

Research on Higher Vocational Calculus Teaching and Cultural Quality Education

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Abstract. The reform of mathematics education in China has lasted for more than half a century, but so far it still feels that the effect of reform is not significant. There is a disagreement about the "what is mathematics" and the related "what is the purpose of mathematics education". As the essence and core of the scientific concept of development, "people-oriented" has gradually penetrated into all levels of society, as well as the mathematics education sector. Since the 1980s, the study of the socio-cultural level of mathematics has increasingly become the research topic of the mathematics education community, and gradually recognizes the profound connotation of mathematics culture. This paper combines the status quo of calculus learning of higher vocational students, takes the mathematical culture view as the theoretical basis, and studies the innovative higher vocational mathematics teaching mode, which is to cultivate mathematics spirit and infiltrate mathematics culture in the overall quality-oriented classroom teaching. Educational model. Higher mathematics teaching in the new mode emphasizes that students learn to use mathematical thinking to observe the surrounding things and analyze and solve practical problems.

Keywords: mathematics education; higher vocational mathematics teaching mode; mathematics culture.

1. Introduction

There are serious problems in current mathematics teaching, and many mathematicians and mathematics educators have pointed out. Most of the mathematics education reforms in more than half a century have been adjusted in the content of textbooks and knowledge systems, but they have not paid enough attention to the basic issues of "what is mathematics, what is the purpose of mathematics education", which has made it a slow progress in mathematics education reform. one of the reasons. As a new topic, higher vocational education needs to solve more problems. In recent years, the "mathematical culture", which has received more and more attention and attention from the mathematics education community and truly cultivated the human quality, has entered the higher vocational classroom. This paper will discuss how to implement mathematics cultural quality education as a knowledge carrier with the basic calculus of higher vocational mathematics.

2. Research Significance of Higher Vocational Calculus Teaching and Cultural Quality Education

2.1 Implementing Mathematical Culture Education for Students is an Inevitable Requirement for Quality Education of Higher Vocational Students

Higher vocational education is not only higher education, but also equal to ordinary higher education. It is the higher stage of vocational and technical education. Higher vocational education emphasizes the training of vocational targeted and vocational skills. It is oriented to the needs of social talent market. Employment education. Mathematics education currently focuses on knowledge as the basis for learning science and technology. This function is indeed increasingly important in modern society, but knowledge is difficult to exhaust, and the mathematical knowledge that each specific person needs in his life is limited. In fact, the above ordinary people will forget the mathematics knowledge they have learned, but in the future work, they need mathematics that have not been studied in many universities. Therefore, mathematics education should "give people to fish" rather than "give people to fish". Therefore, higher vocational mathematics education should come

out of the current one-sidedness. Mathematics that only instills professional knowledge and solves problem-solving skills can only be cultivated as a problem-solving machine with indifference and numbness. Therefore, mathematics education must include education in mathematics, mathematics, mathematics, and mathematics. The important reason is that It can achieve the purpose of enabling students to develop good scientific thinking habits, shape healthy personality and character, and cultivate correct scientific attitudes and values. This is not only the need to implement quality education, but also to cultivate the awareness and ability of lifelong learning for higher vocational students, and to adapt to the requirements of the knowledge economy for talents.

2.2 The New Orientation of the Mathematical Culture View of Mathematics Curriculum, Promoting the Study of Teaching Reform

Mathematics quality education is essentially the education of mathematics culture. Mathematical education is not only an education of scientific literacy, but also a cultivation of humanistic spirit. Mathematics itself is the product of the free creation of the human brain. Mathematics is the knowledge that people make. Then it must be marked with social, epochal and humanistic imprints. Therefore, the humanistic background and cultural value of mathematics should also be understood by students. On another level, mathematics teaching content is not only a logical system of mathematical knowledge, but more importantly, it reflects the mathematical thinking methods it contains through knowledge, reflecting the cultural values it contains. The process of mathematics learning is the acquisition of knowledge and the formation of ideas. The process that occurs at the same time. The purpose of mathematics teaching is not only to ask students to remember the specific knowledge of the system, but also to master the problem of finding, solving the problem, the way of thinking, and the method of mathematics, guiding students to build the basis of learning knowledge, gaining knowledge and forming knowledge. Methods and habits. Correspondingly, the higher vocational mathematics education should focus on the talent training goal, fully mobilize the student's main role according to the needs of the society and the development needs of the students, and follow the universal regularity of the education and the differences in individual development. It is enough to use the scientific knowledge of diligence, truth-seeking, inquiry and innovation while learning mathematics knowledge, methods and application skills, and form a good mathematical awareness and mathematical literacy. Calculus is the main teaching content of mathematics in the higher vocational stage, and its learning is more profound. The generation of calculus marks the leap from constant mathematics to variable mathematics. The leap calculus from elementary mathematics to higher mathematics is also a basic subject, and it is also a widely applied subject. Learning calculus is a prerequisite for mastering the arbitrariness of other arbitrary branches of higher mathematics, and it also makes it possible for students to further study and study other economic disciplines. The learning of calculus courses is more important in the way of thinking through the analysis of the nature of change, so as to cultivate the ability to innovate, analyze problems and solve practical problems, and to transfer calculus ideas to other disciplines. And in social life, at the same time understand the profound and broad humanistic background of calculus. On the basis of calculus as the carrier of knowledge, we explore the issue of mathematics quality education, seek the intervention method of mathematics culture education, and then enhance the understanding of the new orientation of mathematics curriculum in higher vocational stage, so as to effectively carry out the corresponding teaching reform.

2.3 The Education of Mathematics Culture is an Important Part of Implementing the Mathematics Quality of Higher Vocational Students

The basic implication of mathematics quality education is that mathematics education should pay more attention to the cultivation of abilities compared with the learning of basic knowledge and skills. The core of it is to help students learn mathematics thinking, learn to observe the world mathematically and deal with problems. Mathematical qualities include mathematical concepts, knowledge, skills, abilities, thinking methods, mathematical vision, mathematical attitudes, mathematical spirit, mathematical communication, mathematical thinking, mathematical judgment,

mathematical evaluation, mathematical appreciation, mathematicalization The value of mathematics, the cognitive and non-cognitive fields of mathematics, mathematical understanding, mathematical understanding, mathematical applications and many other aspects of mathematical quality. "So what kind of teaching content in higher vocational mathematics education can help higher vocational students to meet the above requirements and improve their own quality? The only answer is that - mathematics culture.

3. An Overview of Higher Vocational Calculus Teaching and Cultural Qualities

In the past two decades, the research on mathematics culture in China has been quite extensive, and many literatures have conducted a more in-depth discussion on mathematics culture, but most of the research on the practical aspects of mathematical culture at the theoretical level is not balanced. Questions about calculus have not received substantial attention. Therefore, before proceeding with further research, the concept of mathematical culture is elaborated.

3.1 Overview of the Study of Mathematical Culture

"Mathematical culture" is a "subculture". At the beginning of the last century, there was a fierce debate about the nature of mathematics. This debate is carried out among the three schools. The core ideas are that mathematics is a kind of transcendental truth of objective existence, mathematics is the free creation of human brain intuition, and mathematics is a system of truth that can be accurately expressed by a careful symbol system. Since each party's point of view has a reasonable component, but there are also insurmountable weaknesses, the debate has not reached a conclusion. But the consensus is that, in history, mathematical truths have never had an absolutely reliable standard of judgment. The standard of truth is grasped in the group of mathematicians of different eras - the "mathematical community." In the 1980s, American mathematician Wilder proposed "mathematics - a cultural system" from the perspective of mathematical anthropology. This view quickly gained wide agreement.

3.2 Mathematical Cultural Content and Value in Calculus

One of the epoch-making and immortal contributions of calculus to mathematics is that it introduces movement and infinite thought into mathematics and becomes a basic mathematical idea. It is an extremely exquisite example of mathematical ideas and methods. It gives a whole set of scientific methods and opens up a new era of science. Colang commented that "calculus, or mathematical analysis, is one of the great achievements of human thinking. It is in the position of natural sciences and humanities, which makes it a particularly effective tool for higher education.

Calculus, some people think that this is a widely used computing system, then in its teaching, as long as the formula system is mastered, this view is tantamount to a glimpse of the leopard. Calculus teaches human beings to grasp the world in movement and change. The concept of calculus has become one of the basic qualities of modern people. It enables humans to clearly grasp the local and the whole, micro and macro, process and state, instant and stage for the first time. The connection enables the human being to be condescending, consider the problem from a holistic perspective, and can analyze the problem from a differential perspective. Therefore, further revealing the cultural value of calculus is of great significance to the development of teaching and learning of calculus.

The study of mathematical culture in calculus can not only stay in the discussion of the importance of calculus, but also emphasize the contribution of mathematics to human civilization, especially the inspiration of calculus on human thinking, the improvement of human quality, and the The promotion of development, below the author's shallow understanding of calculus to explore the culture contained in calculus.

3.3 Mathematical Culture in Calculus and Higher Vocational Mathematics Education

As a basic course, calculus should focus on the functions of culture and application, and focus on cultivating the mathematical literacy of higher vocational students. The important aspects are

mathematical thinking and mathematical modeling consciousness. Higher level mathematical thinking is filled with logical thinking and rich imagination. A wonderful combination of active subconsciousness and keen intuition. In essence, mathematical thinking embodies a kind of creative thinking and a dialectical thinking. It is characterized by aggressiveness, exploration of the unknown, seeking new and different, flexible, pursuing efficiency, saving economy, and these qualities are the modern society. Craving. [The United States has long recognized the importance of mathematics. The development of the world economy has made mathematics a must-have knowledge in many industries. It has never been like this. Americans need to think for survival. They have never been like this. They need to be mathematical. Thinking." On the other hand, the calculus teaching that penetrates the mathematics culture is beneficial to the formation of the loyal, firm and confident will character of the vocational students, which helps the establishment of vocational concepts of vocational college students. Of course, the most important thing is the church. They think, 'know how to use calculus to see the problem.

4. Discussion on Calculus Teaching and Cultural Quality in Higher Vocational Education

4.1 The Teaching of Calculus History Helps Students to Understand

From the perspective of mathematics culture, the interpretation of calculus history runs through teaching, which is also a necessary link to implement mathematics quality education, which will make students fully appreciate that calculus is one of the great achievements of human thinking. The teaching classroom design incorporates the history of calculus, which can show the development process of mathematics humanistic spirit, cultural connotation and mathematics thought to the students, so that they have a more comprehensive view and understanding of calculus and even mathematics.

The teaching of calculus history can give students important revelation of thinking is the first, logical is not necessarily the most ideal, because the order of human knowledge accumulation and logical order may not be consistent. Second, science must be strict, no Strictly speaking, it does not become the third in science. From the perspective of logic, from Archimedes to Newton, Leibniz, and then to the 19th century, the logical thinking of calculus has experienced the development of affirmative-negative-negative negation. stage. Then in the teaching practice, the author believes that concept teaching and proper theorem proving are the best way to intervene in the history of calculus, explaining why the concept is introduced, what is the definition method, and what is the rationality of how they are in predecessors. Formed in the mind, etc., and further guide students to analyze the structure of the concept. In this way, from the formation of the concept, students can develop the abstract and creative thinking ability, and enable them to learn scientific research methods.

4.2 Improve the Teaching Method of Calculus and Visualize the Teaching Content

The teaching of calculus in higher vocational education emphasizes the function of the concept to solve the problem, and vividly highlights the application, so that students of different degrees can realize the meaning of mathematics and appreciate what they need. Then in the teaching process, we must concentrate on thinking, use the intuitive, visual description and geometric description of the concept theorem as much as possible to help the understanding of higher vocational students and diversify the teaching methods, so that teachers can lead It is organically combined with the student body.

First, make good use of "heuristic teaching". Teachers prepare lessons to focus on how to use "speaking" to inspire, guide, organize and motivate students' "learning", making full use of the unique logic of higher mathematics so that students can be guided by teachers. To actively think about the problem. Second, highlighting the "contrast teaching", correct understanding of concepts and mastery of knowledge are necessary links for the development of higher vocational students. In teaching, teachers should be good at grasping the numbers and shapes, constants and variables in calculus,

quantitative and qualitative., local and overall, finite and infinite, differential and integral and other contradictions to make a fuss, but also should pay attention to the comparison of new and old knowledge, comparison between formulas, etc. Third, strengthen "application teaching", teachers should focus on strengthening mathematical modeling The cultivation of ideas should make students understand the corresponding models of calculus in production practice and daily life as much as possible, and insert mathematical modeling cases according to the teaching content to cultivate students' mathematics application ability and innovation ability, so that students can feel To learn the meaning of mathematics, enhance students' self-confidence, and then increase their interest in learning mathematics.

4.3 Develop Curriculum Resources for Calculus to Enrich Teaching Content

The mathematical culture connotation in calculus is very rich. It is integrated into the fields of art, architecture, painting and modern life. If you want to have a more in-depth and comprehensive understanding, let students feel the influence of mathematics culture. To make the classroom full of culture, you must rely on intuitive multimedia technology. However, it should be noted that when the students' enthusiasm for learning is stimulated, the teaching activities should return to the abstract teaching of mathematics, which is convenient for the formation of students' mathematical thinking. Because students understand, master and apply knowledge, they all think. As an intermediary, it finally transforms into ability, so it returns to the symbolic operation and thinking exercise of mathematics, and moderately trains abstract logical thinking in the abstract thinking space.

4.4 Thoughts on Trying to Model Teaching in Higher Vocational Mathematics

A mathematical model is a mathematical structure that is expressed in a generalized or approximate manner using formal mathematical language for or against the characteristics or quantitative dependence of a certain system of things. Various mathematical formulas, equations, theorems, theoretical systems, etc. are all specific mathematical models. The teaching of mathematics is actually to teach students a mathematical model and how to construct a model. The key to cultivating students' ability to use mathematical modeling to solve practical problems is to abstract practical problems into mathematical problems, which requires students to have considerable observation, analysis, synthesis, and analogy capabilities. The acquisition of these abilities requires the understanding of mathematical modeling throughout mathematics teaching, that is, teachers should constantly guide students to observe, analyze and express various things, spatial relationships and mathematical information from the perspective of mathematical thinking, from complex and complex The problem is abstracted out of the familiar mathematical model, and then the use of mathematical models to solve practical problems, so that mathematical modeling awareness becomes a method and habit for students to think about problems.

4.5 Suggestions for Teachers' Teaching

In the higher vocational mathematics classroom teaching, mathematics culture quality education is carried out. On the one hand, teachers should have a deep understanding of mathematics and have a deep understanding of calculus culture. On the other hand, teachers should have a deep understanding of calculus teaching. In addition, the rigorous form should be appropriately diluted in the teaching content, and the theoretical depth should be reduced and the theoretical guidance should be streamlined. It is people-oriented, fully considering the reality of students' abstract ability, and the method of simplification of the positioning scale with the acceptability of students can adopt the popular expression of attaching importance to the essence of the theory, emphasizing the conditions and conclusions of the theorem, and using the geometrical, quantitative relationship or vivid dynamic demonstration of the image. And use the easy-to-understand teaching language to interpret the abstract mathematical content, eliminate the fear of mathematics students, and give them a close world of mathematics. Incorporating modeling ideas into the teaching process is to instill the modeling ideas and introduce the modeling methods in combination with the teaching content. Mathematical modeling is a bridge between professional knowledge and mathematical knowledge.

Teachers have a strong sense of modeling in the teaching process. Mining mathematical models into modeling everywhere is to guide students to learn mathematics and use mathematics, so that higher vocational students take the first step toward the goal of applied professionals in the mathematics classroom.

5. Conclusion

With the rapid development of science and technology and the influence of social and economic globalization, vocational education is no longer an "end-of-sex education", but a lifelong education with a lifetime. Therefore, the goal of mathematics teaching should be based on lifelong education and lifelong learning. The need to develop students' learning ability, cultivate students' world outlook, the formation of a outlook on life, the development of personal qualities, professional ethics, and the spirit of innovation and innovation. In the teaching of higher vocational mathematics, the mathematics culture is integrated into the teaching of calculus, and the combination of the scientific spirit of mathematics and the humanistic spirit is indeed implemented, which is suitable for the needs of the development of the times. Modern people need multi-dimensional vision and radiation knowledge, which needs to be comprehensive. The situation and culture are accepted to understand modern science. Therefore, mathematics teaching in higher vocational schools must pass the education of mathematics culture, so that students gradually realize that highly rational thinking comes from mathematics, so that higher vocational students can understand that they have higher mathematics literacy in order to integrate individuals into society in order to become a higher mathematical quality in the future. Professionals with a broad vision and strong innovation ability are the key to grasping careers and opportunities, and the only way to achieve self-realization.

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