Research on higher mathematics teaching mode based on JITT

Jun Xie[1*] ,Jinlong Yuan[2],Xiao Lin[1]

[1]Department of Basics, PLA Dalian Naval Academy, Dalian 116018, Liaoning, China
[2]Department of Applied Mathematics, School of Science, Dalian Maritime University, Dalian 116026, China

The corresponding author: Jun Xie (xiao_xiejun@126.com)

Abstract. As a basic course in the field of higher education, higher mathematics plays an important role in the cultivation of students' thinking. How to improve the classroom teaching effect of higher mathematics is a common concern of many teachers. In view of the shortcomings of the present situation of higher mathematics classroom teaching, this paper puts forward the application of JITT teaching mode in higher mathematics teaching, making full use of the existing network technology resources, So as to improve the classroom teaching effect and better train students' innovation and application ability.

Keywords: JITT teaching; Advanced mathematics; Teaching mode; Classroom teaching

1 Introduction and research status of JITT teaching mode

As an important public basic course, advanced mathematics is the basis of many engineering majors, and plays an important role in the students' subsequent professional course learning and thinking training. However, from the current teaching situation, there are many problems in the teaching of higher mathematics, which are mainly manifested as students' low interest in learning, teachers' single teaching methods, and students' inattentive listening. Therefore, it is imperative to reform the teaching methods and models of higher mathematics. JITT, a new teaching mode, overcomes the shortcomings of the traditional teaching mode. Therefore, JITT can be used to complete the teaching of higher mathematics.

JITT (just-in-time teaching), also known as just-in-time teaching [3] [4], is a new teaching strategy [1], produced in the United States at the end of the 20th century. This teaching mode was first proposed by four physics teachers from the United States Air Force Academy and Purdue University [2]. In order to overcome the problems existing in the traditional teaching mode, a more effective teaching method is created, and the JITT teaching method is put forward.

JITT is a new teaching mode which integrates information technology with curriculum [5]. Specifically, it is a teaching strategy produced by the interaction between

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students' learning on the Internet and students' independent learning in the classroom. Although JITT teaching mode relies on the network, it is not network teaching, and its teaching is still in the classroom. It only uses some teaching resources through the network after class. To be precise, it is a teaching method integrating in class and after class [6].

Since the JITT teaching model was put forward in the 1990s, many experts and scholars have conducted in-depth research on it and made some achievements [8]. In November 2009, a monograph on JITT teaching mode written by Scott Simkins and Mark Maier researched and summarized the teaching methods applied by JITT teaching mode, and it has been used and promoted in the teaching of many subjects. The National Science Foundation has established several projects for the JITT teaching model, and supported the construction of a JITT teaching site to guide teachers to research this teaching model. Although JITT teaching mode has been popularized and applied to various disciplines in many countries such as the United States and Canada, there is little research on it in China, let alone in practical application. Therefore, discussion on JITT teaching mode should be strengthened, especially in the teaching of higher mathematics to overcome the shortcomings of traditional teaching mode [9]. In order to improve students' independent learning ability and innovative spirit of higher mathematics.

2 The implementation process of JITT teaching mode

2.1 Independent online learning

JITT teaching mode is very different from the traditional instilled teaching mode in the past. It enables students to learn what they have learned more actively. It first puts part of the teaching content on the network platform, so that students can learn independently. After completing independent learning, students will timely report their difficulties in learning to the teacher. In this way, timely communication between teachers and students can be realized [10]. Only by understanding students' learning needs and mastery of preparatory knowledge before class can teachers improve the teaching efficiency in class. Therefore, JITT teaching mode consists of the following four steps [7]: 1. Teachers publish the content that needs to be reviewed before class on the Internet; 2. Students should preview carefully before class and give feedback to teachers; Then the teacher makes corresponding adjustment to the teaching according to the feedback. 3. Create student-centered learning classrooms. In the whole teaching mode, teachers' teaching quality and teaching effect in class are directly related to students' online preview before class and the feedback information they submit to teachers. In the online preview of students' autonomy [11], teachers can adopt various forms of organization. For example, in the teaching of higher mathematics, teachers can divide students into several groups. In addition, the preparatory knowledge required to be mastered by students and the content that students need to preview by themselves are put on the network in the form of micro-lessons or courseware, which is conducive to cultivating students' teamwork spirit and self-disciplined learning ability. Of course, the task assigned by the teacher should consider the interest of the

students, for example, when teaching the concept of definite integral in high numbers, we can propose the area of the regular graph we will solve, such as the area of the circle, the area of the trapezoid, but how should the area of the irregular graph be solved? The question of what determines the height of the rainbow is raised when the problem of extreme and maximum values is taught. Students should complete the task assigned by the teacher in a timely manner within the prescribed time, and complete the discussion in the group before class. After summarizing the problems in the completion of the task, they should timely report them to the teacher before class. After summarizing the problems in each group, the teacher should timely adjust the teaching and teaching progress in class. In this way, teachers can teach the knowledge points of this class more pertinently.

2.2 Student-centered classroom teaching

In the process of classroom teaching, in order to improve the teaching effect, teachers can not only use the traditional teaching mode, but also try some new teaching methods. Teachers can use classroom discussion to strengthen students' learning. Since students have completed the network tasks before and have certain insights on the topics discussed, teachers can also use classroom discussion to strengthen students' learning. Each group can first introduce the completion of its own task, and the problems of different groups can be explained by other groups. Because of the preview, students can actively participate in class activities. Then the teacher will summarize the explanations of each group. In this way, the student-oriented and teacher-led teaching method can be realized. In addition, this learning method can arouse the enthusiasm of students in learning and improve their ability to solve problems.

2.3 The consolidation of network learning for classroom teaching

After the completion of the classroom teaching, the teacher will design some questions for students to think about according to the students' grasp of the knowledge point. Appropriate exercises can be selected and left on the Internet for students' homework, which will deepen the students' further understanding of the knowledge point. The teacher then designs the teaching content of the next class according to the completion of the knowledge of the students on the Internet, so that the cycle is repeated and linked, and the purpose of students mastering the knowledge in the gradual process is realized.

For example, In the course of teaching the extreme value and maximum value of the function in high number, the teacher can give students such a thinking problem on the network in advance: after a heavy rain, the raindrops do not completely disappear, and a beautiful rainbow appears in front of people's eyes, why does the rainbow have color? How do rainbows form? Why is the shape of the rainbow arc and the color has a certain rule? What determines the height of a rainbow? After teachers raise relevant questions on the Internet, students begin to think seriously after class and draw their own conclusions; In addition, the teacher will give feedback to the teacher in time on the problems that are not clear, and the teacher will adjust the teaching progress of

this course in time after seeing the feedback of the students, and then guide the students to actively discuss and speak in class according to the feedback of the students. Finally, under the guidance of the teacher, it is concluded that raindrops will produce rainbows when they are reflected and refracted. The deflection Angle of sunlight is formed by the reflection and refraction of light, and the maximum value of the deflection Angle of sunlight can be obtained by the method of derivation. After reaching the conclusion, it is also possible to predict the time of the next rainbow at a deeper level. Then, according to the students' response in class, the teacher will issue a relevant question on the Internet to deepen the students' understanding of the application of extreme value and maximum value problem in practice.

3 Key points of JITT operation and issues needing attention

The key factor to implement JITT teaching mode is to form a feedback chain. Students should report the pre-class preview to the teacher in time, and the teacher will adjust the content of classroom teaching according to the students' preview. Therefore, there are two kinds of feedback: one is the feedback of students to teachers during pre-class preview, and the other is the feedback of learning effect in one class to the next pre-class preview. Through these two kinds of feedback, teachers can grasp students' learning situation and adjust their teaching content and progress in time to adapt to students' learning. Because this feedback is mainly achieved on the network, the application of information technology plays an important role in this teaching model.

When assigning specific learning content to students before class, teachers should list specific requirements and specify the key steps to be solved for each problem. For example, when asking students to think about how to solve the problem of irregular graph area, they can be told that the solution needs four steps: segmentation, approximate substitution, summation and limit taking. And the way to solve the problem to make appropriate prompts, so that students in the completion of the task to experience the fun of learning and exploration, so as to achieve the expected effect of learning.

4 The change of the application of JITT teaching mode in higher mathematics

4.1 Changes in teachers' teaching methods

In the previous teaching process, students only passively accept what they have learned, while JITT teaching mode guides students to learn independently, and teachers play a guiding role in the whole process. Before each class, teachers should fully understand the situation of students' online learning before class and the problems arising in the whole process of independent learning. Thus, in the course of class, students' problems are answered in a timely manner, and students' understanding of the problems is corrected in a timely manner, so as to ensure the teaching quality of each class.

4.2 The change of student achievement assessment method

In the past, students' final scores were often determined by students' final exam scores. Such a one-sided assessment method could not truly reflect students' mastery of knowledge and was not conducive to mobilizing students' enthusiasm in class performance. JITT teaching mode was adopted, and students' scores were divided into three parts. It consists of three parts: the assessment of students' knowledge preview on the Internet before class, the assessment of students' performance in class and the final assessment. Through the assessment of these three parts, students' enthusiasm for learning can be fully mobilized and students can be more actively integrated into the learning environment.

4.3 Changes the way students learn

In the JITT teaching mode, students can skip the learning content published by teachers before class if there is knowledge that students have already mastered or they do not need to repeat the learning, so as to save time and complete the learning of other knowledge points. If the content is not understood, the student can continue to study until the knowledge point is clear. In this way, students can learn according to the level of acceptance, so as to improve learning efficiency. At the same time, students' learning time has also changed. They can study not only in the classroom, but also at any other time. They can also contact the teacher in time for discussion. Students' learning habits have also changed, and they can continue to study in their spare time. After learning before class, students can watch teaching videos through mobile phones, give feedback to teachers in time, and communicate with classmates, thus achieving good learning results. From this point of view, the application of JITT teaching mode in the design of performance skills courses effectively improves the classroom efficiency, greatly stimulates the learning enthusiasm of students, enricfies the classroom content and enlivens the classroom atmosphere. Through a series of teaching comparison, it can be seen that students' learning ability is obviously enhanced.

5 Conclusion

In the JITT teaching mode, the classroom teaching is student-oriented and teacher-oriented. Because students have already prepared and done the corresponding exercises in advance, they come to the class with questions, so it is easier to mobilize the enthusiasm of students. Students taking initiative will make the class more active. Therefore, the classroom is no longer for students to listen to the teacher's knowledge, but to solve the key and difficult points, to solve students' problems as the core, everything revolves around the students and the curriculum's key and difficult points, students are the center of the classroom, teachers are only responsible for guidance and summary. In view of this, JITT teaching mode effectively improves class efficiency, greatly stimulates students' learning enthusiasm, enriches class content, enlivens class atmosphere, and significantly enhances students' learning ability.Advanced mathemat-

ics plays an important role in the formation of students' logical thinking and the training of their professional quality. It is imperative to reform the teaching methods and modes of advanced mathematics. JITT teaching mode can overcome some problems existing in traditional teaching of advanced mathematics. To improve the teaching quality of higher mathematics.

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