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A Study on Improving the Effectiveness of Mathematics Classrooms in Higher Education

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Abstract: *Higher education institutions are all skill-based schools, and learning higher education mathematics is a compulsory course for every student. Improving the efficiency of classroom teaching in higher education mathematics is a problem that mathematics teachers need to actively think about. Effective teaching in the classroom is a topic that has been talked about a lot in the current new curriculum reform. Making maximum progress and development for students in the limited time available in the classroom is the most important teaching effect that all educators want to achieve. So how can effective teaching in the classroom be improved so that mathematics teaching is no longer boring? This article focuses on the concept of effective teaching in the classroom, analyses the problems that exist at this stage of effective teaching in the classroom, points out the performance of effective teaching in the classroom, and proposes ways to achieve effective teaching in the mathematics classroom.*

Keywords: *Mathematics in higher education, effective teaching and learning in the classroom, research*

1. Introduction

With the continuous reform of vocational education, China's higher education is basically divided into general higher education and vocational education. The vocational education is positioned to cultivate professional and technical personnel with certain theoretical foundation and experience and certain operational skills, which are needed by the society. Vocational colleges and universities are also carrying out corresponding curriculum teaching reforms according to the requirements of the times, and likewise higher vocational mathematics courses are also facing the problem of where to go from here. In the teaching process, we have to consider both the national teaching requirements for higher vocational students and the requirements for professional and skilled personnel in different regions. As an important foundation course in higher education, mathematics plays an important role in the subsequent learning and development of students' quality of thinking. Its fundamental status determines that it plays an increasingly important role in the natural sciences, social sciences, engineering and other disciplines, and is becoming a powerful tool for solving practical problems in various disciplines and engineering practice. However, after entering the 21st century, the rapid development of higher vocational education and the expansion of the scale of schooling have led to the uneven quality of students, who have a poor foundation in mathematics, lack interest in mathematics and are tired of learning mathematics, and generally have low mathematics scores, especially for students who go on to higher vocational education and five-year students. At the same time, the existing higher vocational mathematics curriculum, as well as the content of teaching materials, teaching methods and teaching methods, are far from being able to adapt to the rapidly developing situation of higher education.

1.1. The teaching materials focus on seeking completeness and strictness, and the content cannot adapt to the requirements of reform

The traditional content system of higher vocational mathematics teaching requires all aspects and theoretical rigour. This not only cannot adapt to the requirements of today's era of rapid development of science and technology and rapidly changing knowledge, but also causes the contradiction of more teaching content and less class time in higher vocational mathematics teaching. With the advancement of China's education reform, the curriculum and teaching content of various majors have been adjusted accordingly, raising the requirements for mathematics but reducing the class time for mathematics teaching, further aggravating the contradiction of more content and less class time, making teachers tired of catching up with the teaching schedule in order to complete the teaching task, making it difficult for some key content and content that should be elaborately taught in the teaching process, affecting the quality and effectiveness of teaching. This affects the quality and effectiveness of teaching. Theoretically

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rigorous, logically rigorous requirements are a serious constraint on the teacher's hands and feet, increasing the difficulty of learning for students, which inevitably makes some students feel intimidated by the mathematics curriculum, affecting students' enthusiasm and interest in learning.

1.2. Single teaching methods and backward means

Higher vocational mathematics teachers do not know much about practical technology and lack the teaching process of engineering background. The teaching content is based on the content of books. Boring teaching mathematics theory knowledge, from concept interpretation to theorem proof to example practice, the teaching method is still chalk and blackboard. This ' injection ' or ' duck filler ' method. This "injection" or "duck-fill" teaching method is not conducive to the cultivation of students' mathematical quality and creative thinking.

1.3. Outdated teaching mode

The expansion of the scale of higher education institutions has created great work pressure on teachers in higher education, especially teachers of basic courses. On the one hand, due to the uneven mathematical foundation of students, individual differences are increasing, but the teaching content and teaching requirements are exactly the same, the same teacher lectures, the same classroom lectures, some students are not ' full ', some students are not ' digested ', resulting in teachers and teachers can not adapt. This situation not only affects the quality and effectiveness of teaching, but also affects teachers' teaching reform and academic research. In this context, it is urgent and necessary to study the effectiveness of mathematics classroom teaching in higher education.

2. Let learning dominate the classroom

Classroom teaching should be determined by educational purposes, but at present, higher mathematics classrooms in higher education institutions are usually teacher-led, teaching-led and goal-led, and students, learning and educational purposes have become tools instead. The reasons for this are: (1) higher vocational students have a weak foundation of knowledge in elementary mathematics; (2) higher vocational students have a low sense of self-efficacy in learning higher mathematics and do not have sufficient self-confidence; (3) in contrast, teachers are stronger than students in terms of knowledge reserves and teaching experience, so they naturally have an advantage in classroom teaching and learning, and classroom teaching adopts a model that revolves around the strongest. In fact, without students' learning, teachers' teaching is not possible, it is water without a source and wood without a foundation. Only when students learn can teachers' teaching be relevant and effective. Teachers should change their concept of teaching and position themselves as the organisers of classroom teaching, allowing students to participate not only in their own learning process but also in the teaching process, and to dare and be good at questioning, discussing and researching the content of higher mathematics teaching. Involving students in the classroom is not the same as giving them the classroom, but rather as an organiser who guides their learning. Teaching and learning in the classroom are two sides of the same coin. The state of student learning is the starting point and basis for teacher teaching, and teacher teaching is the supporting force for student learning. In this process, the generative experience of multi-directional interaction and dynamic engagement between teaching and learning, teacher and student, and student and student should be fully taken into account. And the transformation of teaching competence requires renewed learning and multiple efforts to achieve.

A task can be designed as follows: (1) The problem is first presented in an open-ended manner to give students time and opportunities to think first. (2) Depending on the difficulty of the problem, the teacher allows students to think independently, discuss in groups, or break down the problem and give it to each group in a task format. (3) Listen to students' responses and capture different ideas or questions. (4) Teachers teach in a targeted way, explaining the basic theories, concepts and calculations involved, with examples focusing on simple, classical and practical problems. (5) Training through examples is again interactive, with a conscious effort to diversify the participating students, and without rushing to judge students' responses, allowing other students to comment or add to their answers. If the required teaching objectives cannot be achieved, the teacher then presents the new knowledge and shares it with the students. (6) Assign homework to students (at basic and advanced levels) to meet the needs of students at different levels, or break down projects for students according to the difficulty of the work so that every student is involved and has something to do. Based on this, it can improve students' motivation and initiative in learning higher level mathematics courses, guide them to find suitable learning methods,

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improve their self-learning ability and develop good learning qualities, improve the learning process and promote student development. At the same time, it can make full use of the learning resources between teachers and students and their peers, which is conducive to creating a learning organisation and learning atmosphere where students can help each other and benefit from each other together, so that they can appreciate that their common task is to learn.

3. Let application permeate the classroom

In today's increasingly technologically advanced society, schools are required to train 'practical, applied and innovative' talents, so classroom teaching should not only teach students knowledge, but also focus on students' understanding of knowledge, flexible application, questioning and critical awareness, and creative practice. It is only through the development of students' cognition, emotions and abilities that the value of classroom teaching can be realised. Attention is paid to the infiltration of mathematical modelling ideas in teaching, so that learning can truly be applied. In using mathematical methods to analyse and solve practical problems, it is necessary to find out the intrinsic laws from the intricate relationships in practice, then use mathematical language - numbers, formulas, diagrams, symbols, etc. - to portray and describe them, and then obtain quantitative results through mathematical and computer processing - calculations, iterations, etc. - for analysis, forecasting, decision-making and control. This process of reducing a real problem to a mathematical problem and solving it is called mathematical modelling. In short, it is the process of using mathematical models to solve various practical problems. The process of modelling develops students' hands-on skills as well as their creative thinking skills, and requires profound and flexible thinking, while also fostering the spirit of teamwork. It enables students to learn mathematical knowledge that can be truly applied to real-life situations. It also enables students to recognise the importance of learning mathematics, which in turn motivates them to learn mathematics.

4. Enrich the teaching content and broaden the teaching width

The result of multi-level and multi-category enrollment in higher vocational institutions is that students' performance is mixed. This has set up pre-existing obstacles to the teaching and development of higher mathematics. Relevant information shows that students' low self-efficacy in learning higher mathematics is partly due to the fact that students have encountered their own mental failure in secondary school and do not have enough confidence and certainty in whether they can learn higher mathematics well. This, coupled with the fact that mathematical concepts are dry, abstract and difficult to understand, adds to students' "fear of learning". This requires teachers to study and research the teaching methods and approaches of higher mathematics, enrich the classroom teaching content, increase the attractiveness of the classroom, and help students overcome their fears and integrate into their studies as soon as possible. Mathematics classes in higher education often focus on developing students' skills in mathematical calculations, which takes a lot of time but is not very effective. For this problem, teachers should be aware of the role of modern educational technology in improving the quality of classroom teaching. In line with the principles of simplicity, visualisation and practicality, they should remove abstract theories and complex calculations from higher-level mathematics textbooks, retain basic concepts, principles and methods, and introduce the use of mathematical tools and software as appropriate. In the classroom, the teacher will first explain the relevant mathematical concepts and ideas, introduce the methods of using mathematical tools and precautions, and then ask the group members to work together to solve a problem, during which the students may make various mistakes. During this period, students may make various errors, firstly by group members, and then by other students in the class if they cannot solve the problem, and finally by the teacher. The advantages of this are: firstly, students can participate in the process of exploring the operation of mathematical tools in the classroom, which largely satisfies their curious, playful and active nature and makes the boring mathematics become vivid, thus stimulating their interest in learning higher-level mathematics; secondly, they can solve more complicated calculation problems with mathematical tools only by mastering the relevant operation commands, which reduces the learning burden of students and basically. Thirdly, the group experimental teaching in the higher vocational mathematics classroom has cultivated the collaborative spirit of students and improved their awareness and ability to apply mathematical methods to solve practical problems. At the same time, the teaching of mathematical ideas and methods should be strengthened in the higher vocational mathematics classroom, which is an effective way to implement quality education. Insisting on strengthening the teaching of mathematical ideas and methods can effectively help students to form correct mathematical concepts and an excellent mathematical spirit, which can then be relocated to the inherent tendencies of human nature, i.e. internalised into good scientific and humanistic qualities of

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students. Strengthening the education of mathematical thinking methods can be carried out in the following ways: firstly, to permeate the education of mathematical thinking methods at any time in the teaching of higher education mathematics; secondly, to strengthen the special training of mathematical thinking methods for students in the teaching of higher education mathematics; thirdly, to improve the quality of mathematical thinking methods of higher education mathematics teachers themselves. In addition, the teaching of mathematics in higher education should pay attention to the teaching of mathematical language. Mathematical language is both the carrier of mathematical thinking and the concrete embodiment of mathematical thinking, it is both an expression tool and a communication tool. Therefore... Students should learn to use mathematical language in a correct and reasonable way. It is required that the mathematical language of teachers in higher education mathematics classroom teaching should be accurate, rigorous and concise, pay attention to revealing the meaning and essence of mathematical symbols, and strengthen students' training for the transformation of mathematical language. This plays a role in developing students' logic and rigour.

5. A multi-dimensional and dynamic approach to comprehensive assessment

In traditional teaching, students' examination results have been regarded as the only object of evaluation of the effectiveness of classroom teaching, but this does not reflect the students' mental development, problem-solving ability and innovation ability. Obviously, if this is taken as the only classroom evaluation criterion, it will inevitably ignore the educational goal of all-round development of higher education and the value of people-oriented education. In the process of building an effective classroom in higher education mathematics, it is required that the way in which students are assessed has an educational function. This requires the establishment of a pluralistic and dynamic approach to comprehensive assessment, which not only focuses on students' academic performance, but also identifies and develops students' ability to analyse and solve problems and the development of critical and creative consciousness, and helps students to understand themselves and build self-confidence. On the one hand, the assessment process can be integrated throughout the overall classroom teaching, requiring teachers to make natural and detailed observations of students' classroom questions, classroom responses, group discussions, classroom attention, post-class assignments and peer-to-peer assistance in learning throughout. On the other hand, the conventional examination content needs to be reformed to test not only students' mastery of basic knowledge of advanced mathematics, but also their ability and quality to solve practical problems. Assessment methods can take multiple forms such as closed-book examinations, open-book examinations, on-line operations and essay reports. Secondly, assessment methods can combine a variety of comprehensive approaches such as mutual assessment by students, qualitative assessment by teachers, quantitative assessment, summative assessment and untargeted assessment. In order to achieve scientific evaluation of the effectiveness of higher mathematics classes, teachers need to have high comprehensive quality, not only to have a comprehensive understanding of higher mathematics courses, but also to master and be familiar with relevant teaching evaluation methods and their principles, and to focus on the comprehensiveness and fairness of evaluation.

In short, for higher education students, their mathematical quality and mathematical ability are very important to their growth and development. Higher education institutions must recognise this when teaching mathematics in the classroom, put students at the centre, explore students' habits and characteristics in depth, so as to arouse students' interest in learning mathematics and mobilise students' enthusiasm for learning mathematics.

6. Conclusions

Vocational mathematics classroom teaching must be student-centered, deeply exploring students' habits and characteristics, in order to stimulate students' interest in mathematics learning, effectively mobilize students' enthusiasm for mathematics learning, and achieve effective teaching by organically integrating teachers' teaching and students' learning. Only then can classroom teaching become the main battlefield of quality education, while improving the effectiveness of mathematics classroom teaching, Effectively improving students' mathematical abilities and qualities.

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