

Thoughts on the Teaching Reform of Mathematical Analysis

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Abstract:

This paper focuses on the class teaching of mathematical analysis course. It points out the problems exists in current teaching classes and puts forward some teaching suggestion to stimulate students' interest. Some reform and exploration on several aspects such as teaching content, teaching method, and assessment method, are proposed.

Keywords — **Mathematical analysis, Teaching content, Teaching method, Assessment method.**

I. INTRODUCTION

Mathematical analysis is the most important professional foundation course for mathematics majors. It provides students with the basic theories, basic methods and basic skills necessary for learning subsequent professional course, such as ordinary differential equations, complex functions, real variables, probability theory and mathematical statistics. Mathematical analysis teaching has always been the top priority of the mathematics professional teaching system. However, there are many difficulties in the teaching of mathematical analysis. For example, the teaching content is too abstract and theoretical, and it is difficult to stimulate students' interest in learning. Students have difficulty in mastering relevant mathematical ideas and cultivating mathematical thinking ability and innovation ability. It is generally believed that formalized formal teaching in accordance with a highly abstract deductive expression is an important source of mathematical analysis teaching difficulties.

II. PROBLEMS IN MATHEMATICAL ANALYSIS TEACHING

At present, there are some problems in the teaching system, teaching content, teaching and assessment mode of mathematical analysis. To sum it up, it is mainly reflected in the following four aspects:

(1) **Teaching content is not compact enough**

In traditional mathematics analysis teaching, teachers decompose knowledge into chapters, festivals, and units to students. In fact, mathematical analysis embodies the analytical thinking, logical reasoning methods, problem-solving skills and the whole mathematical thinking methods. Knowledge plays an important role in the mathematics learning and scientific research of the subsequent professional course. The isolated mathematics analysis, while ignoring its relationship with other analytical course, is not conducive to students to establish a complete mathematical theory system and cultivate flexible mathematical thinking.

(2) Teaching mode is not innovative enough

The characteristics of the theoretical basic course of mathematics analysis itself make the traditional teaching mode still adopted, that is, the teacher is in an absolute dominant position in the teaching process, and the knowledge is passed to the students while the students are in the process of learning. So the students are always in the passive phase. Neglecting the dominant position of students in the learning process, teachers always ignore the cultivation of students' learning ability and learning methods in classes. Online education can stimulate students' enthusiasm and initiative, and effectively improve their academic performance. However, online education platform has not been fully utilized to dig up the students' fragmentation time.

(3) The assessment method is not flexible enough

At present, the assessment of this course adopts a closed-loop assessment method. Research on mathematics application ability and self-learning ability is not assessed enough. In addition, because the course itself is difficult, and the teaching arrangement itself does not allow students to have enough time to digest and absorb the course content, it is difficult for students to grasp the key points of learning, and there is a phenomenon of students' pulling an all-nighter at the end of a semester. In the end, the students' mathematics foundation is weak, and the method used by students is superficial.

(4) Insufficient connection between theory and practice

A. Mathematical analysis is a classic theoretical foundation course. Its solidified teaching method and content are very easy for students to have the mistaken idea that "mathematics is the castle in the air". In fact, cultivating the scientific quality of college students with learning

mathematical analysis is an important way to cultivate the scientific quality of college students. It is necessary to focus on cultivating students' mathematical modeling ability in the face of practical problems. Teaching mathematical analysis should emphasis on improving the absorbing ability of knowledge, verifying the mathematical theory of learning, deepening students' understanding of mathematical theory, stimulating interest in learning mathematics, and enhancing the ability of applied mathematics.

III. INITIATIVES TO BE IMPLEMENTED

Teaching reform of mathematical analysis should lie in optimizing of teaching content, reforming of teaching methods, improving of assessment methods, implementation of layered teaching, and the use of online assessments. Deeply cultivating students' mathematics ability training mainly includes the cultivation of mathematics discovery ability, mathematics argumentation ability and mathematics expression ability.

We can do the following work:

(1) Building teaching team to improve the quality of education and teaching

We will build a professional teaching team with solid basic knowledge, strong teaching ability. We will train influential professional leaders and carry out efficient and standardized teaching and research activities.

(2) Adjusting the teaching content to adapt to the overall construction of the mathematics professional analysis curriculum system

It is necessary to deal with the current textbooks in the teaching. Through the implementation of efficient and standardized teaching research and teaching activities, we should clarify the relationship

between mathematical analysis and complex courses, real functions, functional analysis and other follow-up course. An organic communication bridge between different course should be constructed. Appropriate increase and decrease of teaching content and the integration of mathematical ideas should strengthen. Learning materials such as study guidance and problem solving should be prepared to meet the learning needs of students.

(3) Improve online teaching resources and build an online testing platform

At present, the teaching mode of mathematics analysis in our school is a single cramming teaching. The teaching process is mainly based on the teacher's teaching, while lacking the information feedback in the teaching. By setting up an online test platform, we can keep abreast of the students' learning status, stimulate students' enthusiasm for learning, and save the school's human and material resources. Open a web discussion forum to answer questions in a timely manner.

(4) Implementing Stratified Teaching in Accordance with Teaching and Exploring the Reform of Teaching Model

At present, the teaching model of this course ignores the individual differences among students. It should adopt stratified teaching and organize teaching according to the actual situation of students at all levels, so that the teaching objectives, teaching content and teaching methods are in compliance with students' knowledge level and receiving ability. In the specific teaching, the teaching content can be re-integrated, and the difficult points, such as uniform convergence, consistent continuous, and real number theory, can be integrated into the following. Heuristic and discussion-based teaching are applied to students with relatively poor foundations. For students with

relatively good foundations, they further consolidate the theoretical foundation and help them prepare for future research.

(5) Improve the assessment method and pay attention to the cultivation of mathematics ability

At present, the assessment of mathematics analysis course of our school is a limited-time closed-book exam with a single form of examination. The main content of the exam is basically the basic theory and basic knowledge points of each chapter. The innovative thinking, independent thinking ability and the ability of the learned knowledge to solve practical problems are insufficient to fully reflect the students' mastery of the key content of the mathematical analysis course. In addition, the teacher can only understand the students' normal learning through homework and attendance, and the student's homework does not reflect the true situation of the students' learning. Therefore, we will establish an online test platform, which is a comprehensive assessment system of "the usual performance + online test + small essay writing + mathematical experiment design + final exam". These can intuitively reflect the students' professional mathematics ability, and the ability to apply mathematics.

IV. SUMMARY

Mathematics analysis is an important basic course for mathematics students. Under the impetus of the reform of education and teaching system, mathematics analysis teaching should be implemented from the perspective of the learning needs of college students in the new era. In order to improve teach efficiency, we must respond to the requirements of the time to optimize teaching content, reform teaching and assessment models, improve online teaching resources, focus on

practical applications. That would meet the needs of today's students' individualized learning, and help students explore new teaching standards for university mathematics foundation course in the new era.

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