The Research and Practice of Higher Mathematics Classroom Teaching Mode in the Information Technology Era

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Abstract. In this paper under the background of promoting the reform of classroom teaching in colleges and universities, with information technology for teaching means, combined with higher mathematics classroom practice teaching before class preview, class learning, review the teaching content design, based on classroom online and offline hybrid teaching mode of teaching practice, using the linear regression method, using SPSS data analyzes the students 'learning assessment factors, and established the multiple linear regression model, thus shows that the classroom teaching mode of profound influence on teachers and students, not only improve the efficiency of teachers' classroom teaching, but also enhance the enthusiasm of students to learn knowledge, It promotes the classroom teaching reform in colleges and universities.

Keywords: Regression model · Mixed teaching · Instructional Design · Teaching Strategy

1 Introduction

At the National Education Information Conference held in December 2021, the Ministry of Education required to accelerate the high-quality development of college education informatization in the new era, leading the modernization with the support of informatization, and accelerating the reform of education in the information age. Education in the era of information technology is bound to be the education under the Internet environment. At the same time, modern information technology plays a great role in boosting the innovation and development of classroom teaching reform in colleges and universities.[1] With the new forms of information technology platform created by "Internet", from the knowledge, students becomes more and more diversified, unlike the traditional classroom education mode in colleges and universities; thus promoting the new mode of classroom teaching reform, has a profound influence on teachers' teaching ideas, teaching mode, teaching content and teaching methods. [2] Therefore, the new era of information technology and the current reform and development of combination of the combination of classroom teaching will be the latest development and research

direction, make the classroom teaching education mode of qualitative change, regardless of teaching content setting, curriculum target gradually transformation, upgrading, make the teaching and learning methods, ideas, places and innovation, focusing on the traditional classroom teaching way and the concept of information technology integrated education reform, make it better promote the Chinese colleges and universities to adapt to the development of The Times of high-quality innovative talents.

During the epidemic period, in line with the national tenet of "no suspension of classes", universities actively promoted the teaching mode of online courses and promoted the construction of open online open courses, such as learning and rain classroom. [3] The school as early as a few years ago has begun to the construction of network information platform, higher mathematics courses approved in 2018, the construction of provincial quality online courses, further promote the development of higher mathematics course online platform, including recording video, making exercises, such as online resources, which provides a powerful teaching for online teaching resources.

2 Strengthen the Student-Oriented Teaching Concept

Advanced mathematics is a course with strong theory, abstract concept and careful logical thinking. As a public basic course of science and engineering, it is freshmen. The basic method of learning mathematics is: the understanding of theoretical knowledge exercises deduction. Even after the reform and innovation of classroom teaching in recent years, the offline classroom teaching methods still need multimedia blackboard writing, in order to present the abstract and concrete characteristics of mathematical theory.[4] During the outbreak, the teaching idea is: let students at home online learning higher mathematics, the understanding of mathematical abstract concepts, example analysis, exercises more close to offline classroom learning, and effectively combined with online learning resources, online school every class, offline preview, review, at the same time let the teacher can timely understanding of students online learning dynamics, so as to promote the interaction between teachers and students, students and students, student initiative get better reflected. Therefore, through the questionnaire of students 'learning situation on the learning platform in the week before the semester, considering the requirements of online live broadcast on the stability of network speed and the platform, as well as the situation of students' online reception at home, the 1 1 mode of Tencent classroom live broadcast, supplemented by learning platform and QQ class group is adopted.

3 Classroom Teaching Strategy of Mixed Teaching Model

In order to make students adapt to the learning link and teaching mode of online teaching as soon as possible, the following online classroom teaching design is conducted, As shown in Fig. 1.
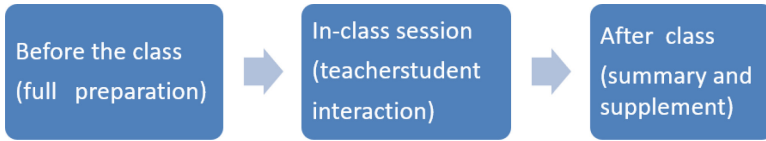
Fig. 1. Classroom teaching design

3.1 Preview Before Class and Prepare for Knowledge

Using the information technology platform, we can easily and effectively provide students with rich course learning materials through the Internet. Pre-class resource preparation is crucial, and the communication between teachers and students is mainly online. For the preparation of students' preview course, teachers will send the class information through the Internet (QQ class group platform) on the day before the higher mathematics course, and send the electronic materials of the pre-class preview list on the information technology platform (teacher client of Learning Pass Information platform), so as to facilitate students to preview and prepare in advance. As shown in Fig. 2:

Preparation before class list, clear annotation students need to complete learning tasks before class, especially through the use of learning platform behind each teaching video design corresponding video test, and set up recruit mode, learning will grasp to each student's learning data, so that teachers to master the dynamic students online learning, so as to improve the students' learning initiative. The following are the video task points set by the teacher client (Fig. 3) and the learning data of the students watching the video (Fig. 4):

For teachers 'classroom teaching content data preparation, teachers not only need to consider online teaching task, and can timely grasp the students' class learning dynamic, so first in the class using the PPT teaching courseware, courseware homepage to present each class need to master the knowledge, in addition to the specific teaching theory, examples, exercises choice is given priority to in the form of choice, convenient students interact with the teacher in class. Secondly, the learning information platform is used to establish a course database, prepare test papers suitable for classroom content, and the
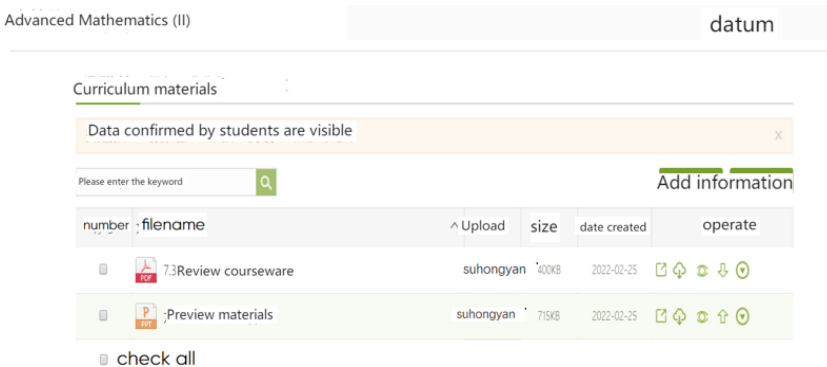

Fig. 2. The teacher client uploads the learning materials on the display page
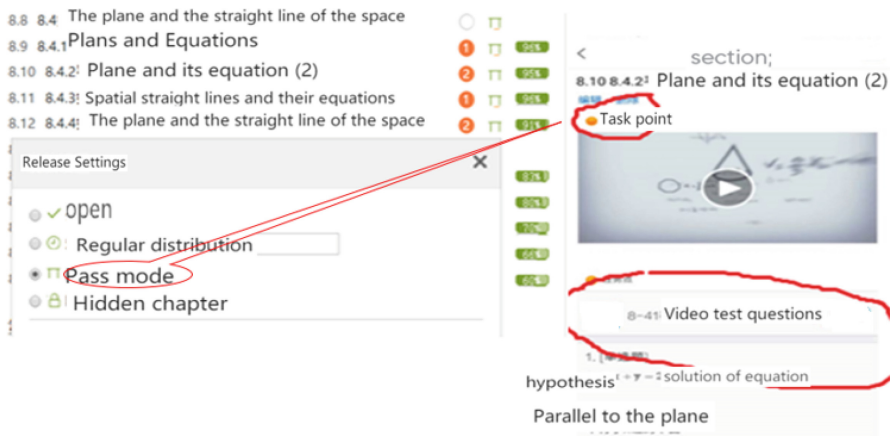
Fig. 3. The teacher client publishes the course video learning task points

Fig. 4. Learning data of the students' viewing videos

corresponding homework is uploaded to the database of higher mathematics courses of the learning information platform, and the platform is used to be pushed to students for reference at any time.

3.2 The Mixed Teaching Mode in the Class, Enhance the Interaction Between Teachers and Students

Due to the epidemic, some students are not studying in the classroom. Teachers will ask students to sign in 10 min before class to timely grasp the online learning situation of students. First class using information technology equipment are: learning platform synchronous classroom function, separate configuration of camera equipment, connection computer, can put the teacher's image and explain the problem handwritten free switch, instead of the classroom blackboard function, avoid online students receive information in class, can't see the teacher in the classroom blackboard writing the problem. [5]
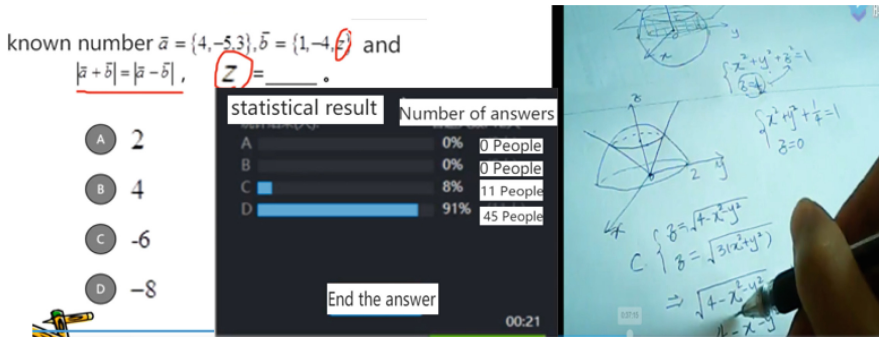
Fig. 5. With the help of the information platform to show the classroom teaching situation

Through the simultaneous online and offline teaching, the classroom effect of teachers is improved.

Secondly, the combination of information technology platform to explain theory and questions, which helps to promote the interaction between teachers and students. In order to facilitate the communication between online and offline students, during the classroom teaching, teachers flexibly mobilize the enthusiasm and initiative of students, such as through the functions of random selection, learning and random selection, the students' learning mode, answer the multiple choice questions in the discussion area or the answer board, and take pictures to the learning information platform, teachers will use the projection function of the platform to display the exercises, convenient for students to learn from each other (Fig. 5).Finally, before the end of the course, the classroom test paper will be sent to ask the students to answer and submit it to the learning information platform, so as to understand the students' mastery of the knowledge points.

3.3 After Class, Online Answer Questions, Knowledge Consolidation

In order to consolidate students' knowledge in class, teachers timely supplement learning resources after class, such as releasing homework on the learning platform of our school, as well as the corresponding chapter test papers and teaching courseware to help students review and consolidate the knowledge they have learned. Among them, the homework is mainly multiple choice questions and short answer questions. After students write, they take photos and upload them to the Learning Pass information platform, so as to facilitate teachers to correct students' homework online. In the function of homework setting of the information platform, teachers will timely choose the mutual evaluation mode of students, so that students can review the examination papers of class students independently, so as to promote students' communication and learning. As shown in Fig. 6
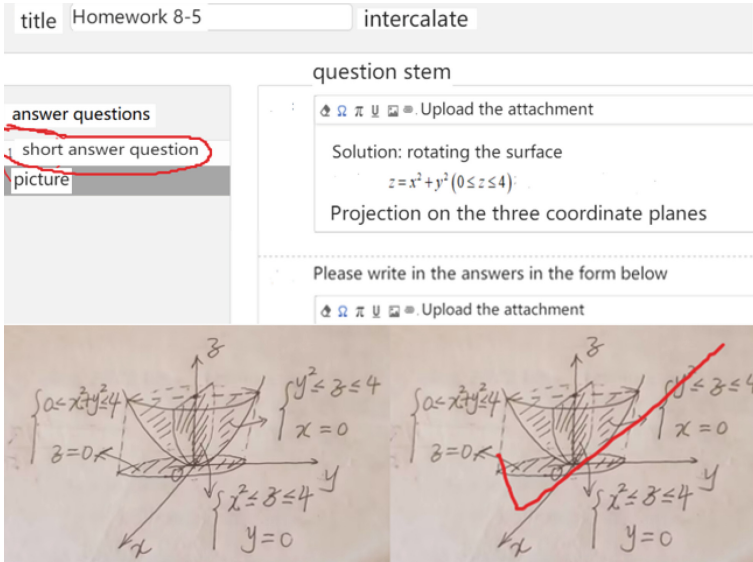
Fig. 6. Assignments submitted by students on the information platform

4   Summary and Evaluation

In order to better grasp the personalized differences of students learning, understand the students' knowledge, the teacher according to learning information platform students multiple evaluation indicators, combined with four class 105 students learning index data, such as considering five assessment indicators: watch video (100%), learning times, homework (average), test (average), classroom activities (integral), normalization, establish linear regression model about students.[6, 7]The details are shown in Table 1

$$y = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \beta_3 x_3 + \beta_4 x_4 + \beta_5 x_5 + \varepsilon$$

Among them, watching video x_1, learning times x_2, homework x_3, test x_4, classroom activity x_5, and y are the results of students' learning evaluation. Linear regression analysis was performed using the SPSS software. See Table 2.

Table 1.   Student evaluation index data

number	x_1	x_2	x_3	x_4	x_5
01	0.9	210	95	95	69
02	0.9	227	100	65	49
03	0.9	54	90	75	69
⋮	⋮	⋮	⋮	⋮	⋮
105	0.96	48	100	88	74

Table 2. Results of the linear regression analysis

	Non-standardized coefficients		Standardization coefficient	t	P	VIF
	B	standard deviation	Beta			
constant	72.783	2.918	-	24.942	0.000**	-1.033
watching video	0.037	0.025	0.095	1.483	0.142	1.043
learning times	0.014	0.007	0.121	1.876	0.064	1.026 1.058 1.067
homework	0.206	0.017	0.767	11.981	0.000**	
test	-0.015	0.021	-0.048	-0.738	0.463	
classroom activity	0.012	0.027	0.029	0.449	0.654	
R^2	0.632					
F	$F(5,92) = 31.640, p = 0.000$					
D-W	2.136					

And the linear regression models were obtained:

$$y = 72.783 + 0.037x_1 + 0.014x_2 + 0.206x_3 - 0.015x_4 + 0.012x_5$$

F test and test P < 0. 05, thus passed the significance test. In addition, checking the multicollinearity of the model shows that all VIF values in the model are less than 5, which means there is no collinearity problem, and the D-W value is near the number 2, which indicates that there is no autocorrelation between the sample data, and the model is good [8, 9].

Through the above model analysis, we can predict that among the factors affecting students 'learning evaluation, the homework completion degree has a great influence on students' evaluation results, so it is also an important factor for teachers to consider in students' evaluation in the future. [10] The teachers timely adjust the weight of students assessment index (100%): video learning 5%, active learning times 5%, homework quantity 60%, 20% classroom activities, 10%, the usual record score, and included in the final assessment score, for the individual students score low every week, teachers will be in learning information platform set learning warning, urge students to learn, improve the students' learning outcomes. See Fig. 7 below for the specific performance data.
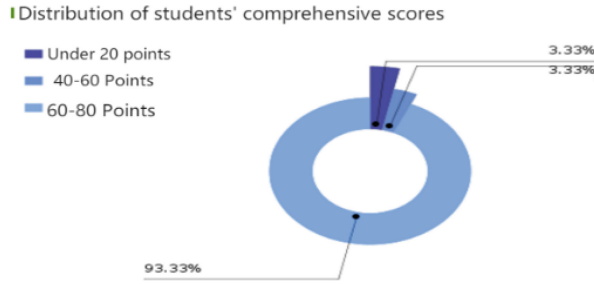
Fig. 7. Analysis of the student achievement data

In higher mathematics classroom teaching reform, therefore, relying on the information platform and the Internet information transmission, make up for the abstract characteristics of higher mathematics knowledge, make students a complete coverage of classroom learning information, interaction between teachers and students more convenient, through classroom online and offline teaching content design (preview materials, classroom information platform interaction, courseware, homework), make college classroom more vivid and flexible, students also experience the fun of learning, fully arouse the enthusiasm of students and initiative.

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