

Online Teaching Satisfaction and Improvement Strategies Based on IPA Model: A Case Study of Modern Educational Technology Courses

Huaping Xu

School of Information Engineering, Yancheng Teachers University, Yancheng, China

Email: ycxhp@hotmail.com

How to cite this paper: Xu, H. P. (2022). Online Teaching Satisfaction and Improvement Strategies Based on IPA Model: A Case Study of Modern Educational Technology Courses. *Open Journal of Social Sciences*, 10, 510-524.

<https://doi.org/10.4236/jss.2022.1012035>

Received: October 24, 2022

Accepted: November 22, 2022

Published: November 25, 2022

Copyright © 2022 by author(s) and Scientific Research Publishing Inc. This work is licensed under the Creative Commons Attribution International License (CC BY 4.0).

<http://creativecommons.org/licenses/by/4.0/>



Open Access

Abstract

Scientific and reasonable evaluation results of online teaching satisfaction are of great significance to improve online teaching. Taking the public course of modern educational technology as a case, the research data and information were obtained through questionnaire and interview, and the IPA analysis method was used to carry out the evaluation of teaching satisfaction. The results showed that the overall satisfaction of online teaching was at the level of “relatively satisfactory”, and there was still some space for improvement. IPA four-quadrant analysis showed that students’ satisfaction with teachers’ professional knowledge and teaching attitude was the highest, while students’ satisfaction with online teaching resources, teacher-student interaction, and experimental teaching arrangement and effect was low. Based on the analysis of the reasons, the authors put forward countermeasures to strengthen the construction and application quality of online teaching resources, improve the content and arrangement of experimental teaching, and strengthen the effectiveness and enthusiasm of communication between teachers and students.

Keywords

Teaching Satisfaction, Online Teaching, IPA, Modern Educational Technology, The Teaching Reform

1. Introduction

As of July 2022, China has made significant achievements in the fight against COVID-19, but the fight against COVID-19 will not be completely over for a period of time in the future (Li, Xu, & Shao, 2022). In order to effectively prevent the spread of the epidemic and protect the health and safety of teachers,

students and staff, universities across the country have successively launched online teaching in accordance with the prevention and control requirements. How to promote the high-quality development of online teaching and improve the quality of online education services is increasingly becoming the focus of education reform. College students directly participate in higher education as consumers of education services and carriers of education quality, and their satisfaction with education has become one of the indicators to evaluate and measure the quality of running a school. It is of great practical significance to carry out research on college students' satisfaction (Yang & Zhang, 2016). Y University in J Province, as a local application-oriented undergraduate university, offered 1322 online courses and 3258 times during the COVID-19 epidemic in the first half of 2020. Two years later, due to the needs of regional epidemic prevention and control work, online teaching was conducted for nearly 4 months from February to June 2022, during which 1621 online courses and 4832 times were offered. Is the quality of online teaching satisfactory? What are the factors affecting online teaching satisfaction? Which of these factors should be maintained and which need to be improved? At present, the common methods involved in the study of online teaching satisfaction include: structural equation model (SEM), fuzzy comprehensive evaluation, factor analysis and so on. Few scholars use the importance performance analysis (IPA) to analyze online teaching satisfaction. This study uses IPA analysis method to test the students' perception of the importance of online teaching and the evaluation of their satisfaction, reveals the factors affecting online teaching satisfaction, and puts forward corresponding improvement strategies, in order to provide reference for the reform of online teaching mode in local undergraduate universities and provide research content of rich teaching satisfaction. This paper provides theoretical basis and practical guidance for maintaining and improving online teaching in the future.

2. Definition of Concept and Review of Research

2.1. IPA Analysis

IPA Analysis, namely, import performance analysis, obtains customer satisfaction by comparing the difference between the Importance of product or service indicators and the actual Performance perception, so as to determine the priority of improving the factors affecting service quality. As the basis for adjusting the business strategy and improving the efficiency of resource allocation. The IPA analysis chart is divided into four quadrants: the first quadrant is the dominant area with high importance and high satisfaction; The low importance and high satisfaction in the second quadrant was the maintenance area. Quadrant III was a weak area with low importance and low satisfaction (Zeng, 2017). The general steps of the IPA method to analyze the satisfaction of online teaching are as follows: first, the selection of evaluation indicators, and the scores of students' satisfaction and importance of each evaluation indicator are obtained through

questionnaires; Second, with importance as the abscissa and satisfaction as the ordinate, the IP axis was constructed. Thirdly, the mean value of importance and satisfaction was taken as the midpoint to divide the four quadrants of the coordinate axis. Fourth, the position of each evaluation index in the coordinate system was determined according to the score. Fifth, the evaluation indicators were analyzed according to IPA theory, and conclusions and countermeasures were drawn.

2.2. Satisfaction with Online Teaching

The concept of teaching satisfaction is derived from the American Customer Satisfaction Index (ACSI) (Wang, 2018). Customer satisfaction refers to the subjective evaluation and feeling that customers' consumption needs are satisfied after purchasing a product or service. Teaching satisfaction refers to students' experience of teaching and the degree to which learning expectations are met. If learning expectations are met, it will positively promote students' learning motivation. Online teaching satisfaction refers to the evaluation and satisfaction degree of students on the content, mode, process and quality of teaching, teachers and environment in a wide range of online teaching (Qian, Wang, & Song, 2021).

2.3. Review of Influencing Factors of Online Teaching Satisfaction

From the static structure, teaching is the activity that the teacher teaches the teaching content to the students. Without any one of the three, the teacher, the student and the content, it can not be called teaching. From the dynamic perspective, besides the above elements, teaching also includes the four elements of teaching purpose, method, media and teaching, which are inevitably involved in the dynamic operation of teaching (Li & Su, 2003). Combined with IPA theory, this study discusses four factors including teachers, courses, interaction and platform from the perspective of dynamic and static combination.

1) Teacher Factors

The role and positioning of online teaching teachers have also changed greatly. Teachers have become creators of learning Spaces, facilitators of learning processes, excavators of learning resources, leaders of educational technologies, resonators of teaching scenarios, reflectors of classroom effects, service providers of task completion, and evaluators of growth goals (Xia, Li, & Liu, 2021). According to He et al. (2021) teachers' attitude positively influences students' learning experience. Zuo et al. (2021) believe that the improvement of teachers' teaching skills affects the teaching quality of online open courses and learners' satisfaction. Li Baoli (2016) used structural equation model to find that the teaching ability of teachers and teaching assistants in blended learning environment plays an irreplaceable role in cultivating students' self-efficacy and is an important factor affecting learning satisfaction. Wang and Yang (2016) believe that teaching style has the most significant influence on teaching satisfaction.

Therefore, teachers' teaching attitude, professional knowledge, teaching methods and organizational ability of online teaching all positively affect the effect of online teaching, and then affect the satisfaction of online teaching.

2) Curriculum Factors

Curriculum is the basic basis for online teaching activities and the main source for students to acquire knowledge. Through structural equation analysis, [Eom et al. \(2006\)](#) believe that curriculum design has a significant impact on online effective learning. Through comparative analysis, [Wu et al. \(2020\)](#) found that course content has a practical impact on students' learning satisfaction by improving their professional ability. [Zhao and Li \(2020\)](#) constructed the satisfaction equation of college English online teaching and showed that whether college students' perceived learning experience of online courses had significant effects on the improvement of their English language knowledge and ability would significantly affect students' perceived value and indirectly affect students' satisfaction with the courses. [Qin et al. \(2020\)](#) emphasized that online education should carry out systematic curriculum design according to the theoretical connotation of different disciplines, and different disciplines should adopt targeted and improved teaching organization form, content structure and teaching concept, so as to improve students' continuous learning willingness and learning satisfaction. [Li and Cui \(2018\)](#) used the binary choice model to find that the course assessment system of economic management majors, including the assessment focus, the sub-score system and the assessment method, affected students' evaluation of the outcome control link and thus affected students' satisfaction.

3) Platform factors

Online teaching platform is the medium to carry out online teaching activities. [Xia Qingsong \(2021\)](#) believes that students' perceived usefulness of online teaching platform has a significant positive impact on their willingness to continue using online teaching platform, and the perceived usefulness of teaching platform can indirectly affect their willingness to continue using online teaching platform through subjective norms and satisfaction respectively. [Yong Wenjing \(2018\)](#) found that students' information technology skill level, e-learning space system design, e-learning space curriculum design, and e-learning space expansion resources can all positively predict students' teaching satisfaction.

4) Interaction Factors

From the perspective of information theory, interaction is the two-way information transmission among various elements in the system. The interaction in online teaching should be the interaction between students and teachers, between students and the interaction between students and the content ([Wang et al., 2014](#)). The role transformation of teachers and the non-intellectual support of teachers in teaching activities, including interaction, can help learners improve their learning satisfaction ([Zhang & Sun, 2022](#)). Through empirical research, Bowie found that teacher-student interaction is an important factor af-

fecting the development of college students, and student development is significantly correlated with student satisfaction (Bao, 2014). Guo Juan (2020) pointed out through factor analysis that the interaction between teachers and students in the teaching process, teachers' teaching preparation, learning time and students' participation has different degrees of influence on online teaching satisfaction.

3. Research Design

3.1. Sample Selection

In this study, sophomores and juniors of normal majors, such as mathematics, physics, chemistry, music and biology, who are offering modern educational technology courses in the spring semester and the autumn semester of 2022 in the university of the author, are selected as the research objects.

3.2. Research Methods

According to the factors influencing students' online teaching satisfaction determined by literature research, a questionnaire was designed. The questionnaire was in the form of five-level Likert scale, and the data were collected through online questionnaire. The scale of importance of the questionnaire was 1 - 5 (1 being "very unimportant" to 5 being "very important"), and the scale of satisfaction was 1 - 5 (1 being "very unsatisfied" to 5 being "very satisfied"). Part I of the questionnaire: Demographic characteristics such as gender, major, online teaching method and online teaching platform. In the second part of the questionnaire, 20 questions were set respectively to measure the importance and satisfaction evaluation of students on each influencing factor index. The method of random sampling was adopted to carry out the investigation. A total of 226 online questionnaires were received, and the invalid questionnaires with more than 2 missing items, obvious question and answer rules and short total answer time were excluded, and 203 valid questionnaires were left.

The online statistical analysis software SPSSPRO was used to analyze the students' perception of importance and satisfaction through descriptive statistical analysis, mean value and standard deviation. The mean values of 20 examined feature items were mapped to the IPA chart in the form of coordinates, the IPA quadrant chart was drawn, and the results were analyzed and discussed using the importance—performance model.

3.3. Evaluation Index System

Based on the outstanding problems existing in online teaching, literature research results and expert interviews, the evaluation index system of students' satisfaction with online teaching is preliminarily designed. Then, the index system is adjusted and improved through pre-survey. Finally, four dimension factors with a total of 20 index items are determined, as shown in **Table 1**.

Table 1. Evaluation index of online teaching satisfaction.

The target layer (A)	Element layer (B)	Indicators (C)	
Online Learning Student Satisfaction (A)	Teacher Factors (B1)	Teachers' Teaching attitude (C11)	
		Teachers' professional knowledge (C12)	
		Teachers' Teaching Language Expression and Style (C13)	
		Organizational ability of teachers in Online Teaching (C14)	
		Teachers' ability to teach via online broadcast (C15)	
	Curriculum Factors (B2)	Rationality of course hours (C21)	
		Innovative and substantial course content (C22)	
		Course Tasks and Nature (C23)	
		Improvement of Students' Professional Ability by Course Content (C24)	
		Textbooks Selected for the Course (C25)	
		Online Learning Resources for the Course (C26)	
		Assessment Methods of Courses (C27)	
	Interaction Factors (B3)	Teachers' preparation before class and reasonable assignment of learning tasks (C31)	
		Communication and interaction between teachers and students (C32)	
		Student-student Communication and Interaction (C33)	
		Division, Depth and Difficulty of Teaching (C34)	
		Teaching Methods Used in Online Teaching (C35)	
	Platform Factor (B4)	Arrangement and Effect of Experimental Teaching Activities (C36)	
		Operation of teaching Platform and related software (C41)	
			Flow Degree and Stability of Network Environment (C42)

4. Research Results

4.1. Descriptive Statistical Analysis

Firstly, the reliability of the questionnaire data was analyzed, and Cronbach's α coefficient was >0.95 , indicating that the reliability of the questionnaire was high. Secondly, from the perspective of basic information, the proportion of female subjects in this survey is 60.12%, which is related to the high proportion of female students in normal education majors. From the perspective of teaching methods, 93.64% of the subjects participated in online live teaching; University MOOC and Tencent conference were the main online teaching platforms, accounting for 96.53% and 85.55%, respectively (see **Table 2**).

4.2. Evaluation of the Importance of Online Teaching Satisfaction Index

This study measured the mean and standard deviation of the importance of online teaching satisfaction index, as shown in **Table 3**. The average importance score of the 20 online teaching satisfaction indicators was 3.84 - 4.41, which reflected that students generally had a high perception of the importance of these

indicators, and most of them were between “important” and “very important”. Except for teachers’ live online teaching, the standard deviations of the other 19 indicators were all less than 1, indicating that students’ opinions and attitudes were less biased. The three indexes with the highest average scores were teachers’ teaching attitude (C11), arrangement and effect of practical teaching activities (C36), novelty and enrichment of curriculum content (C22), and nature and task of curriculum (C42). The average scores of teachers’ professional knowledge (12) and online learning resources (26) were high, and the standard deviation was small, indicating that students’ recognition was high. Socialism with Chinese characteristics has entered a new era, endowing teacher education with new characteristics, new mission and new requirements (Cai & Zhang, 2020). According to these top indicators, students have higher requirements for teachers’ online teaching activity design, and more urgent expectations for modern educational technology courses to improve their own ability and quality.

4.3. Evaluation and Analysis of Online Teaching Satisfaction

Through the measurement of the learning satisfaction of online teaching students, the measurement results are shown in **Table 3**. The average score of 20 perceived satisfaction items was 3.93 - 4.510. Compared with the online learning expectations of online teaching students, most of the perceived satisfaction

Table 2. Basic information of the surveyed students.

Items	Options	The percentage (%)
Gender	Female	60.12
	Male	39.88
Professional	Mathematics	30.09
	Physical	30.64
	Chemical	20.23
	Biological	19.05
Online Teaching Methods	Live online teaching	93.64
	SPOC	78.61
	Autonomous learning	57.23
	Task driven	47.98
	Other	7.51
Online Teaching Platform	WeChat group	78.04
	LAN MUYUN class	67.63
	The rain classroom	15.03
	Tencent meeting	85.55
	University MOOC	96.53
	Other	3.47

Table 3. Evaluation of students' satisfaction with online teaching.

Index layer (C)	Importance (I)		Satisfaction (P)		P-I
	The mean	The standard deviation	The mean	The standard deviation	The mean difference
Teachers' teaching attitude (C11)	4.41	0.73	4.34	0.80	0.07
Teacher's expertise (C12)	4.21	0.67	4.51	0.76	0.30
Teachers' Teaching Language Expression and Style (C13)	4.14	0.73	4.02	0.86	0.12
Organizational ability of teachers for online teaching (C14)	4.16	0.86	4.14	0.86	0.02
Teachers use live streaming and on-camera teaching (C15)	4.2	1.05	4.16	0.85	0.04
Course hours setting (C21)	4.18	0.66	3.98	0.92	0.2
Innovative and informative course content (C22)	4.31	0.99	4.18	0.76	0.13
Course Tasks and Nature (C23)	4.27	0.89	3.97	0.86	0.30
How Course Content Improves Students' Professional Ability (C24)	4.15	0.85	4.36	0.82	0.21
Textbooks selected for the course (C25)	4.12	0.77	4.10	0.76	0.02
Course Supporting Online Learning Resources (C26)	4.22	0.54	3.93	0.74	0.29
Methods of Assessment and evaluation of courses (C27)	3.84	0.86	4.02	0.66	0.18
Teachers prepare before class and assign learning tasks reasonably (C31)	4.23	0.73	4.22	0.82	0.01
Communication and interaction between teachers and students (C32)	4.22	0.66	3.96	0.74	0.26
Student to student Communication and interaction (C33)	4.18	0.94	4.33	0.78	0.15
Division, depth and Difficulty of Teaching (C34)	4.25	0.82	4.26	0.72	0.01
Teaching Methods used in Online teaching (C35)	4.18	0.65	4.28	0.85	0.10
Arrangement and Effect of Experimental Teaching Activities (C36)	4.33	0.98	4.12	0.69	0.21
Operation of Teaching Platform and Related Software (C41)	4.15	0.87	4.13	0.81	0.02
Degree of flow and stability of network environment (C42)	4.02	0.82	4.12	0.75	0.10

scores were lower, indicating that there were differences in the perceived satisfaction and importance of online teaching factors. According to **Table 3**, teachers' professional knowledge (C12), improvement of students' professional ability by course content (C24), teachers' teaching attitude (C11), and student-student communication and interaction (C33) are the most prominent items in the evaluation of students' satisfaction, indicating that teachers have a good teaching attitude. In the process of teaching, teachers can make active and full preparation before class, highlight the key points and difficulties in the teaching process, and students have a good grasp of the degree of learning, and assign corresponding learning tasks after class, so that students have a good experience of online learning. The indicators with low ranking were online learning resources (C26), communication and interaction between teachers and students (C32), online learning resources (C26), and arrangement and effect of experimental teaching activities (C36). At the same time, the standard deviations of these items are high, indicating that there are differences in students' recognition (see **Table 3**).

4.4. IPA Analysis of Online Teaching Satisfaction

IPA analysis of the research data showed that the overall mean values of importance and satisfaction were 4.13 and 4.21, respectively, indicating that the overall satisfaction of online teaching was relatively high. With importance as the vertical axis and satisfaction as the horizontal axis, the coordinate system was established, and the mean of importance and satisfaction as the coordinate origin, and the IPA analysis chart of online teaching satisfaction was obtained as shown in **Figure 1**.

Figure 1 shows that C11, C12, C22, C31, C34 and C15 have 6 variables distributed in quadrant I, which is the “dominant area” with high importance and high satisfaction evaluation. These feature items are teachers’ teaching attitude, teachers’ professional knowledge, curriculum content enrichment and novelty, teachers’ preparation before class and assignment of learning tasks, and teachers’ use of online live teaching. However, considering the mean difference of each observed variable in **Table 3**, although the above variables are the advantages of online teaching satisfaction, there is still some gap between them and students’ expectations. Although this area belongs to the “continue to maintain” area, the teaching team should not be satisfied with maintaining the status quo, and should innovate and develop in the future to give full play to the efficiency and improve the satisfaction of online teaching.

Quadrant II is the “maintenance area”, which has low importance and high satisfaction evaluation, including C24, C33, and C35, which are the improvement of students’ professional ability by course content, the communication and interaction between students, and the teaching method used in online teaching. For these variables, students’ satisfaction with their online teaching is of low importance, but the actual satisfaction is high, which can maintain the status quo in the short term.

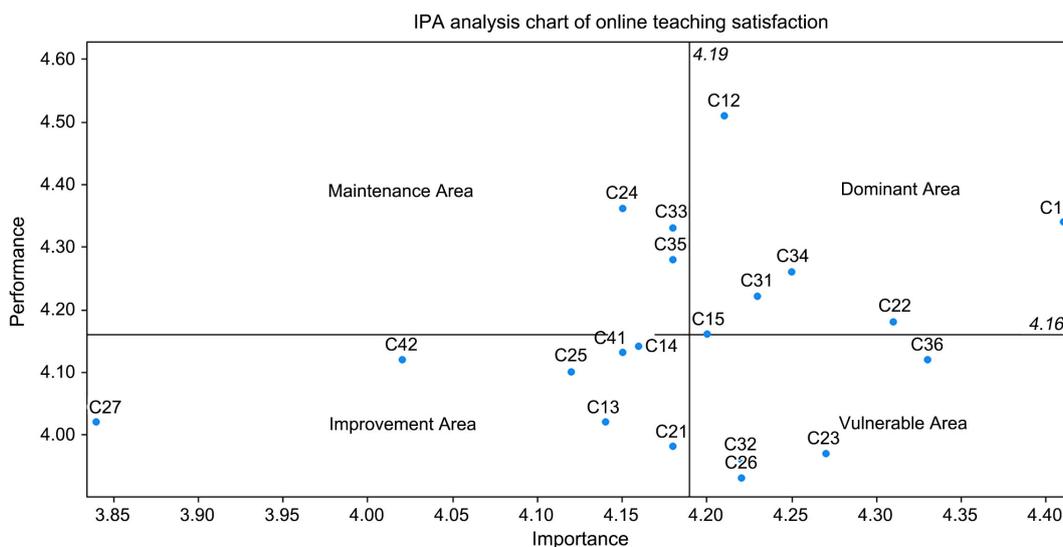


Figure 1. IPA analysis chart of online teaching satisfaction.

Quadrant III is the “improvement area”, which has relatively low importance and satisfaction, including C13, C14, C21, C25, C27, C41 and C42 in this area. Specifically, it is teachers’ teaching language and style, teachers’ online teaching organization ability, textbooks selected for the course, assessment and evaluation methods of the course, teaching platform and related software operation, fluidity and stability of the network environment. The indicators in the region have great room for improvement. Since students do not pay high attention to these variables, they can be improved on the basis of key improvement items.

Quadrant IV is the “vulnerable area” area, which has high importance but low satisfaction, including C23, C26, C32, and C36 in this area. The details are the task and nature of the course, the online learning resources supporting the course, the communication and interaction between teachers and students, and the arrangement and effect of practical teaching activities. This means that students believe that there are some gaps and deficiencies in the online learning resources, interaction between teachers and students, and experimental teaching links with their expectations or with the task and nature of the course, which should be improved.

5. The Main Problems of Online Teaching

5.1. The Construction and Application of Online Teaching Resources Are Not Perfect

Online teaching resources include online courses, online classes, online courseware, etc., which are the basic conditions for online teaching. Compared with the traditional centralized classroom learning in schools, the online learning conducted by students at home has the characteristics of development, autonomy, collaboration and delay, which also puts forward higher requirements for the construction of online teaching resources (Zhang, 2020). Online teaching resources present some diversified characteristics in content and form, but they are mainly PPT, text and teaching video. Although some resources are well constructed, due to various reasons, there are problems such as lag in updating and outdated content, and some online resources are not attractive enough to students. At the same time, due to the large variety and number of various resource platforms, a “hundred flowers bloom” situation is presented, which is distributed in various network platforms, and it appears to be miscellaneous, messy, multi-tasking and with a high repetition rate, which greatly wastes the cost of time and energy for students to find and obtain resources (Chen, 2020).

As a public course for the students, not according to the student’s professional design targeted teaching resources, such as micro class make online teaching cases as eighth grade last semester language text makes to the fortress, for the students in the science normal specialty such as physics, chemistry, such as content of online teaching resources and teaching actual demand derailment, and students’ learning needs derailment. In the interview, some students put forward that “online teaching videos are recorded by multiple teachers with different

teaching styles, some of which are flat and direct, some of which are humorous”. Some students said that “the teaching of theoretical content of online teaching videos is short in time and full of content, and there is no time for digestion and understanding, which makes it difficult to hear. Unlike offline teaching, teachers will pause and give examples in key and difficult parts”, some students said that “some teaching videos can be as short as a few minutes or as long as tens of minutes. When you want to learn in your spare time after class, you are willing to click on the long video to watch”. This reflects the lack of full understanding and grasp of the characteristics of students’ online learning during the construction of online teaching resources, which leads to a large gap in students’ expectations and satisfaction with online learning resources.

5.2. Online Experimental Teaching Is a Shortcoming That Restricts Teaching Satisfaction

The modern educational technology course aims to enable normal university students to receive information teaching training in the pre-service stage through course learning, improve their technical literacy, and master the ability of designing, developing and using educational information resources. Experimental teaching is an important way to improve students’ ability. It is natural for students to place high hopes on the arrangement and effect of experimental teaching activities through the learning of curriculum nature and tasks as well as personal understanding. Combined with the interview, there are two main factors that restrict the satisfaction of experimental teaching. The first is objective factors. As a result of online teaching concerning the operation of the scanner, multi-function copiers and use, wisdom is recorded and display technology, the operation of the electronic whiteboard and use online experiment link could not be forced to cancel or substitute in the form of lectures, interviews with students “have been looking forward to the classroom the teacher took us to the school the future experience the feeling of the future, However, because of the online teaching, it was cancelled, and I felt a little regretful”. Experiments involving group collaboration, such as micro-class development and animation resource development, are conducted online, which put forward higher requirements for teachers and students’ teaching and learning abilities. Second, there is insufficient experience in online experimental teaching. Some teachers lack experience in organizing online experimental teaching efficiently, and they need to make up for the shortcomings in experimental teaching methods, content, resource selection and application.

5.3. Online Teacher-Student Communication and Interaction Are Slightly Insufficient

Although online teaching breaks through the spatial and temporal limitations of traditional teaching, the information exchange between teachers and students relies more on online teaching platforms and social media. Due to the integra-

tion of theory and practice in the curriculum, students need to communicate with teachers before, during and after class about the difficulties encountered in the process of newly learned educational technology theories or experiments. The communication usually relies on WeChat group and QQ group, and the communication between teachers and students is easily disturbed by other information and topics in the group. In particular, some students or old teachers need others' online assistance when they operate the software, and the communication between teachers and students is often inefficient. Therefore, the online communication between teachers and students poses a higher challenge to the expression ability of students and teachers, as well as the skills and technology of network communication. Because some teachers regard online teaching as a temporary state or transition period, they will ignore the emotional communication between teachers and students and simply complete knowledge transfer. Technically, students' facial expressions, body language and body movements are easy to be ignored because teachers and students sit apart from each other in online teaching, which leads to students' boredom, fatigue and alienation, and then affects the effectiveness of students' online teaching (Tian & Du, 2022).

6. Improvement Strategies Based on Online Teaching Satisfaction

6.1. Build High-Quality Online Teaching Resources with Multi-Efforts and Multi-Measures

Resources are an essential element throughout the whole process of online teaching, and their construction and application cannot be separated from the participation of all parties. At the school level, we should establish and improve the normal access, monitoring and elimination mechanism of online teaching resources, strengthen the construction of campus digital resources, and accelerate the integration of teaching platforms. Schools should continue to promote the construction of school-based teaching resources according to their own resource endowment and professional characteristics, use big data technology to integrate all kinds of existing online teaching resources, follow the survival of the fittest rule, discard outdated and backward resources, and integrate advanced and innovative resources. In the course team construction process, the responsibility system should be effectively implemented to ensure the order and sustainability of online education resources construction. From the perspective of teachers, firstly, resources should be fully recognized as the basis for students to explore and construct knowledge in online learning, and the importance and particularity of online teaching resources should be recognized, so as to establish correct concepts. Second, theoretical learning and experience exchange related to the construction and application of online educational resources should be carried out regularly. Only by constantly improving their theoretical literacy and resource construction and application ability can they effectively use these resources in daily teaching work.

6.2. The Combination of Point-Line, Virtuality and Reality Should Be Combined to Improve the Online Experimental Teaching

Online teaching seems to be a response to the epidemic. In essence, it is the adaptation of education to the requirements of the era of mobile Internet and big data, and it is the decomposition and reconstruction of basic elements of teaching after the change of teaching platform. Online experimental teaching should take the initiative to adapt to the changes of The Times and make active adjustments and improvements in various elements. Taking the course of modern educational technology as an example, the main line of training students' abilities in the design, development, application and evaluation of information teaching resources is grasped, and the original offline relatively independent experimental content is decomposed. Micro-experiments are made according to knowledge points and skill points, which are convenient for students to preview before the experiment and practice after the experiment, and realize a new teaching mode in which students can control the content, method, degree, progress and rhythm of the experiment independently. It is conducive to students to make full and effective use of extracurricular and in-class time, and improve the experimental learning effect. Online teaching based on virtual simulation experiments can effectively break the limitations of physical experiments, including the conditions of site and equipment, and is a hot new teaching model at present. With the support of information technology, online teaching can try to virtualize part of the experiments originally needed to be carried out in the physical environment, create a futuristic curriculum environment, flexibly integrate subject elements, and build a virtual subject laboratory.

6.3. Multi-Angle and Teacher-Student Collaboration to Improve the Effectiveness and Enthusiasm of Interaction

Interaction is a process of information exchange between teachers and students. From the perspective of methods and skills, the first is to flexibly play its advantages in exchange and interaction according to the characteristics of the respective network interaction platform. For example, when students encounter difficulties in practice, teachers can set up temporary meeting rooms or groups for two-way video calls or desktop sharing, which can not only avoid interference but also improve the effectiveness of interaction. When discussing and exploring a topic, a discussion thread can be set up for open discussion and free speech. The second is to pay attention to the pertinence of interaction, grasp the learning situation of students through the online teaching platform, carry out personalized interaction for students, and provide individualized learning support. In order to improve the effectiveness of teacher-student interaction from the perspective of ideology and mechanism, it is also necessary to improve students' learning initiative, help students overcome their own inertia, and encourage students to actively interact with teachers and other students by improving the evaluation system and other measures. From the perspective of sustainability, the teacher should pay attention to the study course and sorted out the common

problems of summary, build online knowledge base, guide the student to consult the knowledge base to solve the problem when meeting difficulties, not only part of the interpersonal interaction can be transferred to people and interactive platform, and more time and energy can be saved for the interaction between teachers and students. Finally, by paying attention to the role of emotional factors in the interaction between teachers and students, teachers can narrow the psychological distance between teachers and students through encouraging words, humorous and kind language, so as to promote students to be more engaged and actively participate in online teaching.

7. Shortcomings and Prospects

In this study, the IPA analysis method is used to evaluate the importance and performance of a certain index for the same respondent, resulting in the instability of the measurement results, and there may be some risks in the method. The data collection of the study was affected by the course opening plan of colleges and universities, and did not cover students of different disciplines such as liberal arts, science, physical education and art. The representativeness of the research data can be further improved.

Conflicts of Interest

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

References

- Bao, W. (2014). Measurement of College Satisfaction of College Students and Analysis of Its Influencing Factors. *Education Development Research*, 3, 22-29.
- Cai, Z. Y., & Zhang, H. J. (2020). Practice Path of “New Normal” Education in Local Undergraduate Normal Colleges. *Journal of Xingtai University*, 2, 50-53.
- Chen, Z. W. (2020). The Predicament and Way out of Opening University Curriculum Teaching Resources to the Society—Based on the Survey Data of Beijing’s Universities and Society. *Beijing Social Sciences*, 10, 34-48.
- Eom, S. B., Wen, H. J., & Ashill, N. (2006). The Determinants of Students’ Perceived Learning Outcomes and Satisfaction in University Online Education: An Empirical Investigation. *Decision Sciences Journal of Innovative Education*, 2, 215-235. <https://doi.org/10.1111/j.1540-4609.2006.00114.x>
- Guo, J. (2020). Empirical Analysis on Online Teaching Satisfaction and Its Influencing Factors during the Epidemic Situation—Taking Anhui Xinhua University as an Example. *Journal of Suzhou University of Education*, 3, 75-78.
- He, J. J., Yang, J., & Chen, J. (2021). Analysis of Factors Influencing Online Learning Satisfaction from the Embedded Perspective—Empirical Research Based on the STE Model. *Education and Teaching Forum*, 31, 17-20.
- Li, B. (2016). *The Construction and Empirical Study of the Model of Factors Influencing Students’ Learning Satisfaction in a Mixed Learning Environment*. Ph.D. Thesis, Shaanxi Normal University.
- Li, P., Xu, Z., & Shao, W. Q. (2022). Problems in Online Ideological and Political Education in Colleges and Universities under the Background of Epidemic Prevention and Control and Their Countermeasures. *Journal of Honghe University*, 4, 84-87.

- Li, R., & Su, K. (2003). Theoretical Discussion on Teaching Elements. *Contemporary Education Science*, *9*, 11-14.
- Li, Z. Q., & Cui, Z. L. (2018). Research on the Satisfaction of Postgraduates in Economics and Management with Experimental Courses and Its Influencing Factors—Based on the Survey of Nanjing Audit University. *Journal of Changchun Institute of Education*, *4*, 37-42.
- Qian, L., Wang, H., & Song, J. X. (2021). Evaluation of Online Teaching Satisfaction and Analysis of Influencing Factors. *Journal of Sichuan University of Arts and Sciences*, *6*, 114-120.
- Qin, H. X., Li, Z., & Zhou, J. H. (2020). Satisfaction and Willingness to Continue Using Online Teaching in Different Disciplines: An Empirical Analysis Based on the Technology Acceptance Model (TAM). *Education Research*, *11*, 91-103.
- Tian, G. X., & Du, Q. (2022). Online Teaching: Understanding Students through Emotional Understanding. *Educator*, *23*, 30-31.
- Wang, F. (2018). Analysis of Factors Influencing College Students' Teaching Satisfaction Based on Hierarchical Linear Model. *Fudan Education Forum*, *1*, 48-55+97.
- Wang, Y. W., & Yang, M. (2016). Perspective of Innovative Change in Classroom Teaching from College Students' Satisfaction with Classroom Teaching. *Modern Distance Education Research*, *6*, 65-73.
- Wang, Z., & Chen, L., & Anderson, T. (2014). A Framework for Interaction and Cognitive Engagement in Connectivist Learning Contexts. *The International Review of Research in Open and Distance Learning*, *2*, 121-141.
<https://doi.org/10.19173/irrodl.v15i2.1709>
- Wu, J., Yu, Y. L., & Huang, Z. C. (2020). Survey and Analysis on Satisfaction of Preventive Medicine Experimental Teaching Reform. *New Curriculum Research*, *6*, 67-68.
- Xia, Q. S. (2021). The Impact of Perceived Usefulness of Online Teaching Platforms on the Willingness of Continuous Use—The Mediation between Subjective Norms and Satisfaction. *Journal of Changzhou Institute of Technology*, *2*, 79-85.
- Xia, X. C., Li, B. J., & Liu, L. (2021). Reflections on the Role Transformation of Medical Immunology Online Teaching Teachers. *Health Vocational Education*, *7*, 13-15.
- Yang, L. J., & Zhang, X. Q. (2016). Research on the Satisfaction of College Students in China. *University (Research Edition)*, *10*, 44-53.
- Yong, W. J. (2018). Empirical Study on Student Satisfaction in Vocational Education Online Learning Space. *China Audio Visual Education*, *4*, 66-71.
- Zeng, X. (2017). Research on Exhibitor Satisfaction of Sichuan “Western China Expo” Based on IPA Method. *Journal of Sichuan Cadre Correspondence College*, *3*, 127-131.
- Zhang, M. (2020). The Connotation, Dilemma and Strategy of Online Learning. *Education Science Forum*, *17*, 22-24. <https://doi.org/10.4028/www.scientific.net/MSF.993.22>
- Zhang, X. Y., & Sun, L. X. (2022). Research on Influencing Factors of Online Learning Satisfaction of Open Education Students Based on Interpretive Structural Model. *Adult Education*, *3*, 48-57.
- Zhao, D. X., & Li, S. L. (2020). Survey and Analysis of Satisfaction with Online College English Teaching during the COVID-19. *Journal of Jilin University of Chemical Technology*, *10*, 19-25.
- Zuo, Q. S., Zhang, Y. N., & Li, B. C. (2021). Analyzing the Demand of Online Course Teachers' Teaching Ability Based on the “Student Satisfaction Model”. *China Poultry*, *3*, 118-120.