

# Application of Task-Driven Case Teaching Method in Advanced Mathematics Teaching

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**ABSTRACT.** This paper expounds the advantage and significance of task-driven case teaching method in higher mathematics classroom teaching, and focuses on the specific application of task-driven case teaching method in advanced mathematics classroom teaching, hoping to provide some reference for advanced mathematics teaching.

**KEYWORDS:** Task driven, Case teaching method, Advanced mathematics

## 1. Introduction

Due to the higher mathematics course content more abstract and obscure, and for a long time, in the teaching of higher mathematics course, has been formed mainly teachers teach, students passively accept the teaching mode, this mode with the teacher as the center, textbook as the center, based on the subject system, by rote, cramming education mode of classroom teaching. As a result, students have been learning higher mathematics in a passive way, with low enthusiasm and interest, which will make the final learning effect unsatisfactory. Learning is the need for the realization of “self-worth”, and the new educational concept emphasizes more on the cultivation of students' independent exploration, independent learning and application ability of knowledge. Task-driven teaching method and case teaching method are both new teaching models based on constructivism, humanism and metacognitive theory. They have their own characteristics and advantages. This paper combines these two teaching methods and applies them to the teaching of advanced mathematics.

## 2. Connotation, Characteristics and Advantages of Task-Driven Case Teaching Method

### ***2.1 Connotation of Task-Driven Case Teaching Method***

Task driven type case teaching refers to the students in the case of the design, design and is driven by the specific task to complete the task in the inquiry or in the process of problem solving, in an atmosphere of discussion and conversation to study a kind of teaching method. It will impart knowledge to give priority to the traditional teaching, to get the task, to analyze and solve problems, to complete the task of interactive teaching. The “task” here is designed by teachers according to the teaching content, teaching purpose and teaching cases. It not only contains the knowledge, skills and methods that students should master, but also includes the ability goals that students should acquire.

Collaborative task case teaching emphasize problem principle and task driven mechanism, with “can double master type” teachers, classroom teachers need to be carefully designed specific teaching tasks, teaching content and related knowledge fusion, students by completing these specific tasks, mastering the task of teaching content, so as to realize the overall teaching goal. This teaching mode will completely change the traditional teaching mode, which is mainly taught by teachers, and replace it with the mixed teaching mode, which emphasizes the students' active inquiry type and cooperative type to complete tasks. Teachers conduct proper guidance and effective organization, which is to stimulate the original intrinsic motivation of students through “tasks”. It makes the boring knowledge points become more specific and specific, and the learning process also has a more sense of experience and participation. By means of combination of online and offline mode, MOOC, grasp the learning content, and more effectively improve students ability to solve practical problems according to the mission scene, more help to stimulate the learning potential, develop the students' team spirit, practice ability and innovation ability, effectively promote the students' cognitive development, cultivation of independent inquiry ability and quality of scientific literacy.

### ***2.2 Characteristics of Task-Driven Case Teaching Method***

Task-driven case teaching method originates from the educational model of “student-centered learning by doing” put forward by American educator John Dewey based on pragmatism. In task-driven teaching method, curriculum teachers are required to design the teaching content into one or more specific tasks, and students can master the corresponding teaching content and achieve the overall teaching goal by completing a series of assigned tasks. It is no longer mainly taught by teachers in accordance with traditional teaching methods, but a teaching method that focuses on students' active learning and is supplemented by teachers' appropriate guidance. In essence, it stimulates students' achievement motivation through “tasks”. It makes the learning objectives of students more clear, specific, more effective mastery of learning content; It is helpful to stimulate students' learning motivation and initiative, and improve students' ability to raise, analyze and solve problems. It helps to cultivate students' innovation, teamwork spirit and practical ability, and promotes students' metacognitive development, independent

exploration ability and scientific thinking quality.

### ***2.3 Advantages of Task-Driven Case Teaching Method***

#### **(1) Make the teaching content more explicit**

Task driven teaching method, the task is the key to the whole teaching, task must be closely around the teaching goal, to show the teaching content. In order to do the design of the task, the teacher should firmly grasp good lesson teaching objectives and teaching content, the first step of this is to guarantee the teaching implementation. Secondly, the activity of students are around and action to complete the task, the task is teacher according to the teaching goal and teaching content design, so more specific learning goals.

#### **(2) To improve students' awareness of active participation**

Teaching, if teachers always speak, students listen to and students emotional fatigue, also easy to form dependence on the teacher psychological. The task driven teaching method, make the students in the process of completing the task, and will do whatever is necessary to actively explore various problem solving approach. The minds of students to analyze and solve problems by getting tasks, always is in active state. At the same time, due to the effect of driving of the task, the student will have a sense of urgency, dependence on teachers' psychological, will not happen again become passive to active, enthusiasm, more focused, speed up the learning efficiency.

#### **(3) Improve students' comprehensive ability**

Driven by task type case teaching, student's learning process is in the process of the solution of the case always focus on the specific task for that specific task is according to the teaching goal, teaching content and teaching case design, which makes the students in the process of completing the task, as well as learning the process of teaching content, also is the process of integrated application of the teaching content. Thus the study and application of knowledge and the cultivation of ability organically unifies in together, let the students deeply understand problems originated from practice, and apply it to practice. In solving specific problems, Teachers do not limit the methods and ideas to achieve the task and the completion of the form and content, this for the students to give play to the imagination and free creation leave enough room, so that the students ability to get comprehensive development.

## **3. Implementation Process of Task-Driven Case Teaching Method in Higher Mathematics Teaching**

### ***3.1 Select Teaching Cases and Design to Drive "Task"***

Task-driven case teaching method is adopted. The design of cases and the

proposal of tasks are the entry points of a class. Cases and tasks should not only be closely related to teaching objectives, but also arouse students' interest in learning, arouse students' enthusiasm, and encourage students to analyze and consider from multiple perspectives and levels. The quality of the task is directly related to the effect of the course. Teachers should propose task objectives in a variety of ways according to the situation. According to the specific situation of students and the current classroom teaching objectives, teachers can start from practical application and design cases and tasks that come from reality, life and profession. While stimulating students' interest, it also enables students to understand how the knowledge and acquired abilities can be applied in practice, life and major.

For example, when teaching the concept of derivative, firstly start with the sports limit items of sports, and summarize the extreme sports that students are interested in in the form of question and answer. This paper introduces the origin and development of high platform diving. Then, the task was designed and put forward. The task was driven by the students guessing the diving action of the high platform. Task assignment takes judging the entry movement as the goal to solve the task, which is different from the traditional direct question based on calculated data, improves students' sense of identity to the course, and reduces the distance between teaching and learning.

### ***3.2 Analyze Cases and Tasks and Guide Students to Complete “Tasks”***

(1) When analyzing the case, firstly introduce the origin and development of high-platform diving. The origins of high diving can be traced back more than 200 years to the Hawaiian Islands in the United States. It is also called “extreme diving” because it is such a risky and deadly sport. This sport is quite popular in Europe and The United States. As early as the 1970s, it has had a world record with a height of 26~28 meters. It is very challenging and can impact the visual nerve of the audience with aerial movements. In 1996, the World High Platform Diving Committee was established, and in 2012, it was officially listed as an official event in the FinA Swimming Championships. Different from other extreme sports, this project has a single motion line and is a kind of variable speed linear motion. At the level of students, understanding and acceptance will be more intuitive and easier to be converted into mathematical models. Therefore, this project is selected as the task case for this lesson.

(2) Then, according to the requirements of the high-platform diving sports event, establish the mathematical movement model and give the simulation data of the example. The students have mastered the physics knowledge, one by one design small problems. Question 1: Fina stipulates that the height of men's high platform diving in the swimming world Championships is 27 meters. How much is the average speed of the athletes from taking off to entering the water? Question 2: Can the average speed reflect the athletic state of the athletes in this period? Question 3: What amount can be used to reflect the athletic state of the athlete during the whole process? In the form of questions, the students are gradually guided to use the limit of average speed to express the instantaneous speed. Taking the instantaneous

velocity as the starting point of the study, the students are guided to summarize the definition of derivative.

(3) Finally, the derivative knowledge is used to solve the instantaneous velocity in the high-platform diving task, and then the students are guided to infer the entry movement of the high-platform diver (calculated with the theoretical height of the project).

### ***3.3 Evaluation of Teaching Effect***

“By learning the theory of teaching” is one of the guiding ideology of modern classroom teaching evaluation. It requires that the effect of classroom teaching is: emotional state, contact status and goal to reach a state of harmony. Therefore, I think, for the evaluation of the effect of classroom teaching, to judge from the following three angles. (1) whether to keep a good mood and exchanges between teachers and students; (2) The psychological experience of teachers and students (3) Students' attention, classroom atmosphere, students' interest in learning and thirst for knowledge, all directly affect the classroom teaching effect.

Therefore, after students complete the tasks designed by teachers, teachers should also evaluate students' approaches to completing tasks and their application and understanding of knowledge. The evaluation of students can be divided into two aspects: one is the evaluation of students after completing tasks. Theory, look to whether contradiction with the correct answer, if the answer is correct, so teachers should give students some encourage and reward, and if the answer wrong or incomplete, so teachers should be to the student the answer to a detailed analysis and review, and find out the problems, let students to understand their own deficiencies, to strengthen the students' learning desire and that will also be able to see how the student to the learned knowledge to master degree and the understanding of new knowledge, the largest extent, complete the teaching purpose. On the other hand, it is necessary to apply the methods and thinking abilities used by students in solving tasks to see whether they have given full play to their own advantages and advantages of teamwork. At the same time, it is also necessary to conduct a comprehensive evaluation according to the performance of students in the team, so that students can ensure sufficient learning momentum.

## **4. Conclusion**

Task driven type case teaching attaches importance to students' autonomous learning, students acquire knowledge, cultivating ability in research, therefore, not all of the teaching content is fit for this kind of teaching mode. Better for some content adopt the traditional teaching mode, teachers cannot machine-made, derivative, blindly use drive type teaching method, one-sided exaggerated its role. To sum up, task-driven teaching method has become an important part of classroom teaching of higher mathematics. Teachers' guidance to students can effectively innovate logical thinking and let students study mathematics on the basis of

task-driven, so as to improve students' spirit of exploration and classroom effect.

### **Acknowledgments**

Anhui University of Finance and Economics Teaching and Research Project “Research on the Application Strategy of task-driven Case Teaching method in higher Mathematics Teaching” (No. acjyyb2019029).

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