

# Exploration on Teaching Reform of Higher Mathematics Course in Applied University Under "Golden Course" Standard

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## ABSTRACT

The reform of teaching higher mathematics in applied universities under the guidance of the "golden course" standard is explored in this study. Firstly, the importance and influence of the "golden course" standard on higher education are introduced, and its guiding significance for higher mathematics curriculum reform is expounded. Subsequently, the characteristics of applied universities and the needs of students are analyzed in detail, emphasizing the urgency and necessity of higher mathematics curriculum reform in light of current societal demands for practical application ability of college graduates. A series of concrete measures for teaching reform are then proposed, including the cultivation of students' learning attitudes and methods, stimulation of their learning interest, adjustment of course content, and strengthening of teacher development. Finally, the feasibility of higher mathematics teaching reform in applied universities under the guidance of the "golden course" standard is concluded, with a focus on future development direction. This study aims to provide reference and guidance for the teaching reform of higher mathematics courses in applied universities, promote better alignment between talent training modes and social needs, and has both theoretical and practical significance for improving the teaching quality of higher education.

**KEYWORDS:** *Application-oriented university; Advanced mathematics courses; "Golden Course" standard; Exploration of teaching reform*

## 1. INTRODUCTION

In August 2018, the Ministry of Education issued the Notice on Implementing the Spirit of the National Conference on Undergraduate Education in Colleges and Universities in the New Era, pointing out that all colleges and universities should comprehensively sort out the teaching content of each course, eliminate the "water course", and create a "golden course"! This is also the first time that the concept of "golden class" has been officially used in a document of the Ministry of Education. Since then, teaching and research personnel in various universities have conducted in-depth discussions on the purpose, path, implementation plan of building "golden course" [1-9].

As a higher education institution, the applied university has different characteristics from the traditional theoretical university. In contrast, traditional theoretical universities pay more attention to academic research and theoretical discussion, while application-oriented universities pay more attention to

the combination of teaching content and social actual needs, and the curriculum is closer to the development of social industries, so as to train students to have the skills and knowledge needed for employment. The demand for applied talents is increasing. As a basic subject, the content and teaching methods of higher mathematics need to keep pace with The Times, better adapt to the development needs of the current society, and train students to have the ability to solve practical problems. However, the current higher mathematics courses lack the combination with practical problems and pay attention to the explanation of basic theories, which leads to the students often cannot flexibly apply what they learn to practical work or research after learning the course.

Therefore, the higher mathematics curriculum reform is imperative, and the "golden curriculum" standard has important guiding significance.

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It requires that the curriculum reform of higher mathematics should focus on improving students' practical problem-solving ability, pay attention to the cross-integration of mathematical knowledge and other disciplines, introduce more real cases and application scenarios, pay attention to training students' logical thinking ability, mathematical modeling ability and practical problem-solving ability, and emphasize the connection between theory and practice. Only in this way can we better meet the needs of today's society for the practical application ability of college graduates, and also better serve the characteristics of municipal applied universities and the needs of students. Therefore, the "golden course" standard provides useful reference and guidance for the reform of higher mathematics curriculum, and helps to promote the improvement of higher mathematics teaching quality and the optimization of talent training mode.

## 2. Problems existing in the teaching of higher mathematics courses in applied universities

In recent years, although applied colleges and universities have carried out a lot of teaching reforms on higher mathematics courses and made a lot of achievements, from the perspective of the construction standard of "gold course", there are still shortcomings in the course teaching and further optimization is needed. Taking our school as an example, our school is a municipal application-oriented university, and the advanced mathematics course is the first fine course of our school, and the first batch of high-quality undergraduate courses in Beijing (key construction projects). The teaching team was awarded the title of Beijing Excellent Teaching Team and Advanced Collective of Capital Education, and two members of the team were awarded the title of Famous Young teachers in Beijing. Based on the teaching practice of higher mathematics courses, they won the second prize of municipal teaching achievements for three consecutive times. However, in the regular teaching discussion, the team teachers will still raise stubborn old problems and new problems, generally speaking, there are the following points:

### A. It is increasingly difficult for students to mobilize their enthusiasm for math courses

In the non-"985" "non-" "211" applied universities, many students after entering the school enthusiasm for learning is not high. They lack a clear learning goal, lack of motivation to learn, are addicted to mobile games and ineffective social interaction, and choose to be negative and go with the flow instead of facing up to difficulties. As we all know, if the foundation of mathematics courses is not strong, it is easy to fall behind in the later period, and further

affect the enthusiasm of students. This situation leads to the teaching difficulties of higher mathematics courses, and it is difficult to lead all students in teaching. No matter how experienced a teacher is in teaching, there are always some students who are not interested or involved, and most of the students who fail the final assessment are these students. Taking our school as an example, it can be seen from the teaching feedback of higher mathematics courses for many consecutive years that nearly 60% of students think that the main reason affecting their learning quality is learning attitude.

### B. The mathematical thinking mode and method formed in high school are not suitable for college courses

High school students usually develop specific thinking patterns and learning habits, and when solving math problems, they often rely on pattern recognition and method recall, lacking a global and in-depth understanding. At the university stage, many students are obviously not interested in the formation process and derivation of the basic concepts of higher mathematics, but only pay attention to the conclusion of theorems and formulas, hoping that they can calculate and solve the problem, and are afraid of meeting the proof problem. Students are very dependent on teachers. They always hope that all learning tasks can be completed and understood in class, and they are not strong in independent learning after class. Taking our school as an example, it can be seen from the teaching feedback of higher mathematics courses that about 25% of students think that the main reason affecting their learning quality is learning ability.

### C. Students' weak mathematics learning foundation has become an obstacle to the learning quality of the course

Compared with high school mathematics, advanced mathematics is more abstract and logical and requires students to have stronger mathematical thinking ability and logical reasoning ability. In application-oriented colleges and universities, some students have not been fully trained and cultivated in high school, and have not established a solid mathematical foundation, which leads to feeling at a loss when they come into contact with more abstract higher mathematical knowledge. In addition, some students have a lot of problems with their computing ability and frequently make mistakes in the process of solving simple problems. Moreover, many students lack an intuitive understanding of the application scenarios of mathematics, which also leads to obstacles in the learning of mathematical knowledge. The lack of students' mathematics learning foundation, independent thinking ability, summary

ability, mathematical modeling ability and self-reflection ability leads to the frustration of some students in the course, which reduces their enthusiasm and motivation for mathematics learning.

#### **D. Teachers' teaching ability is not up to the ideal state, which affects students' learning effect**

Public basic math courses are usually taught in large classes, and a teacher may have to face multiple classes of students at the same time. In application-oriented local universities, many students lack the ability to prepare math courses independently, so they rely more on classroom teaching by teachers. Some students feel frustrated because of the unsatisfactory teaching situation of teachers, which will also affect their enthusiasm for mathematics learning, and even affect their confidence and expectations for the whole university study career. Some young teachers have less teaching experience and fail to organize classroom teaching effectively, which leads to low scores in teaching evaluation, affects teachers' confidence and enthusiasm in teaching, and gradually regards teaching as a job rather than a career.

#### **E. The update and optimization of teaching content has not reached the optimal state.**

Taking our school as an example, the optimal choice of course teaching content has always been a trade-off between theoretical basis and practical application. Some teachers tend to lay the theoretical foundation in class first, so that students can understand the principle of calculus, and do necessary exercises at the same time. Students need to complete homework after class, review and check the gaps and omissions independently. Some teachers tend to talk less about theoretical derivation in class, directly tell students the theoretical results and solution formulas, do more exercises in class, and solve the calculation and solution problems as far as possible in class, so as to ensure that students with weak learning foundation and self-discipline can also pass the exam. In recent years, the case teaching and ideological and political content introduced by teachers in class have further caused the contradiction of class allocation. In order to achieve the three teaching objectives of knowledge, ability and literacy at the same time, as well as the gender standard of "golden course", the choice of course content needs to be continuously updated and optimized for students in applied universities.

### **3. Exploration on teaching reform of higher mathematics course in applied university under "Golden course" standard**

#### **A. The important mission of the first lesson: to cultivate students' learning attitude and method**

In the first lesson of higher mathematics, teachers should explain to students the importance of learning

this course and the difference from high school learning, emphasizing that higher mathematics is an extension and deepening of basic mathematical knowledge, including more concepts and theorems, and requires a more abstract and rigorous way of thinking. Compared with high school mathematics, advanced mathematics pays more attention to theoretical proof and derivation, and requires students to have stronger logical reasoning ability. Teachers can tell students that in advanced mathematics, they will be exposed to new content such as calculus, linear algebra, probability and statistics, which will lay a solid foundation for their later professional studies. In addition, teachers can emphasize the importance of higher mathematics in developing students' abstract thinking and problem solving skills, which will play a vital role in their future study and work. In addition, teachers can also introduce students to how to learn advanced mathematics, which is different from the passive acceptance of knowledge in high school, and requires more independent learning and exploration. Students should focus on understanding concepts and principles, not just memorizing formulas and theorems. At the same time, teachers can encourage students to take more notes, do more exercises, and seek help to solve problems in time, and cultivate good learning habits and independent learning ability.

In a word, teachers should set up a correct learning attitude for students in the first lesson, guide them to realize the importance of higher mathematics and the change of learning methods, and help them smoothly transition to the university stage of mathematics learning.

#### **B. Cultivate students' interest and initiative in learning from various aspects**

First, connect with reality and arouse interest. Teachers can arouse students' interest by combining theoretical knowledge of higher mathematics with practical application. For example, the specific application of mathematics in logistics, finance, biology, engineering and other fields can be described, so that students can realize that mathematics is not only an abstract subject, but also a subject closely related to practical problems. Secondly, inspire thinking and cultivate interest. Teachers can lead students to think deeply by asking challenging questions and having open-ended discussions. In class, students can be organized to have group discussions, encourage them to discuss and think about a certain math problem, and encourage students to take the initiative to participate in class interaction. This will help cultivate students' self-learning awareness and problem-solving ability, and enhance students' interest and enthusiasm in

mathematics. In addition, multimedia assistance, vivid display. Teachers can use multimedia technology, such as dynamic demonstration, case analysis, video display, etc., to vividly show mathematical problems and solutions, and stimulate students' interest in learning. Through multimedia assisted teaching, abstract mathematical theories can be made more vivid and easier for students to understand and accept. In addition, encourage interaction and build trust. Teachers can encourage interactive communication between students and interaction between teachers and students. Give students praise and affirmation in class, encourage students to ask questions and express opinions, and create a good learning atmosphere. At the same time, teachers should set an example for students, establish a trust relationship between teachers and students, so that students are willing to participate in the classroom interaction. Finally, personalized teaching stimulates internal motivation. Individualized teaching methods are adopted according to different students' learning characteristics and interests. By understanding the learning situation and needs of students, we can provide them with targeted guidance and suggestions to stimulate their internal motivation for learning. For example, some extended topics or projects can be designed, so that students can choose the direction of interest for in-depth research, so as to enhance their interest in learning.

In short, to arouse the enthusiasm and enthusiasm of students in higher mathematics courses, teachers need to start from many aspects in teaching, pay attention to cultivating students' learning interest and initiative, and make them willing to devote themselves to learning and enjoy the process of learning.

### **C. C. Flexibly use a variety of measures to solve the problem of students' poor foundation**

In view of the situation of students' poor foundation in higher mathematics class, teachers can take some measures to solve it, so as to ensure the teaching quality. First, diagnose the student base. Teachers can get a comprehensive understanding of students' mastery of high school mathematics knowledge by conducting diagnostic tests in the first class. Through the assessment of students' basic level of mathematics, the follow-up teaching plan and measures are formulated accordingly. Second, consolidate basic knowledge. In view of the shortcomings of students, teachers can design some special basic knowledge consolidation links, such as providing additional basic exercises to help students review old knowledge and make up for weak basic parts. In addition, personalized tutoring. According to the learning differences of different students, teachers can also adopt personalized tutoring measures, such

as providing extra tutoring time for students with poor learning foundation, or providing targeted help through one-on-one communication with students to understand their learning difficulties and needs. Finally, provide resources and support. Teachers can also guide students to make use of various learning resources, such as online teaching videos and quality teaching materials, to broaden their learning pathways and provide necessary support and guidance.

In short, in view of the poor foundation of students in higher mathematics courses, teachers give students enough care and guidance in the teaching process, so as to improve the overall teaching quality and ensure that each student can effectively master mathematics knowledge.

### **D. Teachers improve their teaching ability and ensure the quality of teaching through continuous learning**

Teachers should participate in the teaching team, participate in regular collective lesson preparation, teaching seminars, academic exchanges and other activities, and constantly improve their own mathematical knowledge and teaching skills. Through various kinds of learning, enhance teachers' love for the curriculum and care for students, stimulate teachers' enthusiasm for education and improve professional quality. In class, teachers can attract students with lively and interesting teaching methods. For example, the introduction of mathematical historical examples or mathematical application cases in real life, so that students feel the charm of mathematics. Create challenging math problems and situations that stimulate students' intellectual curiosity and curiosity. Pay attention to the systematic teaching of basic knowledge, help students to consolidate the foundation of mathematics, in order to better understand and apply the knowledge of higher mathematics. Students are encouraged to develop logical reasoning and problem solving skills while mastering the basics. Combined with modern educational technologies, such as multimedia teaching, online teaching platform, knowledge graph, etc., to enrich teaching content, enhance interaction, and enhance learning experience. Introduce a variety of teaching methods such as group discussion and problem-solving learning to stimulate students' thinking and cultivate team spirit. Understand students' learning characteristics and levels, teach students according to their aptitude, give personalized guidance, and encourage each student to give full play to their potential. Establish a good relationship between teachers and students, encourage students to ask questions and opinions, and give timely feedback and help.

Through the above measures, higher mathematics teachers can improve their teaching ability, stimulate students' interest in learning mathematics, promote the improvement of students' learning effect, and establish a good relationship between teachers and students to form a positive interaction, so as to comprehensively improve the teaching quality.

#### **E. Choose appropriate teaching content based on students' learning ability and actual needs**

In applied undergraduate colleges, there are many students with a relatively weak mathematical foundation, and advanced mathematics itself is a relatively abstract course. Especially in the case of tight class hours, combining with the actual ability and needs of students, it is very important to choose the course content. We believe that in applied universities, we should first ensure that students have a solid basic theoretical knowledge of mathematics. Secondly, focus on the content combined with professional practice. Priority is given to teaching content related to students' major, such as mathematics knowledge related to logistics, finance, statistics and data science, which can enhance students' interest in mathematics and learning enthusiasm, and better serve students' professional development needs. In addition, it is to give priority to the content of cultivating students' problem-solving ability, such as mathematical modeling, practical case analysis, etc., which helps students apply their mathematical knowledge to practical problems and cultivate their innovative thinking and practical application ability. In addition, integrate ideological and political education content.

The content of ideological and political education will be integrated into the curriculum, and some cases and themes close to students' life with enlightening significance will guide students to form a correct outlook on life and values. Finally, flexible use of a variety of teaching means, in the limited class time, can adopt a variety of teaching means, such as lecturing, case analysis, group discussion, experimental demonstration, etc., to make the teaching content more rich and vivid, improve students' learning efficiency.

In a word, when making the decision to choose the course content, it is necessary to pay close attention to the learning ability and actual needs of students, and give priority to the content of great significance to students' learning and future development. Through reasonable choice and aiming at the actual ability of students, we can achieve the teaching goal better and improve the teaching effect.

#### **4. Conclusion**

The "golden course" standard provides clear guiding significance for the curriculum construction and reform of higher education. In the higher mathematics course, according to the requirements of the "golden course" standard, we can better determine the course objective, optimize the course content, improve the teaching method, perfect the evaluation system and improve the teaching quality. It promotes the mathematics curriculum to pay more attention to the cultivation of students' logical thinking ability, mathematical modeling ability and practical problem-solving ability, which is closer to the social needs and industrial applications, and promotes the transformation of mathematics curriculum from traditional theoretical teaching to practical ability cultivation, so that it is more in line with the development needs of students and the talent needs of society. This guiding significance makes the teaching reform more targeted and effective.

Improving the quality of talent training is the core task of higher education development and an important mission of building a powerful higher education country. For the reform of mathematics public basic course teaching in applied local colleges and universities, it must be closely combined with the development needs of local economy and the actual situation of schools. In the process of promoting the teaching reform, it is necessary to adhere to the attitude of seeking truth from facts, bravely climb the technical difficulties of the teaching reform, form a broad consensus, and concentrate the collective wisdom of excellent teachers, so as to effectively improve the teaching effect and talent training effect of higher mathematics courses.

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