Based on the Interactive Relationship Between Teachers and Students in Colleges and Universities in Jiangsu Province in the Internet Path Study

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Abstract. This study aims to study the teaching process of teachers and students in colleges and universities in the Internet environment, and analyze the influencing factors of teaching interaction, so as to provide countermeasures and suggestions for improving the classroom interaction quality and students' interactive experience effect of college teachers in the teaching process. In this study, linear regression method and qualitative comparative analysis (QCA) method were used to analyze the interaction between variables, so as to explore the path configuration of the teacher-student interaction relationship in colleges and universities, and further clarify the key factors. It is found that there are five configuration paths for the composition of teacher-student interaction in the Internet environment, which verifies the phenomenon of the formation of teacher-student teaching interaction, among which network quality, network equipment and learning resources as key elements have a positive effect on the generation of teacher-student interaction in colleges and universities in the Internet environment. This research conclusion is of great practical significance for exploring how learners and professors can interact more efficiently in the Internet environment in college classrooms, and how to make more effective use of Internet resources in teaching interaction.

Keywords: Interactive relationship · Internet study · University teaching

1 Introduction

Against the backdrop of "Internet+" as a driving force for the innovation of the knowledge society 2.0, the cross-integration of the Internet and traditional industries has become a major trend in society as a whole. In the field of higher education, the Internet, with its broad knowledge scope and diverse disciplines, disseminates the most advanced knowledge of human society to the world through digital and coded forms. The Internet and its derivatives are also sweeping the education market, and the teaching development of Chinese universities is undergoing reform to adapt to new forms. Among them, the impact on the interaction between teachers and students in higher education is particularly significant. It can be said that the Internet environment is gradually becoming an important influencing factor in the teaching interaction of universities.

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Since the launch of the "Open Course Ware Project" by the Massachusetts Institute of Technology (MIT) in 2001, which opened up teaching resources used by schools to scholars around the world through the Internet, universities worldwide have also opened up their advantageous teaching resources through the Internet. In recent years, Chinese universities have also been continuously promoting the reform of higher education in the Internet environment, using Internet technologies and information resources to provide teachers and students with broader knowledge domains and richer professional content.

Due to the objective impact of the major public health events in 2020, university teaching in the online environment has been widely promoted throughout the country. At the same time, in the extensive practice of university teaching, problems in the interaction between teachers and students have also been constantly revealed. On the student side, criticisms of the poor quality of interaction content, weak frequency of interaction, and poor learning quality in university teaching under the online environment are frequently seen on social platforms such as Weibo and Douban, where college students have a strong voice. University teachers are also facing problems such as lack of technical conditions, poor course quality, and low student feedback. The numerous teaching problems emerging in the online environment urgently need to be addressed.

University teaching is influenced by various factors, among which the "interaction between teachers and students" is regarded as an important indicator of classroom quality. The factors involved in this indicator, such as the classroom interaction atmosphere and frequency, can reflect the mechanism of the role of the online environment from multiple perspectives and combinations. Therefore, this article takes university students in Jiangsu province as the research object, and uses fuzzy set qualitative comparative analysis to study the complex factors that lead to the impact of the online environment on teacher-student interaction from the perspective of "configuration", explore the differences in the performance of teacher-student interaction in university teaching in Jiangsu province, and summarize its generative path. Finally, by using information technology in the online environment, the quality of teacher-student interaction in universities can be improved to promote the common development of teachers and students.

2 Literature Review

In domestic research on the interactive relationship in teaching, He Wenli (1999) believes that teaching is a dialectical unity of teaching and learning, which is a process in which the teacher's instruction and the student's learning interact with each other through various means. It emphasizes the close coordination between the teacher's instruction and the student's learning, which enables effective and timely communication, feedback, and mutual growth in teaching [1]. Yuan Weixin (2002) pointed out that "the interaction between teachers and students in college classroom teaching reflects the dynamic relationship between teachers and students in college classroom teaching. The interaction between teachers and students in college classroom teaching is not only a process of social construction of learning, but also a process of individual socialization of students". Compared with the breakthrough proposed by previous scholars, the important point is that both teachers and students are equally important in the interactive relationship in teaching, and teaching is a synchronously socializing process for both teachers and students [2]. Sun Zewen (2008) combined with the theory of interactive teaching, pointed

out that teaching is a process in which various roles in the classroom interact and influence each other to play their unique functions. Teachers and students explore knowledge together and construct the meaning and value of life. Interactive teaching in the classroom means that everyone participates in equal dialogue, respects, accepts, speaks, and listens to each other, forming a true "learning community". This not only reaffirms the equality of teachers and students in the teaching relationship but also demonstrates the cyclical communication and benign development of interactive relationships [3].

Domestic scholars have a relatively consistent understanding of the interactive relationship in teaching, which mainly focuses on the interaction between teachers and students. At the same time, based on the research focus, the roles of different aspects and levels in the interaction process are also discussed.

Since the concept of "Internet Plus" was first proposed in 2012, it has been widely recognized by all sectors of society. In 2015, Premier Li Keqiang first proposed the "Internet Plus" plan in the annual government work report, indicating that "Internet Plus" was elevated to the national strategic level. Science and education are one of China's fundamental national policies, and as the fundamental industry of China, education has undergone tremendous changes with the emergence of the new model of "Internet Plus education". This new model has also brought new development opportunities to the education sector, with more diverse and personalized vitality leading to rapid development of the education industry. Chen Yiming (2016) proposed that "Internet Plus education" is the integration of the Internet and traditional education by using Internet technology and thinking, updating educational concepts, reconstructing educational teaching environments, resetting teaching methods, improving teaching efficiency and quality, and achieving the goal of innovative education. Its essence is to use Internet technology and thinking to think about and solve problems in the field of education, which has fundamentally changed the form of traditional "teaching" and "learning" and brought us a brand-new experience. Meanwhile, under the rapid development of external conditions such as Internet Plus, big data, and cloud applications, the external educational environment is also constantly integrated into the Internet development trend, accelerating the pace of transformation and innovation. In the context of "Internet Plus," the informatization of education has become an important characteristic [4]. According to Cao Peijie (2016), fundamentally speaking, the informatization of education is a microcosm of the entire society's transformation towards informationization, and "Internet Plus education" is an irreversible trend of the times. In the process of promoting teaching, it is necessary to first follow the laws of Internet development and actively carry out innovation [5].

With the rapid development of the internet, the idea of teacher-centered traditional teaching models in China has also undergone some changes. Ma Xing and Wang Nan (2018) proposed that under the background of big data, only by taking "student-centered" and "data-based" as the values of higher education teaching quality evaluation, can we gradually build an evaluation system with the characteristics of full process, multi-level, and dual functions through guidance and technical support. In the teaching system, internet technology needs to be introduced in multiple ways to improve the quality of teaching interaction. One center and one reliance support the updating and upgrading of teaching interaction. The transfer of teaching subjects and the assistance of technological means

are particularly important today [6]. Li Haifeng (2018) summarizes the teacher-student relationship under "Internet+Education" into four parts: from the authoritative teaching relationship to the mutually promoting learning partner relationship, from the industrial production relationship to the ecological cultivation relationship of agriculture, from the knowledge content transmission relationship to the pathfinding and guiding relationship of information sources, and from the knowledge acquisition community to the cultural symbiosis of public relations. These four parts accurately and comprehensively summarize the changes and potential challenges of the teacher-student relationship under the change of the internet environment, providing a new thinking path for us to constantly develop and innovate the teacher-student teaching interaction relationship [7].

In the internet environment, how to better utilize network resources and technological advantages to promote the optimization of teacher-student interaction has become an important issue in the current reform and innovative development of higher education. The conclusion of this study provides important guidance and practical suggestions for strengthening the learning efficiency of learners, improving the teaching status of instructors, and using internet resources more efficiently in university classrooms, and provides a reference for improving the quality of teaching interaction and interaction experience.

3 Factors Affecting the Interactive Relationship Between Teachers and Students

3.1 Interaction Content

There are many factors that influence the interactive relationship between teachers and students, and interaction content is one of them. In the process of teaching interaction, interaction content refers to the information and knowledge transmitted between teachers and students, including course content, teaching objectives, and teaching methods. Good interaction content can promote the improvement of teaching effectiveness, enhance students' learning interests and enthusiasm, and also increase teachers' sense of achievement.

In reality, the interaction between teachers and students often lacks substantial content and may even be merely formal in nature. The goals of interaction are not clear, and some teachers organize interaction solely for the sake of interaction, with limited interaction knowledge. This is not true interaction in the real sense, and therefore not effective. The quality and suitability of interactive content are important factors that affect the teaching interaction relationship. For students, interactive content needs to meet their learning needs and interests and stimulate their learning enthusiasm and motivation. For teachers, interactive content needs to meet teaching objectives and requirements and help students effectively master knowledge and skills. Therefore, teachers need to choose appropriate teaching content and methods according to the learning characteristics and needs of their students to improve the effectiveness and quality of teaching interaction.

In addition, the diversity of interactive content and the variability of interactive forms are also factors that affect the teaching interaction relationship. In teaching interaction, teachers can use different forms and means, such as explanations, questions, discussions, demonstrations, etc., to present interactive content to meet the different learning

needs and styles of students. At the same time, the diversity of interactive content can also increase the interest and attractiveness of teaching, stimulating students' interest in learning and participation.

Therefore, the interactive content in teaching interaction is one of the key factors affecting the quality and effectiveness of teaching. Teachers need to focus on the quality, suitability, and diversity of content during the teaching process to improve the effectiveness and quality of teaching interaction.

3.2 Interaction Frequency

Interaction frequency is the most direct reflection of teaching interaction. To study the interaction relationship, interaction frequency can be defined as the number of exchanges between teachers and students in the classroom. Interaction frequency can also reflect the interaction situation in the teaching process and the teaching attitude of the teacher.

High-frequency interaction can enhance the communication between teachers and students, enhance students' learning motivation and enthusiasm, and thus improve the learning effect. On the contrary, low-frequency interaction may lead to students' passive acceptance and lack of interest, which will weaken the learning effect. However, the frequency of interaction is not only evaluated by frequency, but also whether there is a monopoly phenomenon of teacher-student interaction. Many students can actively answer teachers' questions in class, and interact with teachers frequently. These students form the dominant group in the class, and they basically monopolize the opportunity to communicate with teachers. However, other students are relatively easy to be ignored by teachers, have no chance to participate, and gradually lose their interest and initiative in interaction, becoming spectators in the classroom and invisibly becoming vulnerable groups in the teaching interaction between teachers and students. Therefore, teachers should pay attention to maintaining an appropriate interaction frequency in the classroom, balance the interaction with students, and improve the teaching quality and effect by promoting the benign interaction and communication between teachers and students.

3.3 Interactive Atmosphere

As a special interpersonal activity, teacher-student interaction is rich and varied. Generally, it can be divided into three types: cognitive interaction, behavioral interaction and emotional interaction, including the mutual influence of cognitive styles, the mutual exchange of emotions and the mutual reference of behavioral styles, and this series of interactions is also assisted by the environment that needs interactive atmosphere. Teaching interaction is a circular process of communication between the two sides, and the interactive atmosphere, as the core of environmental composition, has a particularly prominent impact on the interactive relationship.

The interactive atmosphere in the teaching interaction refers to the interpersonal relationship, atmosphere and attitude in the classroom. Only when the interactive atmosphere is harmonious can the interaction between teachers and students be equal and effective, forming a virtuous circle of efficient teaching interaction. The relaxed and free classroom atmosphere makes students feel that the questions they ask and the views they

express are understood and respected, which can promote students' interest and enthusiasm in learning, improve students' participation in the course, and also help teachers to impart knowledge better, guide students to think and improve the teaching effect. Therefore, in the process of improving the interactive relationship between teaching and learning, we must consider the internal and external influencing factors and improve the interactive environment from various aspects.

Based on this, this study draws the following inferences: Inference: There is no single combination of conditions (teaching platform, network quality, equipment, learning resources and extracurricular factors) that has a positive impact on the interactive relationship between teachers and students, but the interaction between teachers and students may be caused by multiple combinations.

Looking back on the above research, the influencing factors of the interaction between teachers and students have interaction, and it is easy to form far-fetched causal logic by using traditional regression analysis. In recent years, the qualitative comparative study in the field of public management has brought dawn to the solution of diversified system problems. In this study, the QCA qualitative comparative analysis method is used to study the mechanism of teaching interaction, so as to find the key elements of teacher-student interaction under the Internet environment, find many ways to improve the teaching interaction and enrich the existing interaction mode.

4 Data Collection and Processing

4.1 Data Processing Method: Qualitative Comparative Analysis (QCA)

A large number of studies on the interaction between teachers and students have found that under the Internet environment, teaching platform, network quality, equipment, learning resources and extracurricular factors can all have an impact on both teachers and students in a specific teaching environment. Due to the complexity of the presentation of teaching interaction, the study of single factor can not scientifically explain the presentation mode of teaching interaction. In other words, teaching platform, network quality, equipment, learning resources and extracurricular factors also have interactive influence. In the field of management, a large number of studies show that due to the multiple complexity of human subjects, it is difficult for social phenomena to present symmetrical essential laws.

Raign (1987) first designed a qualitative comparative analysis method (QCA) in the field of social science research. The research hypothesis of this method is that, firstly, social phenomena are not produced by the individual effects of specific variables, but by the combined effects of multiple variables. Second, the experimental research method is not feasible in many fields because it is difficult to find a perfect control group. At the same time, because the independence between variables assumed by the traditional regression model is difficult to be established in real teaching practice, the research results ignore the joint role of variables. 8

QCA (Qualitative Comparative Analysis) can be used as the research method of comparative study, which identifies the influence of different factors on a certain result by systematically comparing the relationship between different factors.

In the Internet environment, the behavioral factors that lead to teachers' and students' teaching activities are complex, and it is difficult for each factor to play its role independently, and more of them work together on the main body. QCA method can effectively solve the above problems. In this study, the QCA method is mainly adopted according to the following steps:

The first step is to set the antecedent variables and result variables of the behavior configuration of the relationship between teachers and students in colleges and universities under the Internet environment. The antecedent variables in this study are Internet environment, atmosphere teaching platform, network quality, using equipment, learning resources and extracurricular factors. The result variable is the interaction between teachers and students, which is divided into three categories: interactive content, interactive frequency and interactive atmosphere.

Step 2, data calibration. In this study, data were obtained by issuing questionnaires, and a total of 206 data results were collected, all of which were quantitative data. At present, all variables do not exist in the form of sets, so it is necessary to calibrate the variables, so it is necessary to calibrate the variables and give the set membership relationship, and the membership degree after calibration should be between 0 and 1. In order to calibrate the values of all variables to 0 ~ 1, it is necessary to select the values that can reflect the intermediate degree of variables in combination with the actual value distribution of data, so as to determine the qualitative anchor point.

The third step is the construction of truth table. Transform the observation data into a format suitable for FSQCA, that is, encode the performance of the research object into binary variables under various conditions. Finally, the encoded data is arranged into the format of truth table, that is, the performance coding of each research object under various conditions is integrated into a table. Each row in the truth table represents a research object, each column represents a condition and its value, and the value in each cell represents the performance of the research object under this condition.

The fourth step is to analyze the combination of conditions that meet the requirements.

The fifth step is path analysis. The combination of each condition of the intermediate solution is analyzed. By using FSQCA, the consistency and coverage of each conditional combination configuration are analyzed. By analyzing the internal path of teaching interaction with different antecedent variables, the key factors are further clarified and corresponding suggestions are put forward [8].

4.2 Data Collection

Variable determination

The sample of the pre-survey comes from the college students in Jiangsu province who interact with teachers in the internet environment. In order to ensure the validity and rationality of the topics, 50 questionnaires were collected before the formal investigation, and after comparative analysis, the topics whose significance level was not up to standard were eliminated. Combined with the opinions and suggestions of the subjects, the relevant wording of the topic was revised, and finally a formal questionnaire was formed. The measurement contents of variables are shown in Table 1.

Table 1. Variable determination

Type	variable	Content of variable measurement
causal variable	Teaching platform	Is the teaching platform an important influencing factor for teaching interaction under the internet environment?
	Network quality	Is the network quality an important influencing factor for teaching interaction under the internet environment?
	Practical equipment	Is the practical equipment an important influencing factor for teaching interaction under the internet environment
	Learning resources	Is learning resources an important influencing factor for teaching interaction under the internet environment
outcome variable	Interaction frequency	Do Antecedents Affect the Frequency of Teaching Interaction in the Internet Environment
	Interactive content	Do Antecedents Affect the content of Teaching Interaction in the Internet Environment
	Interactive atmosphere	Do Antecedents Affect the atmosphere of Teaching Interaction in the Internet Environment

Data sources

Affected by major public health events, during the survey period, the survey subjects were all in the process of carrying out university teaching in combination with the Internet environment. The survey objects selected in this study are mainly students in universities in Jiangsu who are carrying out teaching interaction. The questionnaire was distributed from January to March 2023, and 206 valid questionnaires were distributed through on-the-spot interviews and questionnaire recycling. See Table 2 for the composition of the survey objects.

Reliability and Validity Analysis

Generally speaking, 36 indicators are required for measuring 8 indicators.

In this study, 8 indicators were measured, among which 5 were antecedent indicators and 3 were outcome variables. Therefore, the sample size met the standard. The questionnaire used the five-level Likert scale method. The eight influencing factors of the teacher-student interaction model under the internet environment are analyzed and processed by SPSS.

In order to ensure the scientific and effective research results, the reliability and reliability of the questionnaire were tested. This study uses SPSS to analyze the reliability and validity of the collected data. Reliability analysis is also called reliability analysis, which refers to the degree of consistency of the results obtained when the same object is repeatedly measured. The reliability index was tested by Cronbach's α coefficient. The higher the Cronbach's α coefficient, the better the consistency of the questionnaire.

Table 2. Composition of survey subjects

gender		major							University grade				
male	female	Management	Literature	Science	engineering	Medicine	Art	Other subjects	Freshman	Sophomore	Junior	Senior	graduate
81	125	45	52	46	44	10	8	1	14	29	107	33	23

Generally speaking, the reliability of the questionnaire used in the research should not be less than 0.6. The Cronbach's α coefficient of each index in this questionnaire is shown in Table 3, and each index meets the requirements, indicating that the questionnaire has good reliability, high reliability and good internal consistency.

In terms of validity analysis, Bartlett sphere test and KMO coefficient are used in this study, and the test results are shown in Table 4. In the aspect of validity analysis, in order to judge whether the data is suitable for factor analysis, this study uses KMO test and Bartlett spherical test of SPSS to analyze. KMO is used to check the partial correlation between variables, and the value is between 0 and 1. The closer KMO value is to 1, the stronger the partial correlation between variables and the better the effect of factor analysis. When KMO coefficient reaches 0.7, the relationship between items is excellent, so factor analysis can be done between variables. Bartlett sphere test can test whether the variables are independent of each other and whether they are identity matrix. In factor analysis, if the value of chi-square distribution falls into the rejection domain, the original hypothesis is rejected, which means that factor analysis can be done. $P < 0.05$, it does not obey the spherical test, and the assumption that each weight variable is independent should be rejected, that is, there is a strong correlation between variables.

Table 3. The variable Cronbach s α coefficient

variable	number of entry	Cronbach's α
teaching platform	3	0.92
network quality	3	0.908
use of equipment	3	0.938
learning resources	3	0.907
extra-curricular factors	3	0.902

Table 4. KMOS coefficient and Bartlett sphere test

	teaching platform	network quality	use of equipment	learning resources	extra-curricular factors
KMO	0.717	0.752	0.77	0.756	0.751
Bartlett's test	480. 806	410. 258	532. 92	402. 229	386. 185
df	3	3	3	3	3
sig	0.000***	0.000***	0.000***	0.000***	0.000 ***

Table 5. Internet environmental conditions combination configuration

	Consistency	Coverage
jxpt1	0.698432	0.815645
wlzl1	0.767130	0.754812
sysb1	0.781645	0.711764
xxzy1	0.825641	0.679679
kwys1	0.770556	0.715050

5 Results Analysis

5.1 Identification of Key Elements

In the Essential Conditions analysis, hdgx1 is the target variable. (Table 5) Five conditions were tested, including teaching platform (jxpt1), network quality (wlzl1), use of equipment (sysb1), learning resources (xxzy1) and extracurricular factors (kwys1). For the consistency and coverage analysis of conditions, it can be found that the conditional learning resource (xxzy1) has the highest consistency (0.825641), which indicates that it is an important condition for explaining the interaction relation of target variables (hdgx1). The conditional instruction platform (jxpt1) has the highest coverage rate (0.815645), which indicates that it provides the most comprehensive information for the interpretation of the target variable interaction relationship (hdgx1). The consistency and coverage of conditional network quality (wlzl1) are relatively high, which indicates that it is also an important condition for explaining the interaction relation of target variables (hdgx1). The consistency and coverage of conditional use equipment (sysb1) and extra-curricular factors (kwys1) are both low, indicating that they may not be necessary to explain the target variable interaction (hdgx1) or that they are less relevant to other conditions.

To sum up, conditional learning resources (xxzy1), teaching platform (jxpt1) and network quality (wlzl1) are the necessary conditions to explain the interaction of the target variables (hdgx1). Conditional use of equipment (sysb1) and extra-curricular factors (kwys1) may not be necessary conditions and their correlation with other conditions needs further study.

5.2 Configuration Analysis

In this paper, fsqca3.0 software is used to analyze the conditional combination of cause variables, and the software outputs complex solutions, intermediate solutions and simple solutions. Considering the consistency and coverage, the complex solution is used to analyze the above data. The results show that the path combination of the formation and state of the interactive relationship between teachers and students in colleges and universities under the Internet environment is complex and diversified, and there are 8 combinations of conditions, as shown in Table 6. The total consistency is 0.708956, and 70.9% of the teaching interaction shows a high use relationship. The total coverage

Table 6. The combination of conditions of the Internet environment in the teaching interaction between teachers and students in colleges and universities

variable	Interaction between Teachers and Students in Universities (hdgx)							
	method1	method2	method3	method4	method5	method6	method7	method8
teaching platform	○	○	○	○			○	●
learning resources	●				●	●		
network quality		○	○		●		●	
extra-curricular factors			●	●		●	○	●
use of equipment		●		●	●	●	○	○
raw coverage	0.548233	0.40405	0.41382	0.45952	0.67977	0.66805	0.323116	0.334746
unique coverage	0.225387	0.00513875	0.00586003	0.00306523	0.0183015	0.778851	0.00225389	0.00595027
consistency	0.761533	0.856652	0.82946	0.840673	0.799151	0.778851	0.899598	0.944063
solution consistency	0.708956							
solution coveragre	0.873811							

Note: ● indicates that the condition exists,
○ indicates that the condition does not appear, and blank indicates that the conditional variable is irrelevant to the result.

is 0.873811, which shows that the eight combinations of conditions can cover 87.4% of the interaction between teachers and students in colleges and universities. From the perspective of conditional combination, these eight paths of conditional combination generation also represent two key modes of teaching interaction under the current Internet environment.

Internal technology model
In Route 2, the original coverage rate is 0.40405 and the net coverage rate is 0.00513875. In terms of consistency, the consistency of path 2 is 0.856652, and the consistency of solution is 0.708956. This shows that the network quality has a great influence on the interaction between teachers and students in colleges and universities; In Route 5, the original coverage rate is 0.67977 and the net coverage rate is 0.0183015. In terms of consistency, the consistency of path 5 is 0.799151 and the consistency of solution is 0.708956. This shows that the use of equipment has a great influence on the interaction between teachers and students in colleges and universities. Based on the Internet environment, the technical conditions of teachers and students in colleges and universities affect the interaction between teachers and students in the teaching process. Using equipment as the basic platform for learning in the Internet environment, network quality as a necessary condition for communication between teachers and students, and the technical application level of the main body as an important means of teaching interaction.

Internal demand model
In Path 6, the use of equipment and learning resources has a great influence on the interaction between teachers and students in colleges and universities. The original coverage rate is 0.66805 and 0, and the net coverage rate is 0.778851 and 0, respectively. In terms of consistency, the consistency of path 6 is 0.778851 and the consistency of solution is 0.708956. This shows that the use of equipment and learning resources has a great influence on the interaction between teachers and students in colleges and universities.

Based on the current technical level of Internet teaching in colleges and universities, the Internet environment often performs the function of deepening and expanding learning resources. Because, in the teaching under the internet environment, college students have higher requirements for learning resources, and the purpose of participating in teacher-student interaction is to expand and meet the refined and individualized learning needs.

6 Conclusion

6.1 Main Conclusions

Through the analysis of conditional configuration, it can be seen that the combination configuration of different factors in the Internet environment is completely equivalent to the interaction between students and teachers. When the specific elements in the Internet environment do not exist, the appearance of other elements can still effectively interact with teachers and students. Therefore, the interactive relationship between teachers and students in colleges and universities under the Internet environment is not the only

combination of specific elements, but there are diversified scenarios. By using linear regression method and qualitative comparative analysis (QCA) method to analyze the interaction between variables, this paper studies the path configuration of the interaction between teachers and students in colleges and universities, and further clarifies the key factors. The research results show that there are five configuration paths in the interactive relationship between teachers and students under the Internet environment, which verifies the phenomenon that the interactive relationship between teachers and students leads to the same goal.

The empirical study shows that learning resources, network quality and teaching platform in the Internet environment have an important influence on students' classroom participation and teaching interaction of university teachers. Following the principle that all roads lead to the same goal, when the learning resources are weak, the network quality and teaching platform work together to improve the quality of the interaction between teachers and students in colleges and universities and enhance the interactive atmosphere. Through the identification of key elements, for most college students, learning resources, network quality and teaching platform are the keys to participate in the interaction between teachers and students in colleges and universities, and extracurricular factors and the use of equipment can not greatly affect their interaction.

6.2 Countermeasures for Enlightenment

In order to improve the interactive quality of college teaching and the interactive experience effect of students, this paper puts forward the following countermeasures and suggestions:

Improve network quality and optimize network equipment to ensure the experience of teachers and students

The results of this study show that the quality of network and the use of equipment are the key factors affecting the teaching interaction between teachers and students in colleges and universities. Therefore, colleges and universities should strengthen investment in network infrastructure construction, improve network bandwidth and stability, and provide a good network environment for teachers and students. At the same time, colleges and universities can regularly train students and teachers on network equipment, so that they can master the use of network equipment skillfully, and equip professional technical handlers during teaching hours to ensure the stability of courses, thus better supporting teaching activities.

Provide high-quality learning resources to lay a solid foundation for the development of teachers and students

The quality of learning resources is equally important to the formation of the interactive relationship between teachers and students in colleges and universities. Therefore, colleges and universities should strengthen the construction and collection of teaching resources, provide rich and high-quality learning resources, and actively build teaching cloud platforms, electronic libraries and other equipment resources based on Internet technology to provide better teaching support and learning experience for teachers and

students. Colleges and universities can also expand the knowledge horizon and communication space of teachers and students and promote the interactive communication between teachers and students by carrying out online courses and academic forums.

Strengthen the cultivation of teachers' teaching ability and improve the atmosphere of teaching interaction

The results of this study show that teachers' teaching ability and the quality of classroom interaction also have an important influence on the formation of teacher-student teaching interaction. Therefore, colleges and universities should strengthen the training of teachers' teaching ability and evaluation of teaching effect, improve teachers' teaching ability and teaching quality, so as to better guide and promote the interaction between teachers and students. Teachers should also pay attention to the creation of classroom atmosphere in classroom communication, encourage students to participate in classroom discussion and ask questions, and create a positive learning atmosphere. Strengthen communication and interaction between teachers and students in various forms, promote mutual understanding and trust between teachers and students through interactive exchanges, and improve teaching efficiency with a relaxed classroom atmosphere.

6.3 Research Limitations

First of all, because the Internet environment contains far more factors than the variables involved in this study, the choice of variables is not comprehensive, and a more detailed analysis can be made through in-depth excavation of the factors affecting the Internet environment. Secondly, in the process of sample selection, the samples are concentrated in colleges and universities in Jiangsu Province, and the sample variables are similar and special due to the availability of data and regional unity, which still need to be optimized and supplemented, and a wider investigation and analysis should be made to make the conclusion more universal.

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References

1. He Huili. Teaching and learning: cooperative interactive relationship [J]. Journal of China Agricultural University (Social Science Edition), 1999 (04): 69–73. DOI: https://doi.org/10.13240/j.cnki.caujsse.1999.04.017
2. Yuan Weixin. On teacher-student interaction in the teaching process [J]. Educational Theory and Practice, 2002(S1): 2–3.
3. Sun Zewen. Classroom interactive teaching research [D]. Huazhong Normal University, 2008.

4. Chen Yiming. Research on the teaching environment and teaching mode in the era of "inter-net plus" [J]. Journal of Southwest Normal University (Natural Science Edition), 2016,41 (03): 228-232. doi: https://doi.org/10.13718/j.cnki.xsxb.2016.03.040.
5. Cao Peijie. Future school reform path-"Internet+education" positioning and sustainable development [J]. Education Research, 2016, 37(10): 46–51.8
6. Ma Xing, Wang Nan. Construction of teaching quality evaluation system in colleges and universities based on big data [J]. Tsinghua University Education Research, 2018, 39 (02): 38–43.https://doi.org/10.14138/j.1001-4519.2018.02.0003200806
7. Li Haifeng, Wang Wei. On the construction of teacher-student relationship in the era of "internet plus" [J]. China Education Journal, 2018(07): 81–87.
8. Benoît Rihaux, Charles. C. Larkin. QCA Design Principles and Applications 2[M]. Beijing: China Machine Press,2017