Research on the Reform of English Smart Classes Teaching Model Based on Network Informatization

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Abstract. Smart classes is the inevitable result of education modernization condensed in classroom teaching, education informatization converges on teacher-student interaction, and education intelligence is converged on students' smart thinking in the context of the post-epidemic era. It is a hot topic of current education intelligence research. This article conducted a questionnaire survey of teachers and students who used the Smart classes cloud to teach during the epidemic. The author analyzes the application of the Smart classes teaching model before, during and after class from three perspectives: student attitude, student input, and teacher input, hoping to provide a new perspective for improving the efficiency of network information Smart classes teaching in the post epidemic era and exploring the integration of information intelligence and contemporary education reform.

Keywords: Network information · Smart English classroom · Teaching mode

1 Introduction

With the rapid development of information technology, repetitive and mechanical work will gradually be replaced by machines. The traditional classroom teaching model that emphasizes indoctrination by teachers and memorization by students is increasingly unsuitable for social development. "National Medium and Long-term Education Reform and Development Plan Outline (2010–2020)" and "Ten-Year Development Plan for Education Informatization (2011–2020)" pointed out that education informatization work should be closer to the major practical issues in education reform and development, and education reform and development should be included in the core area to promote education development. In the age of network information, various new teaching models that subvert traditional classrooms have emerged one after another, such as Smart classes, bisection classrooms, flipped classrooms, etc. Their core is to reconstruct the form of teaching organization, of which Smart classes are the most typical. Smart classes is the inevitable integration of new technology and education reform under the background of network information age. It is the focus of current education reform research that cannot be ignored.

2   Research Purpose and Significance

The purpose of this research is to use literature research, questionnaire surveys, interviews and other methods to study the current situation of the research and application of English Smart classes under the background of network information, and to judge the advantages and disadvantages of the Smart classes teaching model, so as to maximize the strengths and avoid the weaknesses. It provides suggestions for the reform of English Smart classes teaching mode under the background of network informatization in the post-epidemic era.

In terms of theoretical significance, according to the constructivist learning theory, the learner's knowledge is obtained by the learner with the help of others, using certain learning resources, and by means of meaning construction. The ideal learning environment includes four elements: context, collaboration, conversation and meaning construction. Smart classes can very well meet the higher requirements of constructivist learning theory for the learning environment. It utilizes a variety of new media, new technologies and smart devices today, aiming at closed-loop English teaching before, during and after class. Smart classes can create and display various learning situations that tend to be realistic, and enhance the three-dimensional communication between teachers and students, and between students and students. This model is conducive to the development of collaboration, inquiry learning, and helps learners construct the meaning of knowledge.

In terms of practical significance, Smart classes can promote the sharing of high-quality educational resources and teacher power through the Internet, so as to promote the development of educational equity. The intelligentization of the Smart classes from lesson preparation to class and then to after class saves teachers a lot of time and reduces the burden on teachers. Smart classes have the advantages of rich English teaching content, individualized learning, real-time performance analysis, and diversified English teaching forms, which significantly increase the classroom capacity and improve the efficiency of English teaching.

3   Literature Review

The master and doctoral dissertations reflect the research hotspots in a certain field to a certain extent, and the master and doctoral dissertations are relatively long, with relatively complete theoretical expositions and comprehensive coverage of experimental data. Therefore, the author of this study used "English Smart classes" as the keyword and searched the master and post database in the CNKI database. After manually removing irrelevant data, a total of 11 valid data were selected. The author uses the quantitative visual analysis function of the CNKI database to visually analyze these 11 data with a higher frequency. The visual analysis of the "main theme" reflects the hot issues in the research field of "English Smart Class" to a certain extent. The results of the visual analysis are shown in Fig. 1.

"Smart classes" is the subject of this research, so it is not included in the statistical results. It can be found that in the school stage, Smart classes have more research in the "junior high school" stage; in teaching research, the "teaching model" and "application
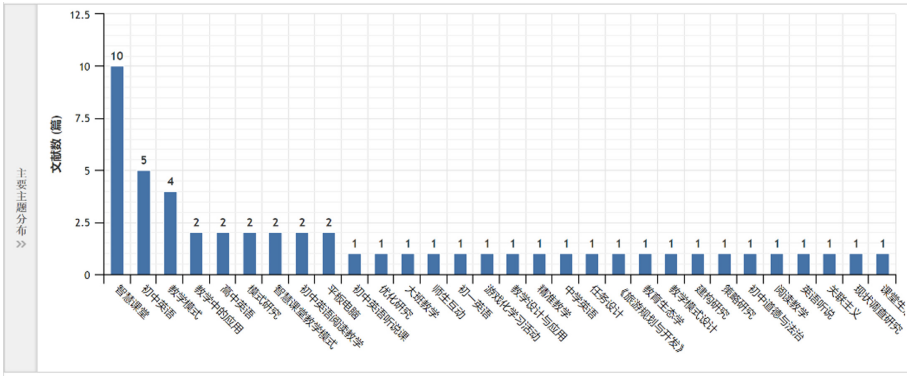
Fig. 1. Distribution of main themes of CNKI quantitative visualization analysis of "English Smart classes"

in teaching" of the Smart classes have a higher degree of attention; in terms of the types of courses selected in the experiment, the "reading" and "listening and speaking" courses are selected more frequently. The specific research summary of related master and doctoral theses is as follows:

Wang Hongbo (2018) summarized the characteristics of English listening and speaking teaching in junior high schools in Smart classes and the choice of task types. He proposed methods and processes for different types of task design and conducted empirical research. Xie Xiangcao (2018) analyzed the teaching cases using Smart classes tools based on the theory of relevance and explored the construction model of the junior high school English Smart classes. Zhong Chongyan (2018) uses the "dual classroom" education cloud platform to conduct empirical research on the teaching model of Smart classes. Zhang Yan (2018) comprehensively described the composition of the information environment of the Smart classes, effectively constructing an intelligent and flexible teaching environment for the Smart classes. Chen Mengqi (2018) explored the presentation, progress, development, and changes of the interaction between teachers and students under the Smart classes teaching model by using a combination of qualitative and quantitative research methods. And he analyzed the effects of teacher-student interaction, in order to explore better models and strategies that are conducive to the development of education.

Guo Ying (2019) introduced micro-classes into teaching design and optimized the teaching process of the Smart classes and the teaching mode of different course types. Li Yuting (2019) started with the design of Smart classes teaching from the perspective of information technology, conducted research on teaching practice, and analyzed the current status of the implementation of classroom reforms and the results achieved with the support of information technology in Xinjiang. Combined with the teaching process of the Smart classes, Liu Yujing (2019) proposed a strategy for the interaction of the junior high school English listening and speaking classes supported by the Smart classes.

Zhao Lei (2020) uses the "Le Class" platform to investigate students' English learning self-efficacy and performance under the English Smart classes teaching model. Zhang Liqiong (2020) explores and implements the English reading teaching model

of boarding ethnic middle schools based on Smart classes through the Internet, mobile smart phones, online reading exchange groups and other modern information technology means. Juan Li (2020) analyzes the status quo of high school students' learning input in Smart classes English learning through a questionnaire on English learning input of high school students in a Smart classes environment.

4 Related Concepts

4.1 The concept of Smart classes

The proposal and development of Smart classes is actually the inevitable result of school education informatization focusing on teaching, classrooms, and teacher-student activities. Regarding the meaning of Smart classes, there are different understandings from different perspectives. "Zhihui" in Chinese usually includes the meaning of "smart, insightful, and strategic" in the psychological sense and "intelligence" in technology (Liu Xiaolin et al. 2016). Therefore, there are two perspectives to understand the concept of Smart classes: One is based on the educational perspective, that classroom teaching is not a simple process of "knowledge imparting", but a process of comprehensive quality training and generation with "smart" as the core. The concept of "Smart classes" here is relative to "knowledge classroom". The other is based on the perspective of informatization, which refers to the use of advanced information technology to realize the informatization and intelligence of classroom teaching and build Smart classes teaching environment. The "Smart classes" here is in contrast to the "traditional classroom" that uses traditional teaching methods. In fact, the above two perspectives are closely related. The fundamental purpose of using information technology to create Smart classes teaching environment is to promote the transition from "knowledge classrooms" to "Smart classes" and to achieve the development of students' smart. The definition of "Smart classes" in this research is put forward by focusing on the latter perspective. Establishing the concept of "Smart classes" from the perspective of informatization is a prerequisite for the development of informatization teaching research. It is also the logical starting point for constructing a theoretical and practical system of Smart classes teaching in the age of network information.

4.2 Theoretical basis

(1) Constructivism theory

According to the constructivist learning theory, the learner's knowledge is obtained by the learner with the help of others, using certain learning resources, and by means of meaning construction. The ideal learning environment includes four elements: context, collaboration, conversation and meaning construction. Smart classes can very well meet the higher requirements of constructivist learning and theory on the learning environment. Using mobile smart devices to create and display a variety of realistic learning situations for the closed-loop English teaching before, during and after class, which is helpful to help learners construct the meaning of knowledge.

(2) Programmed Instruction

Programmed Teaching Method follows the principles of small steps, positive response, timely reinforcement, self-paced and low error rate. It divides the overall goal of a course into several units, and then divides each unit into many small steps. The autonomous learning system of the Smart classes allows students to set their own learning pace to achieve the overall learning goals in accordance with their own learning ability and learning habits. Therefore, programmed teaching provides a solid theoretical foundation for the construction of smart English classrooms.

5   Research Process

5.1   Purpose of Investigation

The purpose of this survey is to understand the use of Smart classes by students and teachers. On the one hand, it can understand students' performance, existing problems and their own needs when using Smart classes learning. On the other hand, it can understand the teacher's feelings when using the Smart classes teaching, including the advantages and disadvantages of the Smart classes. This survey took the teachers and students of Harbin Normal University as the object. The author hopes that the investigation can discover the problems of teachers and students in Smart classes teaching and learning, so as to find a suitable entry point to solve or improve existing problems and provide effective support for the use of English Smart classes teaching and learning.

5.2   Survey Content

This survey is mainly carried out in two parts: student questionnaire and teacher questionnaire. In the research part of the student questionnaire, the main content of the questionnaire includes the attitudes and input of students before, during and after class in the smart English class. In the survey part of the teacher questionnaire, the main content of the questionnaire includes the teaching methods of teachers, the organization of learning activities, and the time for teachers to prepare lessons in the English smart class.

5.3   Research Objects and Tools

The main subjects of this survey are teachers, freshmen and sophomores from the English Education Department of Harbin Normal University. A total of 36 teacher questionnaires and 333 student questionnaires were collected. Two types of tool software are involved in the survey process, one is the questionnaire implementation tool, and the other is the statistical analysis tool used to count the results of the questionnaire. In terms of questionnaire implementation tools, the author used the "Questionnaire Star" (https://www.wjx.cn/) to implement online surveys, mainly considering the actual situation that the epidemic situation is difficult to fill in collectively. The website provides functions such as questionnaire production and release, statistics, etc. After the questionnaire is released, the questionnaire can be answered through mobile phone WeChat, computer online and other platforms, and detailed basic data statistics can be provided according to the situation of each question.

In terms of questionnaire results statistics and analysis tools, SPSS1.19 statistical software is used.

6   Data Analysis

6.1   Reliability Analysis

Whether the questionnaire is consistent and reliable must be proved by analyzing the reliability of the questionnaire. Alpha coefficient is a measure of reliability (Table 1). The author has tested the reliability of the questionnaire of the Internet-based English Smart Class teaching model. The analysis results are shown in Table 2 and Table 3. This questionnaire is divided into teacher questionnaire and student questionnaire. The Cronbach's alpha of the two questionnaires in each dimension are all above 0.7. The Cronbach's alpha of the student questionnaire is 0.975, and the teacher questionnaire is 0.858. This shows that the online information-based English Smart classes teaching model has good internal consistency.

Table 1. Cronbach's Alpha is a measure of reliability

Reliability Coefficient	Significance
>0.80	Reliability is very good
0.70–0.80	Reliability is quite good
0.65–0.70	Minimum acceptable reliability value
<0.60	give up

Table 2. Reliability table of student questionnaires on the teaching situation of the Internet-based intelligent English class teaching model

Dimensionality	Items	Cronbach's Alpha
Student input before class	5	0.847
Student attitudes before class	5	0.930
Student input in class	5	0.759
Attitudes of students in class	5	0.948
Student input after class	5	0.759
Student attitudes after class	5	0.947

6.2   Validity Analysis

Validity reflects the degree of validity of the measurement content. The KMO value is the standard of whether the data obtained from the test is suitable for factor analysis,

Table 3. Reliability table of teacher questionnaires on the teaching situation of the Internet-based intelligent English class teaching model

Dimensionality	Items	Cronbach's Alpha
Teacher input before class	5	0.767
Teacher input after class	5	0.747
Teacher input in class	5	0.767

and the value range of KMO is 0–1 (Table 3). When the factors between variables increase, the more suitable factor analysis is, the larger the KMO value. After analyzing the collected student questionnaire data, Table 4 can be obtained. The result of the student questionnaire test is that the KMO value is 0.970, and the Bartlett's sphere test is approximately 12838.523, and the significance is less than 0.001, indicating that the institute's measurement table is suitable for factor analysis. After analyzing the collected teacher questionnaire data, Table 5 can be obtained. The teacher questionnaire test result is that the KMO value is 0.856, and the Bartlett's sphere test is approximately 928.615, and the significance is less than 0.001, indicating that the institute's measurement table is suitable for factor analysis.

Table 4. KMO value range and meaning

KMO Value Range	Significance
0–0.5	Unacceptable
0.54–0.6	Bad
0.6–0.7	Medium
0.74–0.8	Okay
0.84–0.9	Rewardable
0.9–1.0	Excellent

Table 5. KMO and Bartlett test of the student questionnaire

Kaiser-Meyer-Olkin		0.970
Bartlett	Approximately Chi-square	12838.523
	Df	435
	Significance	0.000

Table 6. KMO and Bartlett test of teacher questionnaire

Kaiser-Meyer-Olkin		0.856
Bartlett	Approximately Chi-square	928.615
	Df	505
	Significance	0.000

6.3 Result Analysis

In the questionnaire, the author considers the three perspectives of student attitude, student input, and teacher input, and designs the questionnaire from three dimensions: before class, during class, and after class. The purpose is to count the actual situation of the smart class teaching mode in the teaching practice process.

1) Student Attitude

According to students' attitudes about applying Smart classes before class, during class and after class, the author designed 15 items and conducted a questionnaire survey. The results of the questionnaire are as follows:

Table 7. Results of the interest questionnaire of students applying smart classes before class

Question	A. Very disagree	B. Not agree	C. Difficult to determine	D. Agreed	E. Very agree	D + E
Q1	4.2%	8.41%	18.32%	50.75%	18.32%	69.07%
Q2	5.11%	8.11%	20.12%	49.55%	17.12%	66.67%
Q3	3.3%	11.11%	15.02%	51.65%	18.92%	70.57%
Q4	4.8%	15.62%	21.92%	39.94%	17.72%	57.66%
Q5	4.5%	12.61%	20.42%	44.44%	18.02%	62.46%

Table 8. Results of the interest questionnaire of students applying Smart classes during class

Question	A. Very disagree	B. Not agree	C. Difficult to determine	D. Agreed	E. Very agree	D + E
Q6	4.2	10.21	21.02	46.55	18.02	64.57
Q7	4.5	11.11	15.62	50.45	18.32	68.77
Q8	3.3	7.21	18.02	53.45	18.02	71.47
Q9	5.11	10.21	19.22	48.95	16.52	65.47
Q10	4.2	6.91	18.32	52.85	17.72	70.57

Table 9. Results of the interest questionnaire of students applying Smart classes after class

Question	A. Very disagree	B. Not agree	C. Difficult to determine	D. Agreed	E. Very agree	D + E
Q11	4.5	11.41	20.72	46.55	16.82	63.37
Q12	4.8	13.81	19.82	45.65	15.92	61.57
Q13	3.6	9.91	21.02	47.75	17.72	65.47
Q14	3.6	10.81	24.02	43.84	17.72	61.56
Q15	3.3	7.21	19.82	53.15	16.52	69.67

From Table 6, Table 7, and Table 8, the Q1–Q15 questionnaire results selected "agree" and "Very agree" options are more than half of the number. This result shows that students have a strong interest in using Smart classes related tools to study before class, during and after class. which is conducive to stimulating students' interest in learning, motivating students' learning internal drive, and cultivating students to learn independently.

2) Student input

According to the students' learning input in the application of Smart classes before class, during class and after class, the author designed 15 items and conducted a questionnaire survey. The results of the questionnaire are as follows:

Table 10. Statistics of student input questionnaire results of students applying Smart classes before class

Question	A. Very disagree	B. Not agree	C. Difficult to determine	D. Agreed	E. Very agree	D + E
Q16	4.2	11.11	23.12	43.24	18.32	61.56
Q17	4.2	11.41	21.02	45.05	18.32	63.37
Q18	8.71	24.62	26.73	30.03	9.91	39.94
Q19	3.3	8.11	18.92	53.45	16.22	69.67
Q20	4.5	9.31	23.12	46.5	16.52	63.02

In Table 9, Table 10, and Table 11, Q18, Q24, and Q29 are reverse questions, and others are all positive questions. From the above statistical results, it can be seen that before and after class the number of people who chose the "agree" and "very agree" options for the positive questionnaire results exceeds 60%, while the questionnaire result for the reverse question is less than 40%. This result shows that most students believe that the use of Smart classes related tools to preview before class and review after-school can increase students' understanding of knowledge, as well as are conducive to improving the efficiency of students' autonomous learning. The results during the class show that

Table 11. Statistics of student input questionnaire results of students applying Smart classes during class

Question	A. Very disagree	B. Not agree	C. Difficult to determine	D. Agreed	E. Very agree	D + E
Q21	3.3	6.61	16.22	53.15	20.72	73.87
Q22	3.3	7.21	21.02	49.25	19.22	68.47
Q23	4.5	11.41	23.42	42.64	18.02	60.66
Q24	7.51	24.92	23.42	32.13	12.01	44.14
Q25	4.5	11.41	25.53	42.64	15.92	58.56

Table 12. Statistics of student input questionnaire results of students applying Smart classes after class

Question	A. Very disagree	B. Not agree	C. Difficult to determine	D. Agreed	E. Very agree	D + E
Q26	3.9	9.61	23.12	46.85	16.52	63.37
Q27	3.9	9.61	23.42	47.45	15.62	63.07
Q28	3.9	9.31	23.12	46.25	17.42	63.67
Q29	7.51	23.72	26.13	20.33	12.31	32.64
Q30	3.3	9.91	26.43	44.14	16.22	60.36

Smart classes teaching methods can improve students' learning input during the class, but there are still disadvantages that it is easy to distract learning and it is difficult to concentrate (Table 12).

3) Teacher Input

According to the teacher's use of Smart classes before class, during class and after class, the author designed 15 items and conducted a questionnaire survey. The results of the questionnaire are as follows (Table 13, 14 and 15):

In Table 9, Table10, and Table11 Q31, Q34, Q35, Q39, Q44, and are reverse questions, and others are all positive questions. By analyzing the data above, It is also concluded that before class smart classroom teaching methods have been affirmed by teachers, but it increased the teacher's lesson preparation burden; during the class the smart classes cloud teaching model completely separated from the physical classroom does not guarantee the teaching effect; after class student data analysis function in the smart classroom tool has been affirmed by most teachers, which has improved the teacher's work efficiency after class, but the frequency of teachers using smart classroom tools after class is not very high.

The author believes that the reasons for this phenomenon are as follows: The author believes that the reasons for this phenomenon are as follows: (1) Teachers and students are

Table 13. The results of the questionnaire on teachers' application of smart classes before class

Question	A. Very disagree	B. Not agree	C. Difficult to determine	D. Agreed	E. Very agree	D + E
Q31	0	22.22	22.22	41.67	13.89	55.56
Q32	2.78	36.11	25	33.33	2.78	36.11
Q33	0	27.78	19.44	44.44	8.33	52.77
Q34	0	33.33	30.56	36.11	0	36.11
Q35	2.78	36.11	30.56	27.78	2.78	30.56

Table 14. The results of the questionnaire on teachers' application of smart classes during class

Question	A. Very disagree	B. Not agree	C. Difficult to determine	D. Agreed	E. Very agree	D + E
Q36	2.78	33.33	33.33	27.78	2.78	30.56
Q37	0	16.67	44.44	36.11	2.78	38.89
Q38	8.33	16.67	33.33	36.11	5.56	41.67
Q39	0	27.78	25	42.67	5.56	48.23
Q40	0	13.89	36.11	44.44	5.56	50

Table 15. The results of the questionnaire on teachers' application of smart classes after class

Question	A. Very disagree	B. Not agree	C. Difficult to determine	D. Agreed	E. Very agree	D + E
Q41	0	5.56	27.78	55.56	11.11	66.67
Q42	0	0	22.22	63.89	13.89	77.78
Q43	0	0	11.11	69.44	19.44	88.88
Q44	11.11	36.11	27.78	25	0	25
Q45	2.78	30.56	22.22	36.11	8.33	44.44

not used to arranging and completing homework in smart classroom tools. (2) Teachers and students are not proficient in the operation steps of smart classroom tools, so that it wastes time to use them. (3) Smart classroom tools are cumbersome to operate, which is not conducive to popularization.

7   Conclusion and Recommendation

This study conducted a questionnaire survey of teachers and students who used the cloud to teach in the smart classroom during the epidemic, and used SPSS1.19 for data

analysis. The author introduces from three perspectives of student attitude, student input and teacher input, and summarizes from three dimensions before class, during class, and after class. In terms of student attitudes, smart classroom teaching methods are conducive to stimulating interest before class, improving driving force during class, and stimulating independent learning after class; In terms of student input, smart classroom teaching methods can increase students' understanding of knowledge before class and improve the efficiency of students' independent learning after class. However, it is easy to distract learning and difficult to concentrate during the teaching process; In terms of teacher input, smart classroom teaching methods have been affirmed by teachers to a certain extent before and during class, especially the data analysis function. However, the teacher's lesson preparation burden is virtually increased, and the teaching effect is affected.

The above research shows that the teaching methods of smart classrooms have been affirmed by teachers to a certain extent, but the teaching tools of smart classrooms still have a lot of room for improvement, and the integration of traditional classrooms and smart classroom models should be further promoted. In the post-epidemic era, the reform of the Internet-based English smart class teaching model should focus on "integration and development" "inheritance and development" and "innovation and development". The construction of the Internet-based English smart class teaching model should rationally design the teaching content, innovate teaching methods, and gradually meet the teaching needs. It should be noted that the application of network information technology is a practical, convenient and novel way to improve the quality of English teaching, and making good use of the advantages of network information technology is also an indispensable boost for English teaching innovation.

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