

# Thoughts and Suggestions on the Reform of Mixed Teaching in Higher Mathematics

Zhen Sun

Ankang University, Ankang, 725000, China

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**Abstract:** Mixed teaching can effectively improve the problems of low classroom efficiency and low enthusiasm of students in traditional higher mathematics teaching, which is of great significance to higher mathematics teaching. This paper analyzes the characteristics and significance of the interactive teaching mode, and analyzes the current situation of the hybrid teaching of higher mathematics in China by means of sample survey, and proposes the recommended measures.

## 1. Introduction

The hybrid teaching reform of higher mathematics is the reform direction of teaching. It mainly focuses on the problems in the traditional teaching mode and proposes a new concept of interactive teaching. Due to its high degree of abstraction and strict logic, advanced mathematics has always been a headache for college students, especially high vocational college students. In traditional mathematics teaching, most of them are based on the mode of board or PPT. It is difficult to stimulate students' interest in learning and bring a series of problems to teaching. Introducing the hybrid teaching mode into higher mathematics teaching, we can fully utilize the WeChat public platform and the BB platform to strengthen communication between teachers and students, enrich teaching resources, and continuously improve students' interest in learning by providing diverse learning methods. Improve the teaching bottleneck in higher mathematics teaching. Therefore, it is imperative to construct a higher mathematics teaching reform model with data, depth and innovation. This paper carries out research in this context, and hopes to realize the interactive exploration of teaching mode and learning mode, and provide some thoughts for the reform of higher mathematics in China.

## 2. The meaning and characteristics of mixed teaching

### 2.1. Overview of the mixed teaching mode

The excellent network learning resource platform and information technology platform are rapidly and iteratively developed. The integration of traditional learning mode and classroom teaching is an inevitable development direction. Under the background of such teaching development, the education departments, universities and other parties are carrying out classroom teaching reform. The resulting blended teaching and blended learning have become the focus of research by society, educational researchers, educators, and administrators. The hybrid teaching mode is an innovation of the educational teaching mode. The most remarkable feature of this teaching mode compared with the traditional teaching mode is that it has strong interactivity. Hybrid teaching is a teaching mode in which the advantages of traditional teaching and network teaching complement each other. It can not only play the leading role of guidance, inspiration and monitoring played by teachers in the teaching process, but also reflect the initiative of students as the main body of the learning process. The emergence of this teaching mode is a concrete manifestation of the application and development of information technology in teaching reform.

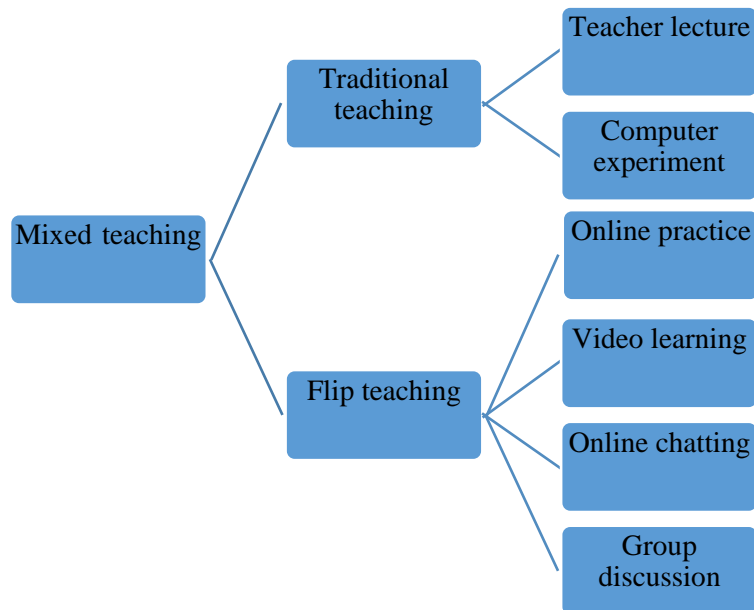


Figure 1. The basic framework of the hybrid teaching model

The mixed teaching mode is based on the full innovation of traditional teaching practice and theory. It retains the advantages of traditional teaching on the basis of traditional teaching, and highlights the interaction between teachers and students, which is conducive to stimulating teachers and students' learning interest. This teaching mode fully integrates online and offline learning resources, effectively exploits the characteristics of online teaching, continuously expands students' learning space, respects students' individuality, encourages students to learn collaboratively and learn independently, and gives teachers and students sufficient The opportunity to communicate. Based on these advantages, the hybrid teaching model has been promoted and applied in recent years. In the hybrid teaching mode, information technology and network environment assistance are needed. The use of mixed teaching mode in higher mathematics teaching is mainly to build a network teaching platform by means of the network, to create MOOC and micro-courses, so that the teaching and learning of higher mathematics is no longer limited to the classroom, and the teaching of higher mathematics is open.

### 2.1. The significance of mixed teaching

Many scholars have put forward persuasive opinions on the meaning of hybrid teaching. Shengquan Yu and other scholars believe that hybrid teaching is equivalent to the concept of mixed learning, which helps to complement the traditional teaching model, reflects the role of students, and inspires students to learn. Kedong Li believes that mixed learning is a mixture of learning and online learning that integrates different teaching theories, teaching models and learning environments. It can promote appropriate independent learning, and build teachers and students to jointly build teaching and learning evaluation feedback big data to promote professors and Learning to promote each other.

Specifically, the hybrid teaching method extends the classroom time to extracurricular activities through the organic combination of “online” and “offline” teaching methods, and inverts knowledge teaching and deep inquiry, which can make learners learn from shallow to deep. The ground leads to deep learning. Effective teaching must be an activity that gives learners timely and accurate external support based on the rules of learning. The purpose of blended instruction is to give full play to the advantages of “online” and “offline” teaching, to improve the initiative and participation of students, and to enhance classroom interaction. The use of hybrid learning methods to organize students' learning and effectively integrate online learning with the advantages of traditional classroom teaching is not only helpful to help students master the basic knowledge comprehensively, but also to improve students' ability to analyze and solve problems.

### 3. Mixed teaching mode in advanced mathematics teaching

The hybrid teaching model has changed the teaching mode of higher mathematics courses, improving students' learning ability, hands-on ability, and language expression ability. However, there are cases where online learning and classroom teaching are difficult to effectively balance, and some new problems will arise during the teaching process. At present, in the mathematics mixed education of colleges and universities, the network teaching platform and the WeChat learning platform are often used. These two learning platforms have designed the following teaching links, provided technical support for teaching interaction, and set up students to participate in answering questions, background messages and other functions, enhance interaction with teachers, and help teachers to carry out teaching activities and enhance the enthusiasm for learning.

The basic framework of the hybrid teaching mode of higher mathematics includes teaching design, teaching evaluation, teaching feedback and teaching implementation.

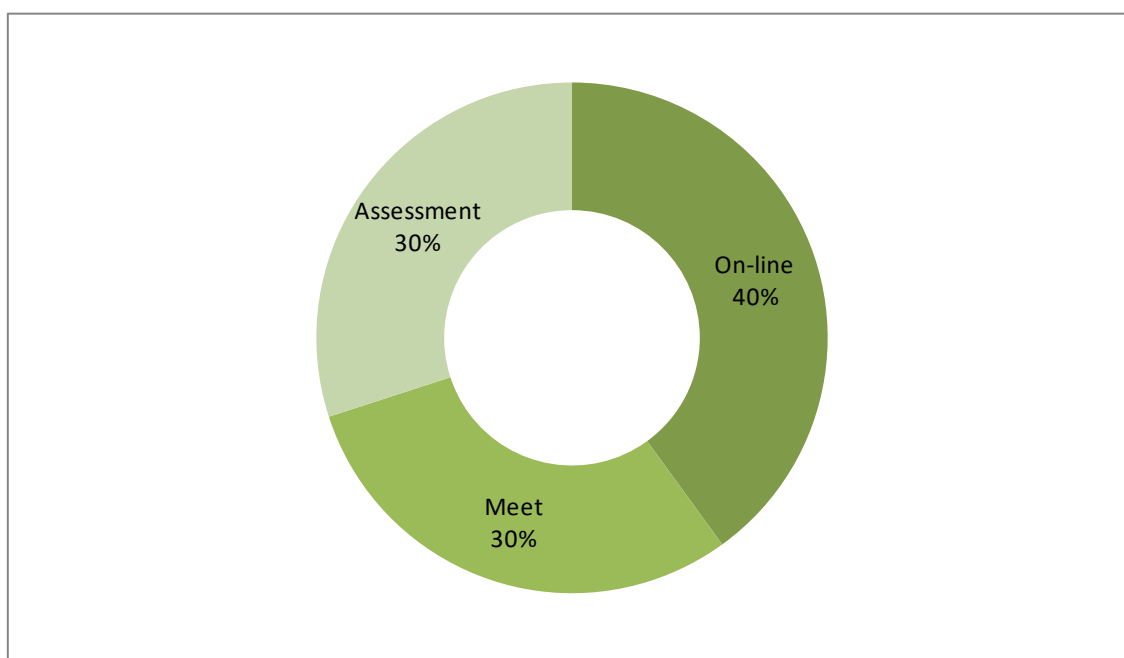


Figure 2. Structure of teaching mode of mixed teaching mode

#### 3.1. Instructional design.

Teaching design includes academic analysis, learning content, learning resource selection, informational teaching platform, learning activity design, evaluation design and so on. The determination of teaching objectives must be clear, specific, hierarchical and feasible. In the teaching design process, it is necessary to fully embody the interactive characteristics of teachers and students. In addition to the multi-dimensional analysis of the social environment, demographic characteristics and cultural background of students, it is also necessary to select the task based on the knowledge base of students and the characteristics of learning content. Teaching methods such as thematic, debate, and expansion methods increase student engagement. If you need to prepare test questions, create group tasks, make voting, manage discussion questions and other specific learning tasks. This is conducive to the establishment of one-to-one synchronization or communication between teachers and students, to understand the different needs of students, and to adjust the teaching design in a targeted manner.

#### 3.2. Teaching content.

The determination of higher mathematics teaching content must strictly follow the systematic, logical and complete content of the course content to ensure the rigor and continuity of the course content system. At the same time, in order to improve the classroom effect and learning atmosphere, teachers often need to insert animations and backgrounds in the PPT of teaching to attract students'

attention. When determining the content of the teaching, under the premise of ensuring the comprehensive coverage of the knowledge points, according to the difficulty level of the content and the nature of the content, the students need to complete the part before the class, the face-to-face part and the self-study part of the students after class, and at the same time give learning Provide the corresponding knowledge resources.

### 3.3. Teaching implementation.

Although mixed teaching advocates students to build their own knowledge, the resources supply, organization and management of teachers are more important for creating a democratic and harmonious learning environment. Therefore, it is necessary to pay attention to methods and methods in the teaching process, and sign up occasionally to enhance the sense of classroom ritual and participation. When interacting in the classroom, feedback should be given to the pre-teaching tasks, and students should be organized in the form of brainstorming, selection of test questions, and assignment tasks to avoid shallow learning and dissociation learning. In the classroom, the teaching time and space saved in the classroom-driven, topic-driven form, using the advantages of traditional classroom board, guide, encourage, inspire, observe student response, enhance the classroom learning atmosphere and integration.

### 3.4. Teaching evaluation.

Teaching evaluation is not only an effective supervision of teachers' teaching effects, but also a further test of students' learning effects. The hybrid teaching mode enables students to participate in the collection of pre-class, in-class and after-school teaching activities. It often involves students submitting assignments online, exchange discussions, classroom responses, etc. Teachers should manually evaluate the submitted assignments and classroom performance according to the achievement of the student's learning objectives, and generate a learning analysis report for each individual student. In addition, students should be encouraged to self-assess their own learning, find out the reasons and actively reflect on them, and build a sense of independent learning. It is also necessary to establish a mutual evaluation mechanism based on the needs of the classroom to jointly build a learning knowledge structure.

## 4. Empirical research on mixed teaching mode of higher mathematics

### 4.1. Identify the research object

This paper investigates the mathematics teaching modes of five universities in Zhongshan University, Guangdong University of Foreign Studies, Guangzhou University, Guangdong University of Technology and Jinan University. The reason for choosing the above schools is that the above-mentioned colleges have their own characteristics. They have traditional 985 colleges, double-class construction disciplines, and municipal colleges, which can guarantee the objectivity of the survey results. On the other hand, because these colleges and universities have relatively strong disciplines, they have a strong reference for the reform of the hybrid teaching model of higher mathematics. The subjects of the survey were the teachers and students of the mathematics department of the above institutions, including 12 teachers and 350 students. In order to ensure the objectivity and accuracy of the research results, these surveyed students are distributed at different levels such as undergraduate, graduate and doctoral students. The structure of the respondents is as follows:

Table 1 Distribution of schools and learning stages

School Name	Undergraduate	Postgraduate	Doctoral student
Sun Yat-sen University,	40	18	12
Guangdong University of Foreign Studies	30	20	20
GuangZhou University	20	30	20
Guangdong University of Technology	15	30	25
Jinan University	50	10	10

## 4.2. Clear investigation and research content

The study was conducted mainly in the form of questionnaires and interviews. In the design of the questionnaire, different subjects such as teachers and students were taken into consideration, and content coverage was also considered. The problems mainly included the attitude towards the traditional mathematics teaching mode, the application of the hybrid teaching mode, and the implementation effect of the hybrid teaching mode. A total of 350 questionnaires were issued, 350 were recovered, and 340 valid questionnaires, with an effective rate of 97%. The questionnaire consists of seven questions, as follows:

(1) What is the education stage you are in now? (A bachelor, B graduate student, C doctoral student)

(2) Has your school adopted a hybrid teaching model? (A full implementation, Part B implementation, C does not)

(3) What do you think are the main problems in the traditional mathematics teaching model? (A classroom interaction is not enough, B teacher teaching method is boring, C students have insufficient interest in learning)

(4) Has the school achieved a significant learning effect in the implementation of the mixed teaching reform? (A is not obvious, B is very obvious)

(5) What is the attitude of students towards mixed teaching? (A is very satisfied, B is generally good, C is very resistant)

(6) Does the teacher's understanding and application of the hybrid teaching model meet the teaching reform goals? (A, fully in line with the teaching method of B teaching has not changed)

(7) Do you think that the hybrid teaching reform is the direction of future mathematics teaching reform? (A, yes, B is not)

## 4.3. Analysis of the conclusions of the investigation

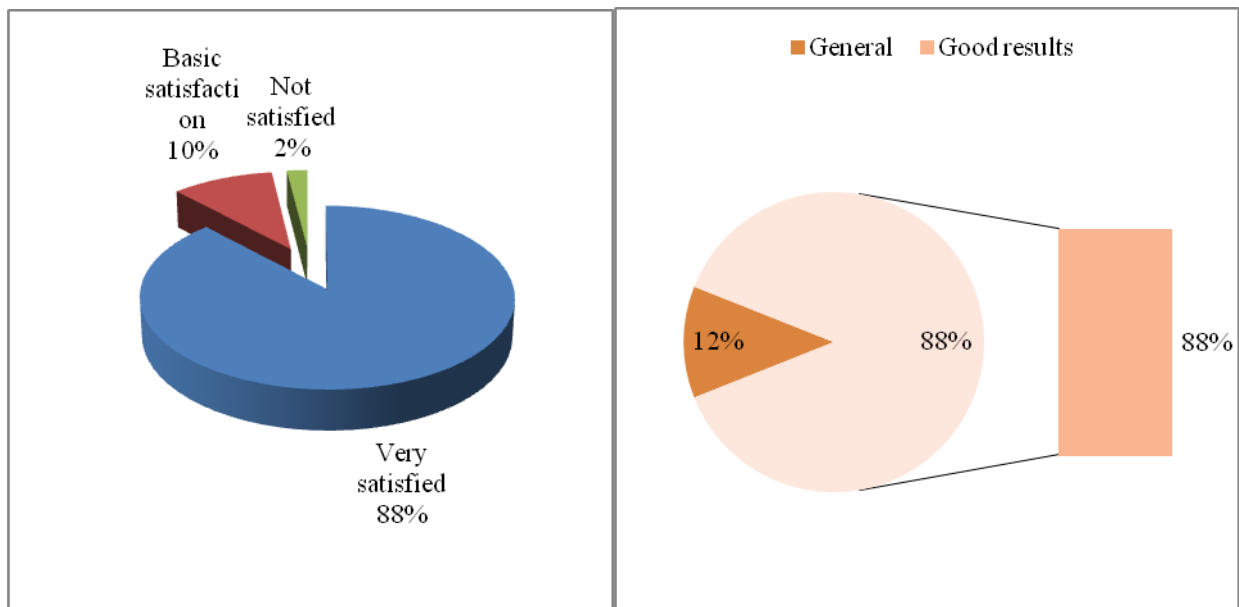


Figure 3. Satisfaction of research subjects on hybrid teaching reform

By combing the above questionnaires, we can have the following conclusions: First, the results of the current mixed-teaching reforms in colleges and universities have not achieved the desired results, and the satisfaction of students is only 54%, which is far from the goal of teaching reform. Second, it is generally believed that the hybrid teaching reform should be the direction of teaching reform. As long as the comprehensive improvement of teaching methods can achieve good results, the positive answer to (5)(7) is 88%. Third, through interviews with teachers, most teachers are full of enthusiasm for mixed teaching, but because of the traces of traditional teaching models, the actual results are not ideal and need to be further cultivated in teaching practice.

## **5. Suggested measures for mixed teaching reform**

### **5.1 Construct a curriculum system that is conducive to the effects of mixed teaching.**

Combining the characteristics of higher mathematics and the disadvantages of teaching functions, this paper holds that the scientific and effective mathematics curriculum system is the most important task in deepening the hybrid teaching reform model of higher mathematics. Therefore, it is necessary to strengthen the top-level design of the curriculum system, build an effective learning framework from the aspects of curriculum objectives, teaching content, curriculum implementation, etc., and introduce a curriculum system suitable for the effectiveness of mixed teaching reform, which provides a prerequisite for the hybrid teaching reform of higher mathematics.

### **5.2 Enhance the fun of the teaching process.**

Uninteresting teaching content will not only attract students' attention, but also make students lose interest in learning. Therefore, it is necessary to increase the individualized learning mode, use the learning platform such as WeChat and MOOC, and develop a multi-teaching mode suitable for students' individuality from the perspective of students' interest and thinking differences, effectively promoting mutual communication between teachers and students. It is necessary to use APP to provide diversified media forms, fast learning content, standard and unified learning resources, etc., to help teachers develop personalized education, and finally let teachers become learners' guides, so that learners can form autonomous learning habit.

### **5.3 Use network resources well.**

Compared with traditional classroom education, online classroom has the characteristics of high resources, high quality, convenient learning, high degree of individualized learning, and wide learning audience. Rich network resources help to stimulate students' enthusiasm for independent learning on mobile devices. Provide conditions for real-time interaction and resource sharing between teachers and students. In the course of teaching design, teachers should follow the guidance of multiple intelligence theory, set up a rich learning environment, effectively carry out teaching design, teaching implementation and teaching evaluation, and maximize the enthusiasm of students.

## **6. Conclusion**

Hybrid teaching is a new teaching model that combines traditional classroom teaching with the rapid development of educational information technology. It has greatly improved the quality of education and the quality of personnel training. It has become the direction of teaching research and reform in many universities. Regardless of whether the traditional teaching mode or the hybrid teaching mode has their own advantages and disadvantages, how to effectively combine traditional teaching and intelligent teaching using information technology in the Internet era, it is a long-term work to continuously improve higher mathematics teaching. New requirements for educators. It is necessary to actively update the teaching concept, combine the concept of higher mathematics education with teaching reform, and use online learning resources such as WeChat and MOOC to enhance the interaction between teachers and students in the classroom and improve the quality of teaching.

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