students after scoring the impact of network delay on online courses, online course software scores and online course forms.

**Table 2:** Grading table of different online course software and different forms of online courses

Software	QQ	Zoom	Tencent conference	Nail	Superstar	MOOC	Other
Average score	2.41	3.74	2.91	4.25	2.32	2.25	2.53
Teaching form	Live broadcast has no playback			The live broadcast has a replay		Record and broadcast	
Average score	2.38			4.1		3.39	

From the above average score, it can be observed that the online course software used by foreign students, whether it is QQ, MOOC, or other, their satisfaction with the online

course software is not very different, and their attitude is relatively low, but their satisfaction with the evaluation of nails and zoom is relatively high, reaching more than 3. The

reasons for these results may be: the network required by each software greatly affects the interaction between teachers and students, resulting in poor experience of students, resulting in low scores; The hardware adaptation of nails and zoom in this respect is very good, which helps to ensure the interaction between teachers and students, and can watch the course content repeatedly according to the needs of students, which is conducive to students' mastery of the course.

**2. Reliability analysis**

Reliability analysis, also known as reliability analysis, is used to measure whether the sample answers are reliable, that is, whether the sample really answers the questionnaire items. In this study, the Cronbach's alpha coefficient method was used to test the reliability of the recovered questionnaires.

The results show that the reliability value of the total scale is 0.89, and the reliability of the questionnaire is high. The reliability value of each subscale is above 0.6, indicating that the internal consistency of the questionnaire is good, and the scale has good stability and consistency.

**3. Validity analysis**

Validity analysis can be used to test the validity and accuracy of questionnaire design, and to measure whether the item design is reasonable. We conducted a construct validity analysis of the sample data, using the KMO and Bartlett tests to determine the suitability of the principal component analysis.

The KMO and Bartlett tests in this study show that the

KMO test values are  $0.874 > 0.7$ , and the Bartlett test shows that  $\text{Sig.} < 0.0001$ , indicating that the extracted principal component factors can represent the information of the original index variables to a large extent, and it is suitable to use the principal component analysis method to analyze the data.

**4. Principal component analysis determines weights and scores**

Principal component analysis aims to use the idea of dimensionality reduction to transform multiple indicators into a few comprehensive indicators, in which each principal component can reflect most of the information of the original variables, and the information contained is not repeated [7, 8].

The weight of each variable determined by the principal component analysis can be obtained by performing the following steps using SPSS software (see Table3):

1. Component coefficient = number of loads/square of the corresponding eigenvalue.
2. composite coefficient = (component 1 coefficient \* component 1 variance percentage + component 2 coefficient \* component 2 variance percentage + component 3 coefficient \* component 3 variance percentage + component 4 coefficient \* component 4 variance percentage + component 5 coefficient \* component 5 variance percentage + component 6 coefficient \* component 6 variance percentage)/cumulative variance percentage.
3. Weight = comprehensive coefficient/sum of comprehensive coefficients of all factors.

**Table 3:** Weights determined by principal component analysis

Question	Coefficient of component 1	Coefficient of component 2	Coefficient of component 3	Coefficient of component 4	Coefficient of component 5	Coefficient of component 6	Comprehensive Coefficient	Weight
Q6	-0.104	-0.017	0.249	0.138	0.101	-0.154	-0.0198	-0.0245
Q7	0.012	-0.045	0.212	-0.005	0.016	-0.038	0.0124	0.0154
Q8	0.163	-0.044	0.057	-0.095	-0.023	-0.077	0.0533	0.0661
Q9	0.097	-0.021	0.095	-0.043	-0.033	-0.201	0.0285	0.0355
Q10(1)	-0.057	-0.037	0.041	0.450	-0.092	0.041	-0.0017	-0.0022
Q10(2)	0.046	0.139	0.023	-0.086	-0.109	-0.129	0.0296	0.0368
Q10(3)	-0.126	-0.062	0.334	0.001	0.087	0.070	-0.0285	-0.0353
Q11	0.116	-0.034	0.124	-0.129	-0.070	-0.006	0.0395	0.0491
Q12	0.230	-0.053	-0.030	-0.147	-0.045	0.104	0.0783	0.0972
Q13	0.285	0.008	-0.224	-0.030	0.030	0.081	0.1097	0.136
Q14	0.261	-0.009	-0.186	0.007	0.032	0.017	0.0981	0.1216
Q17(1)	0-.098	0.217	0.026	0.077	0.023	-0.071	0.0074	0.0092
Q17(2)	-0.044	-0.056	-0.013	0.152	0.023	0.660	0.0188	0.0232
Q17(3)	0.065	0.103	-0.045	-0.137	-0.031	0.322	0.0526	0.0653
Q17(4)	-0.086	-0.017	0.005	0.507	-0.040	0.142	0.0006	0.0007
Q17(5)	-0.018	0.255	-0.063	0.020	0.009	-0.039	0.0391	0.0484
Q17(6)	-0.045	0.280	-0.062	0.048	0.079	-0.114	0.0349	0.0433
Q17(7)	0.058	0.235	-0.153	0.030	0.030	-0.067	0.0604	0.0749
Q18	0.024	-0.046	-0.005	-0.165	0.591	0.202	0.0405	0.0503
Q19	0.170	0.107	-0.235	0.218	-0.050	-0.105	0.0804	0.0997
Q20	-0.004	0.052	0.137	0.035	-0.032	-0.012	0.0201	0.0251
Q21	-0.082	0.052	0.079	0.018	0.563	-0.177	0.0108	0.0134
Q22	0.206	0.014	-0.076	-0.068	0.002	0.033	0.0823	0.1021
Q23	-0.150	0.005	0.334	0.008	-0.021	0.058	-0.0324	-0.0402
Q24	-0.027	-0.061	0.268	-0.329	-0.056	0.321	-0.0087	-0.0109

Finally, the satisfaction of each returned questionnaire is calculated by weight: the lowest score of 201 questionnaires is 1.29, the highest score is 4.94, and the average score is 3.386, which shows that college students are more satisfied with online teaching.

### Conclusion and recommendations

From the above analysis, gender has little impact on the satisfaction of online teaching of foreign students in universities, while the region where the foreign students are located has a greater impact, and the foreign students from African countries are more dissatisfied. Therefore, in view of the low satisfaction of foreign students from Africa, the school should seriously find out the reasons, focus on strengthening the construction of online teaching services, optimize the teaching service process, enrich the teaching service means, improve the efficiency of teaching services, and achieve all-round education.

In addition, online teaching recommends the use of Zoom and nails, in the form of live playback, so that foreign students can review the content of the class after class. At the same time, it can carry out various forms of teaching activities, change the form of classroom teaching, and increase the interest of learning and classroom interaction. The original teaching in the form of recording and broadcasting can adopt the form of live broadcasting, such as nail live broadcasting, to simulate the real teaching environment, ask questions and communicate in time, and enhance the interaction and intimacy. Live broadcasting should be set up in the form of playback to meet the needs of a large number of students.

In the construction of teaching service content, colleges and universities should adhere to the service demand-oriented, regularly investigate the service needs of students, expand teaching service projects, and meet the individual needs of students. At the same time, we should not only standardize the student training program, change the relatively loose learning and living habits of students in online teaching, cultivate the same rigorous and self-disciplined learning habits of students online and offline, but also pay attention to the training of existing in-service teachers, select some teachers to participate in different levels of training every year, change teachers' teaching concepts and improve them. So as to improve the teaching level of teachers.

### Acknowledgements

This research was supported by the General Project of Teaching Research and Reform of Zhejiang University of Science and Technology in 2022 (2022042824) .

### References

1. Guo Juan. An Empirical Analysis of Online Teaching Satisfaction and Its Influencing Factors during the Epidemic Period Taking Anhui Xinhua University as an Example. *Journal of Suzhou Institute of Education*,2020:23(3):75-78.
2. Li Decan. Investigation and Analysis of Online Chinese Teaching for Foreign Students in Guangxi Universities. *Guangxi Education*,2021:(23):28-30:35.
3. Shi Jinsheng, Wang Lufei. Survey on online Chinese language teaching for international students in colleges and universities in the context of COVID-19. *Language Teaching and Research*,2021:(4):11.
4. Tian Han. Survey and Analysis on Online Learning Satisfaction of Thai Students in Yunnan Normal University during the Epidemic. *Yunnan Normal University*, 2021, 12.
5. Chang J, Yuan Y, Wang D. Mental health status and its influencing factors among college students during the

epidemic of COVID-19. *Nan Fang Yi Ke Da Xue Xue Bao*,2020:40(2):171-176.

6. Gao Qun, Zhang Linying. University Satisfaction Index Model and Empirical Research. *Heilongjiang Higher Education Research*,2011:(11):132-134.
7. Jia Junping. *Statistics*. Beijing: China Renmin University Press, 2014, 298-318.
8. Xue Wei. *Data analysis based on SPSS*. Beijing: China Renmin University Press, 2016.