

Teaching Reform and Teaching Practice of Higher Mathematics for Economics and Management

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Abstract: Advanced mathematics is one of the most important public basic courses in colleges and universities. In order to mobilize students' learning interest and subjective initiative, we will discuss how to carry out teaching reform from three aspects. The three aspects are reflecting the central position of students in course learning, carrying out online and offline hybrid teaching and integrating ideological and political elements into the teaching process.

1. Introduction

Advanced mathematics is one of the most important public basic courses in colleges and universities. It is one of the necessary basic courses for all majors in economics and management. It plays a unique and irreplaceable important role in cultivating high-quality scientific and technical talents. The economics and finance major among the economics and management majors in our school has been adjusted from calculus to advanced mathematics after the adjustment of the training plan in 2020. With the teaching practice, there are the following teaching difficulties for advanced mathematics.

First. Students do not play their main role in the learning process. The content of advanced mathematics teaching is mainly based on one variable, multivariate calculus and series, and covers the basic content of ordinary differential equations, vector algebra and space analytic geometry. The content is rich and difficult, and the number of students in a class is more than a hundred. In order to complete the teaching tasks as scheduled, teachers use blackboard writing and PPT presentations in class. Whether it is traditional classroom knowledge transfer or case-based teaching, the main method of teaching higher mathematics courses is still for teachers to sort out knowledge points or collect relevant cases in advance. Teaching has not truly realized the transformation from "teaching" as the center to "learning" as the center. This one-sided knowledge transfer process is indeed a relatively efficient use of classroom time. However, because students' subjective initiative in learning is not fully utilized, this "efficiency" is relatively "inefficient" in terms of improving students' mathematical literacy and cultivating students' mathematical thinking, innovation ability and practical ability.

Second. The teaching content remains unchanged, the class hours are reduced, and the connection between the teaching content and the preparatory and subsequent courses is insufficient. Students come from different majors but study basically the same course content. In the classroom, the phenomenon of not talking about inventions but talking about proofs, and not talking about reasons but only talking about theorems still exists. Students have learned many concepts, theorems, and formulas, but do not know how to apply them. This often leads to obvious deficiencies in students' ability to apply mathematics when relevant mathematical knowledge needs to be applied in subsequent courses and engineering practices.

Third. How to incorporate ideological and political elements into the teaching process of higher mathematics, integrate moral education and knowledge teaching, combine knowledge teaching with value guidance, cultivate students' ability to think dialectically, and strengthen students' sense of innovation, mathematical literacy, and humanistic sentiments. How to highlight the dual functions

of curriculum value guidance and knowledge education on the basis of teaching practice. These problems encountered in teaching need to be solved.

In response to the above three problems, we hope to carry out teaching reform from three aspects: embodying the central position of students in course learning, carrying out online and offline hybrid teaching, and integrating ideological and political elements into the teaching process to improve learning interest.

2. Teaching reform and practice

2.1. Reflect the central position of students in course learning during the teaching process

In February 2019, "China Education Modernization 2035" emphasized that courses should be taught in accordance with their aptitude, knowledge and practice should be integrated, and integrated development, pointing directly to the core and direction of curriculum reform. In September 2019, "the goal of deepening undergraduate education and teaching reform to comprehensively improve the quality of talent cultivation" provides policy guarantees for improving the quality of undergraduate talent training, effectively guiding colleges and universities to return to the education standard and educational rules, and helping to improve college students' sense of educational gain, identity and experience. Undergraduate education is the foundation and core of higher education. To improve the quality and level of undergraduate education, we must properly handle the relationship between education methods and student acceptance. We also need to clarify the central position of students in course learning. Higher mathematics courses are important basic courses. Its basic, instrumental, ideological and cultural nature determines that it plays an important role in undergraduate talent cultivation. The degree to which students master the content of this course will directly affect the quality of students' subsequent course learning, which in turn affects the quality of talent training at the undergraduate stage of the school. Therefore, It is necessary to explore how to build a new student-centered learning model and improve the quality of students' basic course learning to serve the development of school education quality.

We explore the teaching practice of "student-centered learning" to mobilize students' learning initiative and establish the central position of students' learning. We will conduct teaching practice through the following two aspects. First, we guide students to actively discover the sources and applications of higher mathematics in teaching. In the current era of information explosion, students are fully capable of collecting and organizing relevant mathematical culture and cases on their own. This process can not only stimulate students' initiative in learning and cultivate students' ability to review and sort out information, but also deepen their understanding of mathematics during the screening process and effectively stimulate students' interest in learning. Second. Excellent students answer questions for classmates or peers with poor foundation. Excellent students teach the knowledge they have learned to students or peers with poor foundation, which will promote and deepen their understanding of knowledge. They also need to master certain teaching methods and skills. It stimulates active learning and in-depth learning of outstanding students. This teaching practice will affect the learning environment of the university. Students in different positions take on their own responsibilities, which makes it easier for them to improve their independent learning abilities.

2.2. Online and offline hybrid teaching

At present, our school's higher mathematics adopts a teaching model based on traditional classroom teaching. With the continuous deletion of higher mathematics classes hours and the uneven mathematics level of students and other problems, this teaching model can no longer guarantee the quality of teaching. The main manifestations are as follows: The unification of classroom teaching content and progress makes it difficult to achieve personalized learning and hierarchical learning for students; the single teaching method cannot meet differentiated learning; the teaching practice effect is poor; for the content progress, there is insufficient teaching interaction in classroom teaching and the final exam. It is difficult to fully realize the

comprehensive evaluation of students by focusing on summative teaching evaluation. It can be seen that the traditional teaching model is difficult to realize the teaching aspirations of contemporary talent cultivation and cannot adapt to the development requirements of society. With the advancement of science and technology, network information technology has been widely used in teaching, and online education resources have become increasingly abundant. By we use the Internet as a platform, the problem of class hours in traditional classroom teaching can be alleviated; various network information platforms are used to collect students' information. Information feedback can strengthen the interaction and communication between teachers and students. Through the integration and optimization of online teaching resources, it can meet students' personalized and hierarchical learning, improve students' interest in learning, and cultivate students' independent learning ability, innovation ability and practical ability. In particular, the exploration and practice of online teaching models in the post-epidemic era has proved the feasibility and importance of online teaching. the exploration and practice of online teaching models provide a good practical basis for the subsequent online and offline hybrid teaching reform, and also provide a good foundation for the reform of online and offline hybrid teaching based on the Internet platform.

By exploring online and offline hybrid teaching, the teachers use existing online teaching resources to allow students to learn some content online in advance, and then the teacher in class will summarize the content and explain some key and difficult points. This can improve students' self-study ability. Online and offline hybrid teaching determines the central position of students' learning and can save teaching time and solve the problem of insufficient class time.

2.3. Integrate ideological and political elements into the teaching process to improve learning interest

In the teaching process of advanced mathematics, ideological and political elements are integrated to improve learning interest. Advanced mathematics is the most important public basic course in colleges and universities. Advanced mathematics is also a necessary basic course for all economics and management majors. It has unique and unique characteristics in cultivating high-quality scientific and technical talents and irreplaceable important role. Advanced mathematics courses cover a wide range of students, have many class hours, and last a long time, and students pay high attention to them. In the process of higher mathematics teaching, ideological and political elements are integrated to integrate moral education and knowledge teaching, combine knowledge teaching with value guidance, cultivate students' ability to think dialectically, and strengthen students' innovative consciousness, mathematical literacy, and humanistic feelings. On the basis of teaching practice, the dual functions of curriculum value guidance and knowledge education are highlighted.

We excavate the ideological and political elements contained in the courses during the class and integrate them into the courses. The ideological and political education throughout the teaching process can not only deepen students' understanding of each knowledge point, but also It has implemented the task of cultivating people with moral integrity and promoted the realization of the goal of "science and politics, leading lessons, and educating everyone". The "advanced mathematics" teaching path based on curriculum ideology and politics is mainly explored from the following four aspects.

2.3.1. Integrate the history of mathematics development with classroom teaching to inspire students' scientific research spirit and patriotism

"Advanced Mathematics" is a basic public subject. In classroom teaching, due to its tight logic and large amount of calculations, many students find the content boring and difficult to learn. When teachers of higher mathematics are teaching in the classroom, teachers able to tell students the history of the development of higher mathematics, the history of exploration by mathematicians, and the continuation of theoretical achievements in vivid language. Students not only can clearly understand the origin of knowledge and historical changes, but also can understand the pursuit of truth by mathematicians and the perseverance of scientific spirit. These will build students' determination and confidence in seeking knowledge. For example, through the step-by-step solution

of the instantaneous speed problem of variable speed linear motion and the tangent slope problem of a curve at a point, teachers reveal the arduous process of creating the concept of calculus, emphasize the outstanding contributions of two mathematicians Newton and Leibniz, inspire students to take them as role models, be good at observation, diligent in thinking, and have the courage to practice. Only in this way they can gain something and achieve a career through these living things. The history of mathematics and the image of mathematicians undoubtedly add more knowledge and interest to "advanced mathematics", allowing students who seek the truth to know what is happening and why it is happened [1].

2.3.2. Integrate dialectical thinking with classroom teaching to guide students to learn, think and act

In the "Advanced Mathematics" textbook [2], in the chapter on continuous teaching of learning functions, continuous functions can be understood as: Our life is a continuous process of change, with highs (maximum values) and lows (extreme values). As long as we can avoid being complacent in the high valleys and not getting depressed in the low valleys, such a life is meaningful and valuable. When students are learning the limit, the sum of infinitesimals is not necessarily infinitesimal. Through the analysis of examples, the dialectical relationship between "quantitative change" and "qualitative change" has been verified: quantitative change is the necessary preparation for qualitative change, and qualitative change is the inevitable result of quantitative change. When the quantitative change reaches a certain level, the infinitesimal (the limit is zero) undergoes a qualitative change and reaches the limit of "1". Students can also use Xunzi's words in "Encouraging Learning" to understand the artistic conception: "If you don't accumulate small steps, you can't reach a thousand miles; if you don't accumulate small streams, you can't build a river." These experiences tell us that learning is a slow and continuous process. As long as we persevere and persevere, we will surely reach the other side of success. The application of these common philosophies in Chinese language to the teaching of advanced mathematics will undoubtedly increase students' stronger desire for knowledge.

2.3.3. Integrate mathematical culture with classroom teaching, cultivate students' mathematical aesthetics, and exude mathematical wisdom

In "Advanced Mathematics" teaching, teachers convey the regularity of nature through unique language and symbols, or show the beauty of mathematics through curves or symbols or words or images. Mathematics is both the basis and superior to all subjects such as philosophy, science, biology, physics, etc. Mathematical culture is contained in rich and changing graphics, hidden in sections of mathematical codes, and jumping in frames of mathematical characters. Compared with knowledge, the cultural heritage of mathematics is more worthy of exploration. The beauty of mathematics and the transmission of mathematical ideas is the deeper realm pursued by mathematics learning. While guiding classroom teaching, teachers should use language technology, information technology and other teaching methods to cultivate students' sentiments and guide students to integrate mathematical culture and mathematical knowledge. So students can use a positive attitude to accept beautiful things and exude the charm of mathematical wisdom.

2.3.4. Integrate the latest scientific and technological developments with classroom teaching to cultivate students' innovative scientific research spirit

By integrating the latest technologies closely related to the national economy, people's livelihood, and social life into teaching, teachers will allow students to deeply understand the power of mathematics in technological innovation and inspire students to participate in scientific and technological research and development. The following we use Fourier series as an example to introduce how to integrate ideological and political materials and case-based teaching into classroom teaching. It is difficult for first-year undergraduate students without any academic or engineering practice background to understand why functions should be expanded into complex Fourier series. However, the formal complexity of Fourier series brings great convenience to signal processing. In class, we can start with the fierce confrontation between China and the United

States triggered by 5G technology, which led to the U.S. government sanctioning ZTE and cutting off supplies to Huawei. So why does 5G technology cause this? In a society where information is transmitted at high speed, the most competitive advantage of 5G technology is its ultra-high speed, which is inseparable from its core mathematical tool Fourier analysis which leads to the teaching knowledge point-Fourier series. This case uses an exciting opening statement to open up students' curiosity to explore Fourier series, and uses the latest technology to quickly attract students' attention to the teaching content and enter the teaching situation.

3. Conclusion

In the teaching process, we explore and establish a teaching model of "student-centered learning" to improve the quality of education and teaching, cultivate students' ability to consciously and proactively learn and impart knowledge, and promote the construction of a good academic style and cultural environment in the school. Through teachers and outstanding Students, outstanding students and students with poor foundation have formed a closer connection. This connection has important practical significance for building a positive interactive teacher-student relationship and student-student relationship. Online-first-offline hybrid teaching is used to improve students' self-learning ability. Determining the central position of students' learning can save teaching time and solve the problem of insufficient class time. In addition, in the process of teaching mathematical knowledge, ideological and political content is embedded silently to stimulate students' initiative in learning mathematics and cultivate moral ethics. Making high-quality talents with both morality and talent as the fundamental task of their work, ideological and political content can realize the value guidance of ideological and political education in higher mathematics courses [3].

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