

# Establishment of Evaluation Index System of Online Classroom Teaching Quality for International Students in Universities and Countermeasure Research

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## ABSTRACT

The evaluation of online classroom teaching quality of international students is a key factor for colleges and universities to improve the quality of international student education. This article takes 200 international students of University of South China as the research object, and establishes an evaluation index system for the quality of online classroom teaching of international students in colleges and universities by analyzing five factors of teaching content, teaching process, teaching management, teaching facilities and teaching effect. Based on the questionnaire of 200 international students, this analyzes the main problems and reasons of classroom teaching, and provides countermeasures and suggestions such as enriching teaching content, adjusting teaching process, improving teaching management and service capabilities, strengthening the establishment of teaching staff, and enriching network resources. The research results provide ideas for the evaluation of online teaching quality for international students in Chinese universities and the improvement of the quality of online teaching for international students.

**Keywords:** *International students, Online classroom teaching quality, Evaluation index system, Factor analysis.*

## 1. INTRODUCTION

The international students, referred to overseas students in China, are defined as the students who are studying in the universities of China with foreign passports (not including Hong Kong, Macao and Taiwan) [1]. On the basis of the data of the Ministry of Education, a total of 397,635 international students came to China to study at 811 educational institutes in 2019. From 223,000 in 2008 to 397,000 in 2019, the number of international students has been growing rapidly. In consideration of the expanding scale of international students, Decree No. 42 and Decree No. 50 are issued by the Ministry of Education to guarantee the sustainable and sound development and improvement of international students' education in China, promote the assimilation of international students and Chinese students in management and service, and improve the teaching quality and teaching quality assurance system for international students.

At present, a number of colleges and universities excessively pursue the rapid growth of the international

students' scale, however the teaching quality has not been guaranteed accordingly, which results in the problems of teaching quality of international students [2]. According to a UN report, the spread of COVID-19 has caused significant damage to education systems around the world, which have influenced nearly 1.6 billion students worldwide, and made up to 99% students of income-poor countries suspend in schoolwork. Online teaching provides a method for international students studying at home that lessen the infection risk of COVID-19, whereas the quality of online classroom teaching for international students cannot be guaranteed. The improvement of online teaching quality of international students is based on the accurate evaluation of the teaching quality of international students in colleges and universities. Therefore, a set of reliable evaluation index system is necessary for evaluating the teaching quality of online teaching for international students in colleges and universities in order to find and solve teaching problems in time.

## 2. LITERATURE REVIEW

The establishment of a scientific evaluation index system is useful for better guaranteeing the evaluation results of teaching quality [3], and helpful for colleges and universities better carrying out the teaching work of international students. Both domestic and overseas scholars have done a large amount of research on it and established a variety of evaluation index systems [4], as

shown in Table 1.

Table 1 summarizes the research achievements of some representative classroom teaching quality evaluation systems and points out some shortcomings accordingly, which have laid a solid foundation for the establishment of the evaluation index system in this article. Previous researches on the classroom teaching quality evaluation system focus on the teaching quality of teachers and domestic students, while there are few

**Table 1.** Comparison in researches of classroom teaching quality evaluation index system

Author	View	Contributions	Deficiencies
Wang Junming, Guan Yuechen et al(2020)	Three first-level indexes: Teaching scheme, teaching strategy and teaching effect; Eight second-level indexes[5]	From students' perspective, the evaluation index system is established by using Delphi method, which provides an important basis for the evaluation of classroom teaching quality	The selected indexes are too few to obtain reliable evaluation results
Chen Yong, Chen Xiaolong, et al(2020)	Four first-level indexes: Project planning, resource allocation, project operation, project effectiveness Ten second-level indexes	Combined with the actual situation of international cooperation in secondary vocational education, KPI, SMART and Delphi methods are used to establish the evaluation index system	The sample size was too small with 3 secondary vocational schools selected, and the reliability and validity were not high enough
Gao Bingcheng (2019)	Four first-level indexes: Opportunities universalized, investment prioritized, quality optimized, and development equalized; Twelve secondary indexes[7]	It is a new perspective and attempt to establish the classroom teaching quality evaluation system with consideration on the regional differences in education	Limitation on data acquiring and lack of data typicality
Cheng Tiejun, Cheng Yakun et al (2018)	Four first-level indexes: Achievements of course learning, achievements of scientific research learning, achievements of communication and cooperation, and achievements of professional skills; Eleven secondary indexes[8]	On the basis of classroom teaching quality evaluation system existed, the achievements of students' course learning is added into the evaluation system	The selection criteria of indexes are not stated
Dong Guoyu, Qi Yingchun (2017)	Two first-level indexes: Quantitative and qualitative indexes; Six secondary indexes[9]	Analytic Hierarchy Process (AHP) used in the classroom teaching quality evaluation improves the research's reliability, objectivity and impartiality	The selected indexes are too few to obtain reliable evaluation results
Zhou Yongwei, Fan Hehua (2014)	Four first-level indexes: Teaching content, teaching attitude, teaching method/means, and teaching effect; Nineteen secondary indexes[10]	Combining factor analysis with analytic hierarchy process (AHP) to establish the evaluation index system makes the evaluation result more objective	The maneuverability of part the indexes is weak, such as full exploration of students' thirst for knowledge
Cai Hongmei, Xu Xiaodong (2014)	Five first-level indexes: Teaching effect, teaching content, teaching attitude, teaching quality and teaching method; Eleven secondary indexes[11]	Multivariate statistical method is used to explore the essential relationship between multiple indexes and establish a structured evaluation index system model	Difficulties in evaluating some influencing indexes, such as teaching quality
Song Reyu (2013)	Five first-level indexes: Teaching process, teaching content, teaching facilities, teaching management, teaching effect; Twenty-five secondary indexes[2]	The cultural background of international students is one of indexes of the classroom teaching quality evaluation system, which complements the insufficiency of the existing evaluation system	Secondary indexes are distinguished too detailed, which lead to the generation of repeat and strong correlation indexes
Robert J. Angell (2008)	Four first-level indexes: Education, employment, leisure, cost[12]	The indexes of Study and Employment affect the quality of classroom teaching mostly.	
Marsh H.W. (1987)	Nine first-level indexes: Examination, study, interpersonal harmony, teaching enthusiasm, group interaction, organization, width of knowledge, homework, homework quantity; Thirty-two secondary indexes[13]	The evaluation system of classroom teaching quality is established from multiple dimensionsl	

researches on the teaching quality of online class for international students. Although the patterns of educational management and services for Chinese and international students are similar, the online classroom teaching should be conducted in consideration on the characteristics of international students due to cultural differences between them. Therefore, on the basis of previous research results, this article improves the

**3. DESIGN OF ONLINE CLASSROOM TEACHING QUALITY EVALUATION INDEX OF INTERNATIONAL STUDENTS**

**3.1. Establishment of Index System**

A scientific selection and description of indexes should be on the basis of the principles of scientificity, emphasis, maneuverability and comprehensiveness. This article has been applied expert interviews(one-to-one in-depth interviews) and literature review to describe the indexes and define the scope of indexes; specifically, the methods of asking the experienced scholars, international education administrators and professional teachers, and making reference to related resources of existing classroom teaching quality evaluation system such as "classroom teaching evaluation data mining and analysis"[14], etc., have been applied to define the scope of indexes. With the evaluation indexes further refined, a complete description of 16 indexes is obtained finally, as illustrated in the Table 2:

**3.2. Research Methods and Tools**

In this research, 16 evaluation indexes were established to describe the online classroom teaching quality of international students in colleges and universities, which caused a large number of variables

in the analysis. Principal component analysis (PCA) can make use of dimension reduction technology to simplify data without the loss of the key information, which can solve the problem of excessive variables and lower the influence of useless information noise among indexes [15]. And the factor analysis method can illustrate the meaning of factors by rotation function on the basis of principal component analysis. SPSS software is adopted to invoke the results of principal component analysis and factor analysis.

**4. EMPIRICAL RESEARCH**

**4.1. Condition of International Students' Online Classroom Teaching in the University of South China**

The University of South China was qualified to recruit international students in 2007. In 2008, it undertook the task of 3-month technical training for 44 students from Azeliji Mining Co., Ltd., Niger, Africa. Since 2011 the university has officially enrolled and trained international students, and in 2020 it has passed the educational quality certification for international students by the Ministry of Education. Currently, there are more than 600 international students in the university, majoring in clinical medicine, engineering and humanities&social sciences. The education level of international students includes doctoral, master's, undergraduate and preparatory students. Then the requirements of formulating and revising the international students' online teaching program have been identified clearly, moreover, an assimilating, professional and differentiated online classroom teaching mode for international students has been exploring all the time.

**Table 2.** Description of online classroom teaching quality evaluation indexes for international students in universities

Sequence number	Indexes
1	The curriculum and teaching materials are in line with international standards
2	Adopt a combination of teaching and practice
3	The teaching content is systematic and substantial
4	Teachers can make use of inducing-mode teaching
5	Teachers correct homework carefully and answer questions timely after class
6	Teachers are full of spirit and good appearance in online classroom teaching
7	Teachers respect the cultural differences of international students
8	Teachers have good foreign language proficiency and expression ability (strong cross-cultural ability)
9	Teachers have a high quality of professional knowledge
10	Regular implementation of teacher-student teaching evaluation
11	Teachers make teaching plans according to students' actual situation and learning objectives
12	Use advanced teaching equipment and instruments in online classroom teaching
13	Abundant network resources in the school
14	Get excellent grades through studying
15	Cultivation of students' good studying habits
16	The classroom atmosphere is active and the interaction between teachers and students is frequent

**4.2. Data Collection**

This article adopts the method of questionnaire survey. The respondents of this questionnaire survey were international students of the University of South China, including undergraduates, postgraduates and doctoral students. A total of 200 questionnaires were distributed to international students who came from more than 30 countries in the University of South China. After removal of 66 invalid questionnaires, 134 valid ones were obtained with an effective recovery of 67%. Then SPSS software was applied to conduct factor analysis on the collected data. Likert 5-level scale was applied to describe the degree of conformity between the evaluation object and the indexes in the design of each question in the questionnaire. In the answers of questionnaire "1" means "strongly disagree" and "5" means "strongly agree".

**4.2.1. Reliability Test**

In this article, Cronbach's  $\alpha$  coefficient method will be selected to test the reliability of the questionnaire. Statistically speaking, if Cronbach's  $\alpha$  is less than 0.35, it means that the reliability of the scale is too low to be adopted, and it is not desirable. If  $0.35 \leq$  Cronbach's  $\alpha < 0.7$ , it is acceptable; If Cronbach's  $\alpha \geq 0.7$ , it indicates that the scale has high reliability. The reliability analysis results of the questionnaire in this article are shown in Table 3: Cronbach's  $\alpha$  coefficient is 0.855, greater than 0.7, indicating that the reliability of this measurement scale is high.

**Table 3.** Reliability statistics

Cronbach's alpha coefficient	Cronbach's $\alpha$ coefficient based on standardized terms	Number of terms
0.855	0.856	16

**4.2.2. Factor Analysis**

Factor analysis is a technique to simplify data. It studies the data structure by investigating the inner-relation existing among multiple variables, and then demonstrates the result with several hypothetical variables[10].

Before the factor analysis, KMO test was first conducted on the collected data, and then Bartlett test was used to detect whether the data was suitable for factor analysis (shown in Table 4).

**Table 4.** KMO and Bartlett Tests

KMO measure of sampling adequacy		0.795
Bartlett's test for sphericity	The approximate chi-square	842.979
	Degrees of freedom	120
	Significance probability p	000.

The test results showed that the KMO was 0.795 and the significance probability  $P < 0.001$ , which indicate that the data were correlated and suitable for the factor analysis.

Factor analysis was carried out on 16 items of the scale, and common factors were extracted by the method of maximum variance. According to the Table 5 (composition matrix after rotation), 5 common factors can be extracted from 16 indexes. The variables dominated by common factor 1 were 5, 6, 7, 8, 9; The variables dominated by common factor 2 were 1, 2, 3, 4; The variables dominated by common factor 3 were 14, 15, 16; The variables dominated by common factor 4 were 12 and 13; The variables dominated by the common factor 5 were 10 and 11. 5 common factor named according to its classification were "teaching content, teaching process, teaching management, teaching facilities and teaching effect". The predicted variances of the extracted 5 common factors are 17.41%, 15.964%, 14.133%, 11.497% and 10.375% respectively, which can explain 69.38% of the scale contents.

**4.2.3. Determination of Index Weight**

**4.2.3.1. Determination of First-level Index Weight**

First, Equation (1) is used to standardize the variance contribution rate of the five factors to keep the data within the interval of [0,1] to avoid the information difference caused by dimensional difference. Then, the weight of first-level index is calculated by Equation (2).

$$A = \frac{A_i - A_{\min}}{A_{\max} - A_{\min}} \tag{1}$$

$$M_i = \frac{m_i}{m_1 + m_2 + \dots + m_b} \tag{2}$$

$M_i$  is the weight of the  $i$  common factor to the overall target,  $m_i$  is the contribution rate of common factor to the overall target, and  $b$  is the number of extracted major factors ( $i = 1, 2, \dots, b$ ). Then the weights of five common factors were calculated: "teaching content (25.09%), teaching process (23.01%), teaching management (20.37%), teaching facilities (16.57%) and teaching effect (14.95%)".

**Table 5.** Composition matrix after rotation

	Composition				
	1	2	3	4	5
1 The curriculum and teaching materials are in line with international standards	-.132	.726	.239	.170	.111
2 Adopt a combination of teaching and practice	.012	.815	.132	.137	.007
3 The teaching content is systematic and substantial	.311	.766	.046	.098	.147
4 Teachers can make use of inducing-mode teaching	.172	.627	.305	.243	.012
5 Teachers correct homework carefully and answer questions timely after class	.678	.132	-.113	-.089	.311
6 Teachers are full of spirit and good appearance in online classroom teaching	.717	.072	.141	-.039	.211
7 Teachers respect the cultural differences of international students	.755	-.162	.199	.043	.113
8 Teachers have good foreign language proficiency and expression ability (strong cross-cultural ability)	.680	.032	.403	.209	-.183
9 Teachers have a high quality of professional knowledge	.688	.253	-.010	.128	.062
10 Regular implementation of teacher-student teaching evaluation	.195	.063	.242	.043	.849
11 Teachers make teaching plans according to students' actual situation and learning objectives	.229	.135	.172	.299	.763
12 Use advanced teaching equipment and instruments in online classroom teaching	.073	.242	.135	.851	.074
13 Abundant network resources in the school	.030	.223	.015	.819	.165
14 Get excellent grades through studying	.144	.230	.718	.305	.094
15 Cultivation of students' good studying habits	.038	.236	.814	.123	.173
16 The classroom atmosphere is active and the interaction between teachers and students is frequent	.210	.177	.757	-.239	.245

*(Note: extraction method is principal component analysis)*

**4.2.3.2. Determination of Secondary Index Weight**

The weight of the secondary index can be obtained by multiplying the result of the standardized scoring coefficient of the first-level index with the weight of the first-level index[16], the calculation formula is as follows:

$$N_{ij} = A_{ij} * M_{ij}$$

$N_{ij}$  is the weight of secondary indexes on their corresponding first-level indexes. The calculation results are shown in Table 6.

**5. CONCLUSION**

Through the analysis of this evaluation index system for the online classroom teaching quality of international students, the sum of the weights of teaching content, teaching process and management achieves to 68.47%, which suggests that administrative staff of colleges and universities must attach importance to the teaching content, teaching process and teaching management in the process of improving the teaching quality of online class for international students. In addition, compared with the traditional teaching quality evaluation index system, there are also differences in each specific index. Especially, it puts forward higher requirements for teachers' foreign language level, cross-cultural ability, abundant network resources in the school and other aspects.

**6. SUGGESTIONS**

The suggestions are proposed as follows:

**6.1. Enrich the Teaching Content**

When the colleges and universities make teaching plan for international students, in the precondition of satisfying the basic knowledge, the number of compulsory courses and elective courses can be adjusted to make the teaching arrangement flexible so that international students can have enough space for development to fully mobilize their enthusiasm and passion, and the enthusiasm and passion into the learning activities, on self-adjustment of learning progress and curriculum content according to their own learning foundation and individual career planning, in order to improve the learning effect. In addition, the selection of teaching materials should conform to international standards, and appropriate teaching materials should be selected to enhance the internationalization of course content.

**6.2 Adjusting the Teaching Process in Consideration of the Different Educational Backgrounds of International Students**

As international students come from different countries in the world, there are differences of their religious beliefs, social development level, openness of mind, educational background, cultural habits and so on.

The teaching process can be adjusted according to the specific differences, and different guidance teaching can be carried out according to the different cultural backgrounds of students, so that students can integrate into the new learning environment in a short time.

In addition, teaching should be taught in accordance with students' aptitude, according to the students' learning objectives to adjust the corresponding training programs, and adopt the way of combining teaching and practice.

**6.3. Improving the Ability of Teaching Management and Service**

The fundamental goal of international student education is to improve the quality of international student education, and the improvement of various systems should be centered on international students. The implementation of teacher-student evaluation measures can accurately reflect the actual teaching situation of international students, so as to improve teaching management and ensure the reliability of teaching quality evaluation results, which is essential for universities to formulate teaching programs related to

international students. Institutions of higher learning should strengthen information establishment, apply information technology to the teaching management and service of international students, so as to rapidly improve the information level of teaching business.

**6.4. Strengthening the Teaching Staff Construction and Improving the Teachers' Cross-cultural Ability**

Higher learning should take relevant measures, such as assessment and incentive, to protect and enhance the enthusiasm of teachers in teaching international students, so as to improve the teaching effect to a certain extent. Through regular training, communication and other forms, systematically improve teachers' foreign language level, enhance their cross-cultural ability, so as to enhance the internationalization level of teachers; At the same time, attention should also be paid to the construction of teachers for the basic courses such as Chinese and China Overview. We should strengthen the training, make scientific planning and reasonable allocation, and improve the development of international and domestic teaching ability.

**Table 6.** Weight value of evaluation indexes for teaching quality of international students in online class at all levels

	First-level Index Weight (%)	The Secondary Indexes	The Component Score Coefficient	Secondary Index Weight (%)
<b>Evaluation Index System of Online Classroom Teaching Quality for International Students</b>	Teaching Content /25.09%	The curriculum and teaching materials are in line with international standards	0.329	0.0604
		Adopt a combination of teaching and practice	0.407	0.0747
		The teaching content is systematic and substantial	0.390	0.0716
		Teachers can make use of inducing-mode teaching	0.241	0.0442
	Teaching Process /23.01%	Teachers correct homework carefully and answer questions timely after class	0.262	0.0426
		Teachers are full of spirit and good appearance in online classroom teaching	0.270	0.0439
		Teachers respect the cultural differences of international students	0.302	0.0491
		Teachers have good foreign language proficiency and expression ability (strong cross-cultural ability)	0.289	0.0470
		Teachers have a high quality of professional knowledge	0.291	0.0474
	Teaching Management /20.37%	Regular implementation of teacher-student teaching evaluation	0.592	0.1099
		Teachers make teaching plans according to students' actual situation and learning objectives	0.505	0.0938
	Teaching Facility /16.57%	Use advanced teaching equipment and instruments in online classroom teaching	0.526	0.0845
		Abundant network resources in the school	0.505	0.0812
	Teaching Effect /14.96%	Get excellent grades through studying	0.365	0.0460
		Cultivation of students' good studying habits	0.430	0.0542
		The classroom atmosphere is active and the interaction between teachers and students is frequent	0.390	0.0492

### 6.5. Enrich Network Resources

Institutions of higher learning should provide abundant and high-quality teaching resources and corresponding facilities in the process of developing teaching and training for international students. Especially in the case of the rapid development of this network world, we should take a free ride to enrich the school's network resources. As the epidemic is still spreading abroad, Institutions of higher learning should make more efficient use of online learning resources, especially high-quality learning resources, so as to improve the quality of online teaching.

### AUTHORS' CONTRIBUTIONS

Li Yuqiong guided, revised and translated the article; Zhou Ling wrote the article and analyzed the data; Duan Yuzhu translated the article; Zheng Zhenqiang designed the questionnaire and processed the data.

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