

# An Analysis of the Infiltration of Mathematical Culture in Mathematics Teaching in Colleges and Universities

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**Abstract:** With the rapid development of information technology, the requirements of modern education for knowledge level are getting higher and higher, and people pay more and more attention to education. Nowadays, mathematics education in colleges and universities is not only to teach students to master mathematical theory knowledge, but also to infiltrate mathematics culture into the classroom in the process of teaching. By analyzing the cultural background of mathematics knowledge, teachers can stimulate students' interest in mathematics in an all-round way, and also let students make clear the necessity and importance of learning mathematics culture, which can effectively improve students' comprehensive literacy and strengthen students' practical application ability of mathematics. This paper probes into the ways of permeating mathematics culture in mathematics classroom.

## 1. Introduction

Mathematics is the cultural wealth of the development of human society, which has the same unique language and cultural connotation as other disciplines. When carrying out mathematics teaching activities in colleges and universities, we should simultaneously improve college students' mathematics application skills and cultural accomplishment, attach importance to the dissemination and development of mathematics culture in colleges and universities, and integrate the concept of mathematical culture throughout the classroom. It is necessary for college students to fully understand the inseparable relationship between the development of human society and the subject of mathematics in the mathematics teaching classroom, so as to show the humanistic value of mathematics and highlight the scientific and applied nature of mathematics in real life.

## 2. The basic connotation of mathematical culture

### (1) The concept of mathematical culture

Mathematical culture can be divided into narrow and broad sense. In a narrow sense, mathematical culture refers to a cultural form in the spiritual world of human beings, and in a broad sense, it refers to the unnatural things created by human society in the process of development. In the continuous development of culture, mathematics has its own independent cultural system, which is not only a special cultural form, but also an indispensable and important part of the development of human civilization. In the process of origin, development and perfection, the mathematical culture has brought the extremely important influence to the human social production activities. This form of cultural existence not only presents the enterprising spirit of human beings in understanding and developing mathematics knowledge, but also embodies the sense of mathematical thinking that human beings have in the process of cultural development. In the mathematics classroom of colleges and universities, teachers communicate the incomprehensible abstract mathematics thought to the students through easy language, and use the effective and scientific teaching method to pass on the mathematics knowledge to the students, and constantly spread and transmit the mathematics culture knowledge in depth to embody the educational function and cultural value.

### (2) The characteristics of mathematical culture

Mathematical culture is a highly scientific culture with many characteristics. Firstly, quantitative characteristics. Mathematics is a standard that can effectively measure whether a person has the core literacy of mathematics, which is very different from other disciplines. Secondly, the characteristics of development. The origin of mathematical knowledge is extended in the process of researchers' constant pursuit of perfection, and every time the last "perfect stage" and incorporate new mathematical elements are broken, some new branches of mathematics will be created, thus broadening the scope of the influence of mathematical knowledge once again. Thirdly, the practicality of the characteristics. Mathematical culture is the most frequent culture used in daily life and an indispensable practical tool for human life and work development, and mathematical culture and all fields are inextricably linked. Fourth, the characteristics of thinking. The quintessence of mathematical cultural knowledge is mathematical thinking, and it is also the most important training point for teachers to carry out mathematics teaching activities. Fifth, the characteristics of educational nature. After a period of systematic mathematical skills training, students can form an unforgettable cultural accomplishment, not only can enable students to improve the practical application of mathematics, but also have a positive impact on the lifelong development of students, this feature is irreplaceable and not available in other disciplines.

### **3. The value of mathematical culture**

#### **(1) The educational value of humanistic literacy**

As a special cultural form, mathematical culture naturally has the same educational function as social culture. People continue to delve into the actual process of mathematical knowledge, it is possible to effectively enhance their own rational awareness, and improve people's aesthetic judgment. Compared with other disciplines, mathematics has a more rational values and emotional outlook, which can stimulate people's rational cognitive ability in an all-round way, so as to gradually improve people's sanity. Mathematical culture is also a key part of the actual social culture, which can let students more intuitive and real understanding of the actual social life situation, so that the dialectical materialism values deeply integrated into the students blood, so as to effectively promote the formation of students' good thinking quality, enhance students' aesthetic taste. Finally, students can achieve the goal of improving their ability to solve practical problems through mathematical knowledge.

#### **(2) The educational value of science**

Mathematical culture plays an active and important role in the field of human real life and production, and mathematical culture is not only a cultural technology, but also a cultural tool, which is a kind of cultural form that occupies an important position when human beings carry out production activities and transform the natural environment. When the mathematics teachers in colleges and universities actually carry out mathematics teaching activities, students can solve the mathematical problems in real life through the guidance of teachers, using the calculation methods and verification methods in mathematical knowledge, so as to cultivate students' practical and objective scientific research attitude, and to enhance students' meticulous and rigorous in carrying out mathematical research. It is beneficial for students to form a thoughtful mathematical inquiry attitude and make it scientific.

### **4. Effective measures to infiltrate mathematics culture into mathematics teaching in colleges and universities**

#### **(1) Paying attention to mathematical inquiry and cultivating mathematical spirit**

When the maths teachers carry out exploration activities in colleges and universities according to college students living environment, and accept the link between the characteristics of the various aspects ability, knowledge, learning experience, comprehensive teaching materials for students to create a scientific, reasonable and interesting learning environment . In such a teaching mode, teachers can not only carry out teaching activities smoothly, but also fully stimulate the interest of college students in high-level mathematics knowledge learning, and at the same time obtain

mathematical knowledge and basic application skills, effectively promote the development of students' good mathematical thinking ability, so that college teachers can achieve higher teaching quality in teaching activities<sup>[1]</sup>. In the process of teachers guiding students to explore mathematics knowledge, students also apply their mathematical knowledge to practice, and under the guidance of teachers' science, forming a new mathematical knowledge system, deepening students' ability to understand and mastering the basic knowledge of mathematics.

Therefore, in the higher mathematics classroom teaching, the teacher should create a full exploration space for the students, and assign the subject status in the classroom to the students, so that the students can reflect the subjectivity of the classroom and actively participate in the exploration of mathematics knowledge, guide students to open their minds, break through the limitations of traditional imagination, and fully exert their imagination, so that the communication between students and students, teachers and students is more close and effective. In this way, the higher mathematics teaching classroom is gradually transformed into a place for students to actively explore mathematics knowledge.

For example, when a teacher teaches the content of "Cauchy-Schwarz Inequality", the teacher can make the relevant materials of Cauchy into multimedia teaching courseware through video and audio editing before the class. Then, the teacher plays it in the classroom for the students to watch, lets the students start from the characters, explore the relevant knowledge in the "Cauchy-Schwarz Inequality", and have a general impression. Finally, the teacher uses this as a clue to combine the textbook and video-related content to organize the characteristics of the students' inequalities and the relationship between the vector product and the inequality of the vector. In the process of guiding students to explore, teachers can encourage students to express their opinions and associations boldly, and other students can infer and question. The teacher comprehensively explains and expands the problems that the students can't overcome through hard work, and presents the conclusions of the main inquiry of the classroom to the students through the definition of the number of products. The mathematics knowledge that students independently explore can be more deeply remembered by students, which not only can improve the students' practical mathematics application ability and professional knowledge level, but also effectively expand the students' knowledge horizon, and pay attention to the education of mathematics history and explore the context of knowledge.

In carrying out mathematics teaching activities in colleges and universities, it is necessary to pay attention to students' knowledge of mathematics history. The teacher guides the students to understand the history of mathematics, enables them to fully understand the mathematicians in the history of mathematics, and truly feels the mathematical spirit of these outstanding scholars' lifelong struggle to promote the development of mathematics<sup>[2]</sup>. In addition, when students understand the whole development process of mathematics, they can also increase students' sense of identity in mathematics, stimulate students to explore the enthusiasm of mathematics knowledge, and broaden students' knowledge. In the process of teachers guiding students to clarify the development of mathematics knowledge, students can deeply understand the mathematical research ideas of mathematicians, so that college students will master the law of development in the process of exploring mathematical knowledge, improve students' ability of mathematics research, and finally, promote the development of mathematical knowledge science, and deeply penetrate the mathematical culture into students' life and learning.

For example, when teachers are teaching mathematics related knowledge theory, they can fully integrate the content of "three crises in the history of mathematics" into the classroom content. Before the class, the teacher first put the "three crisis" related curriculum content collation and editing after the production of PPT teaching plan, by playing PPT to let students fully understand the causes and processes of the three crises, in addition, they can also let the students understand the mathematical culture reflected in the process of crisis outbreak. Then, under the guidance of teachers, students can also understand that mathematicians in the process of dealing with the crisis, on the basis of the original mathematical knowledge to innovate a variety of new mathematical concepts. For example, in the 1st crisis, in the history of mathematics, the concept of axiom

geometry appeared; in the 2nd crisis, the basic theory of analysis was gradually completed under the constant inquiry of mathematicians; And in the 3rd crisis, a large number of novel branches of mathematics in the former people to promote the development of mathematical logic poured into the long history. Through such a teaching method, students can learn from the existence of mathematical truth has a hierarchical and targeted relativity, students will gradually form a speculative mathematical logical thinking. For example, when teachers introduce the “development history of non-European geometry” into mathematics teaching activities, students can improve the mastery of higher geometry related knowledge according to the historical context of European and African geometry, and enhance students’ understanding of abstract geometric concepts, so as to make students fully feel that they want a major mathematical problem to be solved, It takes a lot of mathematical inquiry workers to work together to achieve success.

### (3) Strengthening applied teaching of mathematics and broadening students’ knowledge vision

When teachers actually carry out higher mathematics teaching activities, teachers should give full play to the instrumental nature of higher mathematics, so that students know that mathematics is the most powerful research tool in the world. Therefore, mathematics teachers should introduce the mathematical knowledge points and skills that can be applied in students undefined daily life and practical production activities into mathematics classroom teaching<sup>[3]</sup>. For example, in the mathematics classroom to guide students to study and discuss “building design-related issues”, “housing and land measurement issues”, “product yield accounting issues” and so on, in the process of exploring these problems, students can not only effectively acquire mathematical knowledge, but also improve students’ practical application ability in mathematics.

In addition, teachers can also play the knowledge related to mathematics in modern science and technology fields to students through video display, and guide students to discover and record problems closely related to mathematics in their lives, and bring them into classroom discussion. Then, teachers take this as a clue to compare mathematics knowledge with other disciplines, so that students can understand the similarities and differences between mathematics and other disciplines and links. For example, the specific disciplines such as chemistry, astronomy, physics and other disciplines contain rich mathematical culture and knowledge. These disciplines usually use mathematics as an effective application tool and apply mathematical formulas to the deduction of the discipline’s laws. At the same time, these disciplines are constantly improving and promoting the development and advancement of mathematics in the application of mathematical knowledge. Teachers can use these disciplines. Life examples closely related to mathematics teaching in the field of science are analyzed to students, such as artificial satellites designed by scientists, the launching process of artificial satellites, the operation of artificial satellites and so on. Through this teaching mode, students can effectively broaden their knowledge, and deeply understand the positive role of mathematical culture for human life, and understand the inseparable relationship between human life and mathematical knowledge. After class, teachers can also send the key contents in the classroom or the practical problems of mathematics that students are difficult to solve. Through video recording, they can send the difficult points, key points and related solutions to the learning group of the class in the form of video, and guide the students to express their views and opinions in the group, so that the mathematics culture can penetrate into all aspects of the students, thus effectively improve the students mathematics core literacy.

## 5. Conclusion:

In summary, the effective penetration of mathematical culture into mathematics teaching classroom in colleges and universities can not only arouse students’ interest in mathematics learning, promote students’ independent exploration of higher mathematics knowledge, but also improve students’ mathematics accomplishment and humanistic accomplishment in an all-round way. Therefore, the mathematics teacher colleges and universities will need to dig deeper cultural knowledge textbooks and comprehensive analysis of one of the inner meaning to the students to develop mathematical thinking and mathematical spiritual consciousness of students, broaden their knowledge of applied

mathematics in real life, so as to achieve the purpose of the comprehensive development of college students.

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