

Differential Research and Analysis of Online Instruction Satisfaction of Instructors in Different Majors

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Abstract:

Under the special background of the coronavirus epidemic, online instruction is in full swing all over the world. The academic structure, system construction, and thinking habits of different majors are different. The satisfaction of online instruction of different majors was studied, It is of great significance to improve the quality of online instruction. A questionnaire survey was launched on 8203 instructors from 105 colleges and universities in China. The six different majors of humanities, social sciences, natural sciences, technical sciences, medical sciences, and art design were divided into 18 influencing factors as the independent variable. Satisfaction was used as the dependent variable. The reliability and validity were tested and the statistical validity was good. The principal component dimensionality reduction analysis was carried out by using the multiple linear regression analysis method. And three main factors of users, inductors and external environment were considered. The analysis results show that overall satisfaction of each specialty ranks as humanities>natural sciences> social sciences> technical sciences> art design> medical sciences. In order to promote the quality of talent training, several suggestions are given through analysis. The managers need to further improve the management service level, and the instructors need to increase investment, adopt diversified guidance modes and increase interaction.

Keywords: *Online instruction, Satisfaction, Professional category, Difference analysis, Main factors*

I. INTRODUCTION

Under the special background of the epidemic, online education supported by information technology has played a key role, influencing and shaping the new form of college education teaching in the future. According to statistics, in 2020, 1.37 billion users in 138 countries are facing school suspension and online education[1]. As of May 2020, 1454 universities in China have launched online teaching, 1.03 million inductors have opened 1.07 million online education Courses, a total of 12.26 million courses; 17.75 million college users participated in online learning, a total of 2.3 billion person-times (Higher Education Department of the Ministry of Education of China, 2020)[2][3][4]. This is the largest scale of implementation, the most online courses, and the most extensive online teaching in Chinese history. It is

also a learning revolution in the field of education and teaching. College inductors' online teaching satisfaction is an important element that affects the sustainable development of online teaching. It is the key to whether the online teaching reform of Chinese colleges and universities achieves sustainable development in the post-epidemic era.

At present, relevant scholars have carried out researches on online education satisfaction from different angles. Wu Wei et al. carried out a study on the differences in online teaching satisfaction of higher education inductors between regions and institutions, and analyzed the different factors affecting user learning effectiveness and university inductors' satisfaction with teaching in different regions and different types of institutions [2], Wang Fang et al. focused on personality factors, teaching behaviors, and college types to analyze the impact of user learning effects and school satisfaction [5], Zheng Hong et al. conducted research on online teaching attitudes of college inductors in the post-epidemic era, inductors of different types, different natures, different ages, and different subjects have significant differences in their online teaching attitudes and willingness to improve teaching. It is proposed that the recognition of inductors' online teaching can be promoted from the aspects of university system, technical support and inductor themselves [3]; Ma Li Ping et al. analyzed the classroom interaction and classroom satisfaction in synchronous online teaching through fixed-effects model and other methods, and studied relevant course interaction factors that affect satisfaction [6]. Palmer (Palmer, S. R) and Holt (Holt, DM) believe that online education satisfaction should pay more attention to their own special factors, such as teaching comfort, technical proficiency, self-evaluation, etc. [7]; Lige (Bolliger, DV) and Oksana (Oksana, W.) believed that the analysis should be conducted from the perspective of the subject and object of education, focusing on factors such as inductors' own information technology application ability, user communication level, school policy support and work arrangements[8]. Hogan (Hogan, R. L.) and McKnight (McKnight, M. A.) believed that factors such as the teaching environment and technical support are the main factors affecting satisfaction [9]. In the analysis of inductor satisfaction with online teaching, it is also related to professional disciplines. Different majors have different academic attributes, core structures, system structures, and logical origins due to different disciplines[10][11]. There are also certain differences in the ways and methods of cultivating users' thinking. It is of great significance to study the satisfaction differences of online teaching of inductors in different majors and to improve and perfect the online teaching of different professional subjects and maintain the continuous development of online teaching.

II. RESEARCH METHODS

2.1 Survey Data

The research team divides various professional disciplines into six categories: humanities, social sciences, natural sciences, technical sciences, medical sciences, and art design. The humanities include philosophy, literature, history, and education; social sciences includes economics, management, and law majors; natural sciences include science majors; technical sciences include engineering and agronomy majors; medical sciences include medical majors; art design includes art majors.

The research team conducted online teaching surveys nationwide through questionnaires. 8,203 inductors from 105 colleges and universities in China participated in the survey. The data mainly includes the basic information of the respondents, online teaching satisfaction and its influencing factors. Basic information includes gender, subject and professional type. The sample data is shown in Table 1, male 46%, female 54%. Humanities 20%, social science 21%, natural science 15%, technical science 18%, medical science 14%, and art design 12%. Online teaching satisfaction can reflect inductors' evaluation of online teaching experience, and influencing factors can be used to analyze the main reasons for related inductor experience. The various factors of online satisfaction are used as independent variables to analyze the main reasons and differences of online satisfaction of inductors in different disciplines. Online teaching satisfaction is the dependent variable. The level of satisfaction reflects the inductor's experience evaluation of online teaching, as shown in Table 2. Using Likert's five-point method for scoring.

TABLE I. Basic information description of the sample

Basic information			Percentage (%)
Gender	Male	3785	46%
	Female	4445	54%
Subject	Humanities	1646	20%
	Social Science	1728	21%
	Natural Science	1235	15%
	Technology Science	1481	18%
	Medical Science	1152	14%
	Art design	988	12%

TABLE II. Sample feature description

Dimension	Variables	Average value	Standard deviation
Independent variable			
User	Degree of learning initiative	4.65	0.578
	Familiarity with online platforms and tools	4.67	0.564
	Frequency of learning feedback	4.45	0.631
	Good online learning habits	3.64	0.682
Inductor	Prepare lessons effectively according to the characteristics of online teaching	4.58	0.689
	Personalized design of teaching plan for online teaching	4.48	0.703
	Diversity of teaching resources	4.71	0.976

	Proficiency in the use of online platforms and tools	4.23	0.764
	Effectively organize classroom progress and make arrangements reasonable	4.75	0.552
	Online after-school tutoring	3.98	0.879
	The degree of interaction of online teaching	4.01	0.665
	Analyze student learning and teaching reflection through data	5.02	0.598
External environment	Class size for online teaching	4.52	0.706
	The stability of the platform operation and the fluency of the network	4.41	0.887
	Ease of use of tools	4.71	0.745
	Platform's support services for online teaching	4.65	0.663
	School policy support for online teaching	3.54	0.994
	School's training support for online teaching	4.79	0.723
Dependent variable			
Satisfaction	Online teaching satisfaction	4.32	0.635

Note: All items range from 1-5 points, 5 means very good, 1 means very bad

2.2 Analytical method

Use SPSS25.0 software to analyze the reliability of the six professional categories of humanities, social sciences, natural sciences, technical sciences, medical sciences, and art design. The Alpha values of the observed variables in each category are 0.951, 0.950, 0.949, 0.950, 0.948 and 0.947 respectively, all close to 0.950, indicating that the questionnaire is highly reliable. Using exploratory factor orthogonal variance maximization method for principal component analysis, KMO coefficient value is 0.949, Bartlett's sphere test reaches a significant level ($p < 0.001$), and the questionnaire survey has good reliability and validity. Using independent sample T-test and one-way analysis of variance, analyze the difference between online teaching satisfaction and professional subject types; then perform principal component analysis on the three dimensions of user, inductor, and external environment on 18 independent variables that affect online teaching satisfaction. Then use multiple linear regression analysis to analyze the reasons why different disciplines affect inductor online satisfaction.

III. RESEARCH RESULTS

3.1 Satisfaction of inductors in different professions

To analyse the differences in the satisfaction of different professional inductors, the single-factor analysis of variance is adopted. The various mean M and standard deviation SD are 3.96 (0.08) for humanities, 3.91 (0.011) for social sciences, 3.94 (0.08) for natural sciences, 3.90 (0.09) for technical sciences, 3.84 (0.014) for the medical sciences and 3.89 (0.012) for art design respectively. Which mean the satisfaction ranks as humanities>natural sciences>social sciences>technical sciences>art design>medical sciences. Different majors have significant differences in satisfaction with online teaching. The F value is 19.785, and the p value is less than 0.001. The humanities and natural sciences have higher satisfaction, while the technical sciences, medical sciences and art design have lower satisfactions.

3.2 Causes of differences in online teaching satisfaction among different types of colleges

The research group further analysed the factors affecting the differences in online teaching satisfaction among inductors of different majors. According to the 18 independent variable factors of the questionnaire survey, the method of summing and averaging is adopted, and the principal component analysis method is used for dimensionality reduction from the three dimensions of users, inductors, and external environment. The user dimension includes learning initiative, familiarity with online platforms and tools, frequency of learning feedback, and good online learning habits; the inductor dimension includes effective lesson preparation according to the characteristics of online teaching, personalized design of online teaching teaching plans, the proficiency of the platform and tools, the effective organization of classroom progress and the reasonable grasp of the arrangement, the online after-school tutoring and answering, the degree of interaction of online teaching, the data analysis of user learning and teaching reflection; the external environment includes the class scale of online teaching, and the operation of the platform, the stability and the fluency of the network, the convenience of using tools, the platform's support services for online teaching, the school policy's support for online teaching, and the school's training support for online teaching.

Through multivariate regression analysis of controlling professional variables, taking users, inductors, and external environment as independent variables, and online teaching satisfaction as the dependent variable, we explored the differences in online teaching satisfaction of inductors of different majors. Table 3 shows the influencing factors of online teaching satisfaction of 6 professional inductors. The VIF values are all less than 3, and the research observations are independent of each other (Durbin-Watson test values are 2.114, 1.998, 1.800, respectively), and the regression model has statistical significance. To analyse the influence of inductors' online satisfaction, the main factors for humanities majors are inductors ($p < 0.001$), the main factors for social sciences majors are inductors ($p < 0.001$) and the external environment ($p < 0.01$), and natural science majors are the main factors are inductors ($p < 0.001$), users ($p < 0.01$) and social environment ($p < 0.01$). The main factors for technical science majors are inductors ($p < 0.001$), users

($p < 0.01$) and social environment ($p < 0.001$), the main factors for medical science majors are inductors ($p < 0.001$), users ($p < 0.05$) and social environment ($p < 0.001$), and the main factors for art science majors are inductors ($p < 0.001$), users ($p < 0.001$) and social environment ($p < 0.001$).

TABLE III. Multiple regression analysis of factors affecting online teaching satisfaction

Professional Classification	Influencing factors	Coefficient (standard deviation)	T value	Significance level
Humanities	User	0.039 (0.084)	1.824	0.062
	Inductor	0.278 (0.079)	6.723	0.000
	External environment	0.201 (0.067)	0.792	0.208
Social Science	User	0.089 (0.056)	6.215	0.051
	Inductor	0.210 (0.016)	12.911	0.000
	External environment	0.198 (0.043)	10.825	0.007
Natural Science	User	0.045 (0.078)	3.325	0.003
	Inductor	0.098 (0.065)	8.453	0.000
	External environment	0.421 (0.073)	7.367	0.001
Technology Science	User	0.217 (0.085)	4.098	0.003
	Inductor	0.276 (0.064)	10.002	0.000
	External environment	0.207 (0.049)	7.334	0.000
Medical Science	User	0.048 (0.044)	4.105	0.011
	Inductor	0.064 (0.067)	13.911	0.000
	External environment	0.092 (0.082)	8.341	0.000
Art design	User	0.062 (0.063)	6.001	0.000
	Inductor	0.182 (0.071)	9.213	0.000
	External environment	0.332 (0.066)	4.889	0.000

IV. ANALYSIS AND DISCUSSION

4.1 Discussion

Through questionnaire surveys and statistical analysis, the satisfaction of online education for inductors of different professions is generally good. This is reflected in the unprecedented development of online education during and after the epidemic, but the overall satisfaction of inductors' online teaching is still lower than offline teaching. Some professional departments or some courses, such as online teaching and offline teaching, which are more suitable for teaching courses, have the same satisfaction level, indicating that although online teaching has great application and convenience, it cannot replace face-to-face due to the virtualization of time and space offline teaching. There are differences in the satisfaction of different

types of professional inductors in online education, and the influencing factors are also different.

The main factor that affects satisfaction with humanities majors is inductors, and their dependence on the external environment is not as strong as other majors. The roots of humanities disciplines focus on the depth of history, helping understand modern society and its future development, analyzing the difference of civilizations and cultures of various ethnic groups. It has a wide range of fields and mainly focuses on the academic level of inductors, teaching purpose, teaching design and organization. The online education does not rely strongly on external conditions support, so humane online education has the highest degree of satisfaction when the basic external environment conditions are available.

The main factors affecting satisfaction with social science majors are inductors and the external environment. Sociology is a science that targets social phenomena. Its task is to explain various social phenomena and their development laws. Therefore, the main factors of satisfaction are affected by the external environment. Online education cannot replace offline social research, social experience and social activities, so its satisfaction is not as high as in humanities.

The main factors affecting satisfaction of natural science majors, technical sciences, medical sciences, and art design are inductors, users and the external environment. Natural sciences are sciences that study the physical forms, structures, properties, and operating laws of the natural world. The main task is to understand the world and explore the changing laws of the material world. Certain theoretical explorations and experiments are required. Compared with natural sciences, technology Science majors emphasize engineering applications, use and transform the world, and highlight applied practices. The satisfaction of online education for natural sciences and technical sciences is lower than that of humanities and social sciences, and technical sciences are slightly less than natural sciences. The medical sciences and art design emphasize technology, practice, and a strict discipline comprehensive system structure. They also pay special attention to practice, internships, face-to-face interactions between inductors and users, and a sense of real experience to stimulate users' knowledge internalization, experience. Online teaching cannot create real learning and teaching situations, therefore, the satisfaction of these two majors is lower than that of other majors, and they rely heavily on experimental environments and experience scenarios.

4.2 Suggestion

Integrating the advantages of online and offline teaching, according to the characteristics of professional disciplines, classify and implement diversified online, offline, online and offline mixed curriculum models in stages, and build a system of different professional disciplines and different courses. The teaching model of different courses is a systematic design, taking full advantage of the characteristics of each major and each course, combining appropriate teaching methods, expanding teaching resources, making full use of teaching tools, building a system of courses, constructing interrelated online resources among similar courses. Some of them are used as the main course teaching for online teaching modes, some are used as auxiliary teaching modes, forming synergy between courses and teaching modes, and

each exerts its advantages to promote teaching reform.

To strengthen the in-depth interaction of the online teaching model and inductor input, the inductors play an important role in the online teaching of various professions. It is necessary to do a good job of teaching design, build resources suitable for the diversified and personalized development of users, and effectively implement online classroom teaching, design of in-depth interactive activities in the classroom, and follow-up feedback of teaching after class. Through online tools, video cases and other new forms of teaching resources, increase the degree of concern for users, strengthen process management, promote users' sense of learning experience, stimulate users' initiative, and at the same time, inductors and users promote each other to enhance inductors' sense of teaching achievement and passion, and achieve deep integration of teaching and learning.

Strengthen the support for online teaching. Compared with inductors of natural sciences and technical sciences, some inductors of humanities and social sciences need further training and guidance in the use of tools and platform; the service efficiency of the platform needs to be improved in an all-round way to help inductors of different professions. Make full use of good tools for teaching design and implementation, speed up the development of necessary virtual simulation teaching systems and teaching cases, and promote application-oriented professional teaching satisfaction and teaching effects through the combination of virtual and real, online and offline hybrid methods; comprehensively build a standardized teaching, management, and data analysis platform to manage teaching and learning data throughout the process and improve teaching feedback. It avoids the use of multiple platforms for the same course, breaks the barriers of each platform, and drives various professional courses. At the same time of teaching, it provides good support for building a new modern education ecology.

V. CONCLUSION

Through the survey and research of online teaching satisfaction of inductors of different majors, the differences and influencing factors of online teaching satisfaction of different majors are analyzed. Overall, the satisfaction of each discipline is relatively good, and the satisfaction of the professional disciplines which have requirements for experiments, practices and application scenarios are relatively low. Unlike other disciplines, the humanities disciplines are not as dependent on experimental conditions and material conditions as other disciplines, and their inductors' satisfaction with online teaching is relatively high. Through research and analysis, it provides suggestions for the follow-up online teaching of various disciplines, teaching reforms in universities and the improvement of talent training quality. Each professional can implement online, offline, online and offline diversified mode according to the characteristics of the discipline and curriculum systems. The teaching system of different disciplines forms a systematic teaching of different courses and the teaching of each course forms a positive force; inductors of various specialties should further increase teaching investment, prepare carefully in teaching design, provide diversified and personalized resources, and increase the in-depth interaction of users in the online teaching, reflect the individual guidance and take care for users before, during and after class in the

teaching process. In addition, the school's lessons are implemented through policy guidance, technical training, teaching ability improvement training, and teaching supervision. Comprehensive guidance, service and support of the online teaching is a systematic project. To improve work through different dimensions of schools, majors, inductors, and to promote teaching reform and the improvement of the quality of talent training, the key part is inductors. This study did not analyze the types of institutions as variables and there are also differences in the impacts of different majors. Through the follow-up in-depth analysis, we hope to provide accurate analysis basis and suggestions for the teaching reform of various majors.

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