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Research on the Reform of the Hierarchical and Graded Teaching Methods of Advanced Mathematics Courses in Financial and Economic Universities

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ABSTRACT: Advanced mathematics courses are important basic courses in higher education, playing a key role in cultivating logical thinking and improving the ability to solve practical problems. However, with the changes in social needs, the traditional teaching model has gradually exposed many drawbacks, including single teaching form, insufficient practical application, and uneven student levels. Based on an in-depth analysis of the current teaching situation, this paper proposes a reform idea of hierarchical teaching and optimized assessment system. The study found that the hierarchical teaching model can effectively improve students' learning interest and comprehensive ability according to their different needs and foundations, while the optimized assessment system plays an important role in improving learning enthusiasm and consolidating knowledge mastery. This study provides an important reference for the teaching reform of advanced mathematics courses, aiming to meet diversified educational needs and improve students' comprehensive literacy.

KEYWORD： Advanced mathematics; Financial and economic colleges and universities; Teaching reform; Graded teaching

I. INTRODUCTION

Advanced mathematics is one of the most important basic courses for undergraduate students. The teaching quality of advanced mathematics courses is an important indicator of the undergraduate teaching level[1]. With the rapid development of science and technology and the widespread application of computer technology, mathematical ideas, methods and techniques are playing an increasingly important role in the fields of natural sciences, engineering technology, etc., and have been widely used in various fields of economics, management and social sciences, which also puts forward higher requirements for the teaching of advanced mathematics. The teaching of university mathematics should enable students to learn richer and more useful modern mathematical knowledge and have stronger ability to use mathematical tools and techniques to adapt to the needs of the development of the times. The goal of university mathematics education is not only to provide students with the foundation and tools for learning professional knowledge and cultivating mathematical application ability, but also to guide students to accept the influence of mathematical culture, master a modern scientific language, and learn a rational thinking model, including training in various scientific qualities such as analysis, deduction, discrimination and induction. With the changes in educational concepts and social needs, the drawbacks of traditional advanced mathematics teaching have become more and more prominent. Especially in the Internet era, the diversification of educational resources and the personalized needs of students have put forward higher requirements for teaching models. In Chinese colleges and universities, advanced mathematics is a course for

freshmen. From the teaching in recent years, students' ability to solve problems independently has been declining. Students always complain that I can understand what the teacher says in class, but when I have to do it, I don't know where to start. The main goal of the university is to cultivate people who can solve problems and engage in various professional work. In the current context of entrance examinations, middle school teaching has to focus on examinations. A lot of questions have been done, and teachers and students have paid a lot, but the ability to solve problems has not been formed. As a result, students who have just entered college have many difficulties in learning advanced mathematics, their confidence is easily frustrated, and they develop a dislike for learning. Even with online course resources and teacher communication platforms, they are unwilling to face advanced mathematics questions.This paper aims to explore the path of reforming the teaching model of higher mathematics courses by analyzing existing problems, focusing on the role of hierarchical teaching and optimized assessment settings in improving teaching quality, and combining practical cases to verify its actual effect.

II. ANALYSIS ON THE CURRENT TEACHING SITUATION OF ADVANCED MATHEMATICS COURSES

Teaching model issues : At present, most colleges and universities still use the traditional teaching model of "theory-derivation-examples" for advanced mathematics teaching. This one-way knowledge transfer model focuses on teachers' lectures. Although it is efficient in content delivery, it has limited effect on cultivating students' analytical and innovative abilities, and lacks student participation, resulting in insufficient classroom interactivity[2].In particular, according to the general response of students who have studied advanced mathematics for many years, advanced mathematics content is abstract, contains a lot of theoretical derivations and proofs, and is boring and difficult to learn. These are especially stressful for freshmen who have just entered colleges and universities, and students are prone to develop a dislike for learning, which ultimately affects learning outcomes. In addition, this "indoctrination" teaching method ignores the differences between individual students in learning styles, prior knowledge and interests, resulting in a mismatch between the teaching process and students' personalized needs. Mathematics is a widely used subject, but traditional teaching often focuses too much on imparting theoretical knowledge rather than practical application. Although some students have mastered formulas and theorems, they lack the experience and skills to apply this knowledge to real-world problems. When the course content is presented in a single and repetitive manner, students may feel bored, and this emotion will affect their learning enthusiasm and class participation.

Insufficient practical application : Advanced mathematics involves a large number of abstract mathematical theories, such as the concept of infinitesimals in calculus, vector spaces in linear algebra, and complex number fields in complex variable functions. These concepts are often far from students' intuitive experience and daily perception, making it difficult for students to form specific mental models. When students learn these abstract concepts, they often need higher-level logical thinking and abstract thinking abilities[3]. This requires not only students to have a solid foundation in mathematics, but also to be able to reason and calculate without specific examples. This is a challenge for many students, especially in traditional teaching environments, where they lack sufficient practice and application opportunities to deepen their understanding of these concepts.In practical applications, students need to combine these abstract theoretical knowledge with specific mathematical problems. This requires them not only to understand the concepts themselves, but also to be able to apply them flexibly in various situations. For example, applying the concept of differentials to the calculation of velocity and acceleration in physical problems, or applying the theory of matrices to solve engineering problems.

Although some textbooks contain some cases or application scenarios, these contents are mostly presented in a brief form and do not guide students to deeply explore the mathematical principles and practical significance behind them. For example, when teaching the concept of "derivative", teachers often only stay on the definition and calculation of the rate of change of the function, without in-depth analysis of its application in physics (such as speed, acceleration) or economics (such as marginal benefit). In courses that lack a practical orientation, students tend to regard mathematics learning as a simple theoretical memory task rather than an instrumental subject. Traditional teaching methods not only weaken the attractiveness of the course, but also limit students' ability to use mathematical knowledge to solve practical problems[4]. The cultivation of such application ability requires time and practice, and traditional teaching models often cannot provide sufficient opportunities for case analysis and practical problem solving.

The assessment method is backward and monotonous : In order to test the learning effect of students, assessment is usually conducted. At present, the assessment method of "Advanced Mathematics" course is mainly a combination of regular grades and final grades[5]. Regular grades include attendance, homework, classroom performance, tests, midterm exams, etc. The main assessment content is the students' usual mastery of basic concepts, theorems, formulas, properties, calculation methods and other knowledge. This assessment method is not very interesting to students. They are not serious in normal times, and they rush before the exam. They do not pay attention to the persistence required for learning "Advanced Mathematics". Even if they have good grades in normal times, they have not trained the ability to solve practical problems through mathematical methods. In terms of final grades, most of them adopt the mode of paper-based examinations for assessment. Compared with regular assessments, the content is more comprehensive and more difficult. Good grades can be achieved through review and recitation, but students have not mastered the essence of "Advanced Mathematics". Once they encounter more difficult problems, they are prone to fear and rejection. In addition, these assessment methods only conduct theoretical examinations, do not cultivate students' hands-on ability, and do not train students to use big data or computer technology to solve mathematical problems. Such an evaluation and assessment mechanism is not conducive to students' future development, and also goes against the new curriculum reform's requirement that talent training should emphasize comprehensive and applied principles.

Students' learning needs and mathematical foundations are significantly different : With the increasingly fierce competition for employment and the need to build a learning society, the "postgraduate entrance examination fever" has become popular. The academic requirements of the society for college students are constantly increasing, and more and more undergraduates have chosen to take the path of postgraduate entrance examination. The form of postgraduate entrance examination in the next few years will only become more and more severe[6][7]. For accounting undergraduates, who are mainly composed of liberal arts students, postgraduate entrance examination mathematics III is a difficult and critical postgraduate entrance examination subject. It is the only subject in the public course with a full score of 150 points. Some people even say that "he who has mathematics can win the world". It is not an exaggeration to say that mathematics determines the life and death of postgraduate entrance examinations. Its importance can be seen. In order to reduce the review pressure of accounting undergraduates during the postgraduate entrance examination and lay a good foundation for undergraduates to take the postgraduate entrance examination, colleges and universities should improve the advanced mathematics level of undergraduates during teaching, which puts forward new requirements and challenges for major universities. In addition to postgraduate entrance examinations, there are some basic

Performance requirements such as: scholarship selection, study abroad programs, guaranteed postgraduate study, application for party membership, etc. Students hope that they can get a satisfactory score after studying the course. Students' mathematical foundation and personal learning ability are also different. At present, more and more colleges and universities are beginning to implement the "general admission" enrollment model. As of 2021, among the 137 "double first-class" colleges and universities, more than half of them have implemented general admissions. General admissions have become the mainstream trend of talent training in China in the 21st century. In the future, more and more colleges and universities will implement general admissions, which will replace the previous ordinary professional admissions on a large scale[8]. However, due to the differences in the foundations of high school graduates from all over the country, the education level, teaching staff, hardware and software equipment, etc. of the regions where they live before entering university are different, which makes students' learning ability and acceptance of knowledge uneven. These differences also affect the teaching effect of university education. In addition, students have different personal interests, future plans, and different requirements for themselves. If unified teaching is implemented, it is inevitable that they will affect each other. Taking advanced mathematics as an example, for the advanced mathematics B course that was uniformly set in previous years, its teaching content is difficult to take into account the learning needs of students at different levels. Students with good mathematical foundation have spare time to learn and hope to expand and extend the learning content; students with poor mathematical foundation cannot keep up with the teaching progress due to their limited personal ability. If this continues, it will inevitably affect the overall learning effect of the college's advanced mathematics, and then affect the teaching of advanced mathematics courses. If we continue to use a unified teaching model, we can neither achieve the purpose of teaching students in accordance with their aptitude nor improve the quality and efficiency of teaching.

III. DESIGN OF HIERARCHICAL AND GRADED TEACHING METHODS

Theoretical basis of graded teaching : The theory of graded teaching guides the implementation of graded teaching. Benjamin Bloom proposed the "mastery learning" theory, that is, in the collective teaching form based on the class teaching system, "the unified teaching content, method and speed are difficult to take care of the development needs of all students, and it is difficult to implement individual tutoring for individual needs of students"[9]. British philosopher Jeremy Benth (BENTHAM J) proposed a graded teaching method based on the concept of utility, which has the advantages of saving teachers' energy, highlighting key points and accumulating experience. An important theory in English graded teaching is American language educator Stephen Krashen (KRASHEN SD), who proposed the famous "i+1" formula, that is, the language input received by language learners should be graded. Teaching is a teaching strategy that adapts to individual differences of students. It divides students into several levels for differentiated teaching according to their foundation, ability and interest. Slightly higher than their current language level, the difficulty of "1" in the formula cannot be higher than the learner's current language level (such as i+2) or lower than the learner's current language level (such as i+0). Only in this way can effective language input be ensured[10]. Aiming at the current curriculum setting and teaching status of higher mathematics in Chinese universities, Zhang Ling et al. [11]established a multi-objective teaching mode system of higher mathematics, and on the basis of teaching design and practice, proposed to further explore a new grading mode through various student-centered teaching methods and methods, so as to adapt to the construction and development of new engineering. In order to achieve different goals, a series of reform studies should be carried out in each teaching link, such as the optimization of curriculum system, the selection of teaching methods, the compilation of exercises and exercises after class, and the construction of question bank.

Then the feasibility of the scheme is analyzed through teaching practice. After entering the school every year, according to the characteristics of the major and basic research, through questionnaires, discussion, enrollment analysis and other ways, the new students' mathematical foundation, learning requirements and learning motivation are investigated to obtain first-hand information. Then the grading examination is carried out, taking into account the students' majors, and the whole new students are divided into three classes of A, B and C according to the ratio of 4:13:7.

Practical Path of Tiered and Graded Teaching : From the relevant theoretical analysis of graded instruction, it can be seen that graded instruction is based on the differences in students' learning foundation, learning habits, and learning goals. Reasonable grading and more targeted teaching activities based on students' characteristics are effective ways to implement teaching students in accordance with their aptitude and "student-centered". It is a teaching organization model with the goal of improving teaching effectiveness.

Student Stratification : Improve the student stratification standards. The basis for stratifying students is the first key factor in the graded teaching of advanced mathematics courses, with the college entrance examination mathematics scores as the main reference. It is planned to add an entrance test before student stratification in the future, measure the differences in students' mathematics levels through entrance tests, and require the difficulty and range of test questions to be set reasonably. The stratification operation needs to take into account the students' wishes, collect students' learning needs through questionnaires, and set up two levels of advanced classes and ordinary classes in combination with the actual situation of undergraduate further studies and professional training goals of the school, and stratify them according to a certain proportion (25%~30%).Establish a dynamic adjustment mechanism. Advanced mathematics teaching is generally completed in two semesters. In the first semester, there are situations where students' learning status changes during the learning process and the grading needs to be adjusted, that is, a dynamic adjustment mechanism needs to be established. After the first semester of advanced mathematics teaching, a "Notice on the Adjustment of Graded Classes" will be issued to all students. Based on the learning situation in the first semester, students who fail the overall evaluation of advanced mathematics in the advanced class must be adjusted to the ordinary class. Students in the ordinary class who meet the score requirements and are willing to enter the advanced class will be examined by the college to finally determine whether to enter the graded class, and the total number of adjustments will be controlled within an appropriate proportion (about 10%).

Course Objectives Hierarchy : According to the requirements of the engineering education professional certification, "the course objectives must reflect students' learning gains, support relevant graduation requirements, and guide the teaching and learning of the course", each teaching and research center implements graded teaching to ensure that the teaching requirements for ordinary classes (Class B) are not lowered; the course leader has formulated clear and measurable course objectives for the advanced class courses based on the actual needs of students in the advanced class (Class A) and the graded teaching positioning. The advanced mathematics course takes the laying of a comprehensive and solid foundation for students' future further studies as the basic starting point. The advanced level of teaching pays more attention to inspiring students' thinking, cultivating students' awareness and ability of self-study, exploration and innovation, and lasting learning motivation and the habit of conscious research. The basic level of goals focuses on stimulating students' interest and enthusiasm in learning, and guiding students to form good learning habits and effective learning methods.

Teaching content stratification : Different versions of advanced mathematics textbooks can be selected for teaching in advanced classes (Class A) and regular classes (Class B). The advanced mathematics classes (Class A) and regular classes (Class B) have the same study hours and basically the same teaching content, but they are expanded in depth, breadth and difficulty to improve the comprehensiveness of the teaching content.

Teaching method stratification : During the graded teaching process, the teachers actively try to reform the teaching methods to achieve the ability training goals. For example, the advanced mathematics course (Class A) strengthens questioning and interaction in class to mobilize students' enthusiasm for class participation, and conducts seminar-style teaching twice a semester, including topic selection, grouping, group communication, large group review and summary improvement, or encourages students who are interested in mathematics competitions and modeling competitions to participate in the competitions and provide guidance. Through a series of extracurricular activities, the interest in learning advanced mathematics courses is increased.

Assessment and Evaluation Layers : Course assessment is an important part of objectively checking and evaluating the achievement of course objectives, and plays an important guiding role in student learning. During the course learning process, the teacher can take effective measures to track the learning progress of each student, and the students can timely feedback the problems in the learning. The teacher can dynamically adjust the teaching strategy based on the tracking feedback information to help students meet the graduation requirements. After the implementation of graded teaching, in the graded teaching of advanced mathematics, the process assessment of the advanced class students is basically the same as that of the ordinary class students. The adjustment focuses on the stratification of exercises. For example, the exercises of advanced mathematics are divided into basic questions, advanced questions and postgraduate entrance examination questions to increase the difficulty of learning and test the learning effect. After the implementation of graded teaching, the final assessment of the advanced class and the ordinary class must follow the principle of fairness, and the overall evaluation scores must be comparable in scholarship assessment and academic review. It is also necessary to examine the effect of graded teaching in the advanced class through the final examination. To this end, when implementing graded teaching, on the basis of adopting a unified final examination method, the assessment of students is changed to the "final unified examination paper + graded class test" method. The final unified examination paper is included in the total scores of the advanced class and the ordinary class to ensure that the total evaluation scores are comparable. At the same time, separate tests are conducted for students in graded classes, and the examination papers are adapted to the difficulty of graded class teaching. Students who achieve passing grades in both semesters are deemed to have completed a 2-credit general elective course and are awarded 2 credits.

IV. BASIC COURSE GRADED TEACHING MANAGEMENT AND SUPPORT WORK

(1) Teacher allocation. In order to ensure the effectiveness of graded teaching, the college needs to equip the advanced classes with excellent teachers who have solid teaching basics and good teaching results, and continuously promote graded teaching work by forming a graded teaching team.

(2) Management work. Students' prior understanding of the graded teaching arrangements and dynamic adjustment mechanisms of basic courses, as well as the course objectives of advanced classes, has a positive impact on mobilizing students' learning enthusiasm and improving their level of engagement. The college regards various notifications of graded teaching, class data maintenance, dynamic adjustment mechanisms, data analysis, etc. as an important teaching management task to ensure the smooth

operation of graded teaching.

(3) Joint management. In the early grades, the departments focus on the construction of academic style, hoping to understand the students' basic course learning situation in a timely and in-depth manner, and also hope to promote students' learning through timely communication with the department's class teacher. Establish a joint management mechanism, through the establishment of a corporate WeChat communication group for basic course teachers and students' class teachers, timely communicate with the class teacher about students who are in poor learning status and need supervision, understand the students' learning situation through a unified mid-term exam, and promptly feedback the results to the students' departments, so as to promote the improvement of basic course teaching effect and the construction of academic style.

V. CONCLUSION

Under the background of "postgraduate entrance examination fever" and "difficult employment", the implementation of graded teaching of higher mathematics is the inevitable result of the deepening of teaching reform. The graded teaching of higher mathematics has shifted from teacher-centered to student-centered, from simply imparting knowledge to focusing more on cultivating the ability to apply knowledge, providing different programs for students with different starting points, cultivating additional abilities for students with spare learning, and developing all-round development for students with weak foundations, so as to truly teach students in accordance with their aptitude. In order to improve the higher mathematics level of accounting undergraduates, colleges and universities should start from the perspectives of the college and the students themselves, and continuously reform and practice. In the process of exploring and breaking through one by one, the students' higher mathematics level will be gradually improved, and finally a good foundation will be laid for students' future postgraduate entrance examination, guaranteed admission to graduate school, and employment. This paper puts forward feasible suggestions for improving the higher mathematics level of accounting undergraduates in order to provide reference for the development of higher mathematics education.

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