

# *Using Mathematics Culture to Explore Math Teaching in Higher Vocational Education*

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**Abstract:** This article will discuss the urgent need for reform in higher vocational math teaching in difficult situations, and explore the integration of mathematics culture and mathematical ideas in higher vocational math teaching, which will reflect the higher educational value of higher mathematics, and provide reference for future higher vocational math teaching reform.

## **1. The Current Situation of Math Teaching in Higher Vocational Colleges**

Today's higher vocational education is limited by the teaching model and traditional thinking, the number of higher vocational students has decreased and the quality of students is declining, math teaching time has been reduced. At the same time, the teaching methods are rigid, and the students are tired of learning. The reform of mathematics teaching in higher vocational education is imperative.

Part of the fundamental reasons, the author thinks that there are several ones as follows:

(1) The content of course is aging and lack forward looking, innovation and attractiveness. Although the mathematics textbooks used in higher vocational colleges have been revised many times, most of them have the problem of emphasizing knowledge rather than application, emphasizing logic and neglecting practice. Even some of the topics in the textbooks that combine theory with practice have an outdated background for a long time, have not kept pace with the times with industry development, and are seriously out of step with the majors students are studying.

(2) The teaching is too much single form. Traditional mathematics teaching attaches great importance to learning knowledge and exercises, but ignores the teaching of mathematical ideas, mathematical spirit, and mathematical methods, which are exactly the essence of mathematical culture.

(3) The college does not pay enough attention to general courses, and the advanced math teaching plan has been repeatedly compressed. The teaching hours have changed from two years to one year, and one year to one semester. Some majors even no longer offer higher mathematics courses.

It is time to face the fact, if the current teachers still stick to the old rules and continue to use the existing teaching methods to teach step by step, the trend of higher mathematics being marginalized will continue and become increasingly acute. The reform of mathematics teaching in higher vocational education is imperative. This paper studies the problems faced by higher vocational math teaching, the ideas of teaching reform and teaching methods.

## **2. Re-evaluate the Position of Advanced Mathematics in the Higher Vocational Teaching System**

《The Decision of the State Council on Accelerating the Development of Modern Vocational Education》 mentioned that the connection between vocational education and lifelong learning should be realized. Different from undergraduate education , higher vocational education is not only a employment education, but also attach importance to the all-round development of higher vocational students. In fact, judging from the feedback of companies employing students, the competitiveness of vocational students is not only their professional operation ability, adaptability, and learning ability, but also their humanistic quality and logical thinking ability. From the perspective of lifelong education, mathematics is the foundation and tool of professional learning, and it is the most important course for cultivating students' mathematical literacy and thinking ability.

## **3. The Direction of the Reform of Math Teaching in Higher Vocational Colleges—Embedding Mathematics Culture In Mathematics**

Li Daqian with the Chinese Academy of Sciences once said that ignoring the edification of mathematical ideas on students and the improvement of students' mathematical quality, it will lose the most essential characteristics and requirements of mathematics courses. The fundamental purpose of higher mathematics education is not only to let students master the classic calculus knowledge before the 17th century, but also to cultivate students with a pair of keen eyes, which will be able to find rules from daily life, and to learn to use rigorous thinking habits, rich language and scientific model to get along well with the world. To achieve this goal, we should pay more attention to the penetration of mathematical ideas and mathematical culture, and cultivate students' scientific literacy and humanistic spirit.

## **4. The Specific Content and Methods of Teaching Reform**

The author adds short stories related to mathematical historical events in day-to-day lesson preparation, which is proposed to let students broaden horizons, understand the ins and outs of mathematical historical events, and improve students' interest in learning mathematics. When talking about the fact that L'Hospital Rule was bought by L'Hospital from his master John Bernoulli at a great price , and when we talked about the Newton- Leibniz formula, he inserted the story of "the battle of the inventors of calculus", Our students were found to be very interested in these short stories. Vocational students generally have a weak mathematical foundation. Many students give up mathematics learning in high school or even junior high school and even lose confidence so early. The introduction of mathematical culture is beneficial to reshape their interest in mathematics. Higher vocational math teaching not only serves professional courses, but also cultivates students' mathematical quality. When explaining the method of integration by parts, the classical

transformation ideas in mathematics are used to transform difficult problems into simple ones. These mathematical ideas, methods and inner spirits develop students' mathematical thinking and improve their comprehensive quality, which is the biggest gain in learning mathematics. When students graduate and go to work, mathematics may not be related to the work they are engaged in. The mathematics knowledge learned in college will gradually be forgotten over time, but the mathematical literacy they learn will benefit them for a lifetime. Therefore, in the teaching of mathematics in higher vocational education, we should deeply understand the historical background and cultural connotation of the teaching content.

#### **4.1 Restructure the Teaching Content**

First of all, according to the specific teaching contexts, the knowledge points are processed, adapted and designed in the perspective of mathematical culture. The teaching content can be combined with relevant mathematical historical materials, so that students can experience the precious innovative spirit of mathematicians while mastering mathematical knowledge, study the way of thinking and the charisma of a mathematician in the process of inventing theorems or formulas. Secondly, dig deep into the knowledge points and teaching materials, and find things that students can't see but are very valuable for cultivating students and development, and extract them and infiltrate them into the classroom of higher vocational mathematics to help students know this and know why, then they can understand the source of the knowledge, grasp the intrinsic connection between theorems or other knowledges, and broaden their horizons. The dissemination of these mathematical cultures, which are derived from textbooks and higher than textbooks, is not only conducive to students' understanding and mastery of mathematical knowledge, but also conducive to the improvement of students' thinking ability and learning ability, thereby improving students' core literacy and competition force.

#### **4.2 Innovative Teaching Methods**

For a long time, mathematics lessons have been conducted in the form of "one chalk and one mouth". Teachers are accustomed to the traditional and rigorous mathematics teaching of logical reasoning and calculus, and are used to theoretic knowledge infusion. Boring and passive learning is one of the important reasons why students hate mathematics learning. Mathematical culture is based on mathematical content, it can make a story, clip, video, in the background of the Internet age, the display of mathematical culture becomes very convenient.

In higher vocational math teaching, we should try our best to introduce new media teaching methods in the classroom according to the level of students, and make teaching methods more informational. The first thing is to use new media to enrich teaching resources. According to the mathematicians, knowledge points, symbols and practical application of mathematical knowledge involved in the teaching content, the mathematical cultural resources contained in the relevant mathematical content can be deeply mined, process them then displaying through new media, which will allow students to experience and feel the mathematical culture, mathematics is not boring, and mathematics is not rigid. While stimulating students' interest in learning, students can fully understand the mathematical culture and learn the mathematical ideas behind mathematical knowledges and methods etc. The second one is to use multimedia methods to visualize the teaching contents. Teachers can use multimedia technologies such as PPT, video synthesis softwares to make multimedia animations, micro-lectures, which will fully demonstrate the whole process of the generation, development and application of mathematical knowledge. It integrates mathematical

culture and mathematical knowledge organically to achieve the unification of explicit knowledge and implicit culture, so that students not only master mathematical knowledge, but also lay the foundation for subsequent learning, and at the same time master mathematical thinking methods, and give full play to the role of mathematics in education at the same time. .

#### **4.3. Open Mathematics Elective Courses to Cultivate Students' Mathematical Cultural Literacy**

Such elective courses include history courses such as history of mathematics and anecdotes of mathematicians that cannot be carried out in the compulsory advanced mathematics courses due to class time constraints. In the process of mathematics development, the evolution and formation of concepts, the establishment and development of thinking methods, etc., all reflect the thought of materialist dialectics, such as “replace the straight with the curve”, “replace the variable with the constant”, “part and the whole” in calculus, they are so full of dialectical philosophical thought. Mathematics originates from the real world and embodies the materialism in epistemology. By opening elective courses in a targeted manner, we can give full play to the hidden education function of mathematics culture, and make mathematics education point to the improvement of people's core literacy.

#### **4.4 Optimize the Mathematics Teaching Evaluation System**

In traditional higher math teaching, closed-book examinations are used as the main method to examine students' mastery of knowledge. After introducing mathematics culture into the classroom, students can use existing multimedia means to make a short-time PPT, micro-lecture, video, etc., according to the knowledge points to be taught in this class, related mathematicians, and even an integral number. The mathematics culture reflected in these mathematics contents is given to the students for evaluation. At the end of the semester, students can be asked to write a short paper on mathematics culture, or summarize the mathematics knowledge learned in the semester on a piece of paper and a PPT. In this seemingly inconspicuous process, the students' mastery and comprehension of knowledge were examined, as well as their mathematical cultural qualities such as comprehension, induction, and summarization. These qualities are the core of mathematics culture and the core literacy of students, and are the direction and basis for promoting students' development. At the same time, optimizing the evaluation method can also change the bad atmosphere of not working hard at ordinary times and making sudden attacks in exams, so that students can grasp every link in the learning process, pay attention to the cultivation of ability and quality, and lay a solid foundation for professional learning.

To summarize, the practice of mathematics teaching reform in higher vocational education should focus on "affinity". Because of its abstraction, mathematics is regarded as a very boring subject by many students. In classroom teaching, we should be guided by mathematics culture, present the beauty of mathematics in a lively way, show the process of mathematics, stimulate students' interest, and make mathematics learning process more interesting. The content learned in advanced mathematics, such as: limit, continuity, calculus, etc., are the essence of human society's long-term practice and hard work. How can teachers combine these essences with students' interests in a humorous and natural way, so that students have a real affinity for mathematics and learn with great interest, which is also a topic that needs to be continued to be studied in the reform of mathematics teaching in higher vocational colleges.

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