

Exploration of Mathematics Education in Universities from the Perspective of Mathematical Culture

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Abstract. This article elaborates on the concept and characteristics of mathematical culture, and explores the far-reaching significance of teaching and education in colleges and universities from the perspective of mathematical culture. On this basis, a series of comprehensive and effective mathematics teaching reform strategies are proposed, including but not limited to, changing teaching concepts, optimizing teaching methods, enriching teaching content, using modern scientific and technological means, establishing a tiered elective system, etc. In addition, these strategies should be effectively evaluated and monitored as a whole, and necessary adjustments and optimizations should be made based on the actual situation to ensure their implementation effectiveness. The purpose of these measures is to provide substantial help and suggestions to college mathematics teachers, thereby improving the quality of mathematics teaching and further promoting the progress of mathematics education.

Keywords: From the perspective of mathematical cultural perspective; Universities; Mathematics education

1. Introduction

As a key subject throughout the education stage, mathematics is crucial to cultivating students' logical thinking, abstract thinking and ability to solve practical problems. At the same time, mathematics education also assumes the important task of improving students' comprehensive quality and promoting all-round development. Teachers have the responsibility to strengthen the dissemination and education of mathematics culture so that students can appreciate the profound cultural heritage of mathematics and feel the unique charm of mathematics, thereby stimulating students' enthusiasm for learning and subjective initiative. Research on mathematical culture helps to promote the development of mathematics education. Through in-depth research on mathematical culture, teachers can better understand the nature and value of mathematics, thereby imparting mathematical knowledge more effectively and improving students' mathematical literacy. At present, research on mathematical culture has become a hot topic in the field of mathematics education at home and abroad. A large number of scholars and teachers are committed to studying mathematics culture and exploring its role and value in mathematics education. In practice, some schools have begun to incorporate mathematics culture education into their curriculum systems, allowing students to better understand and feel the charm of mathematics culture by offering mathematics culture courses and organizing mathematics culture activities. In addition to school education, some social institutions are also actively involved in mathematical cultural research and practice. For example, some museums, scientific research institutions, etc. have organized mathematical cultural exhibitions, lectures and other activities to provide the public with a wider range of mathematical cultural experience opportunities.

2. Basic Concepts and Characteristics of Mathematical Culture

2.1 Basic Concepts of Mathematical Culture

The so-called cultural view of mathematics refers to the process of studying and teaching, treating mathematics as a special culture and paying special attention to the cultural and spiritual values it contains. Specifically, mathematical culture is typically intertwined with the humanistic spirit, historical stories, educational significance, and aesthetic qualities inherent in mathematical spirit,

language, methods, and more total. Under the guidance of its concept, daily teaching work not only teaches mathematical knowledge itself, pays attention to using various mathematical methods to solve and handle practical problems, but also contacts and learns knowledge related to mathematical culture, so that students can cultivate their own sentiments, improve cultural literacy, and ultimately achieve the unity and integration of mathematical knowledge, culture, and education [1, 2].

Establish a scientific and reasonable mathematics teaching system to promote the improvement of teaching effectiveness.

2.2 The Characteristics of Mathematical Culture

Mathematical culture is not only a culture, but also has its own unique characteristics that enable it to be clearly distinguished from other cultural phenomena. Firstly, mathematical culture has a high degree of unity, relying on a unique mathematical language that can scientifically express a variety of mathematical phenomena through various theorems, formulas, and concepts. For example, many cutting-edge theories in physics use mathematical language to describe key theories and formulas, and use these mathematical formulas as important evidence of theoretical validity. Secondly, mathematical culture has a high degree of plasticity in the process of dissemination, and can optimize the content of mathematical teaching through various means and methods, thereby improving the effectiveness of teaching and dissemination, and shaping it reasonably according to the actual situation. Finally, mathematical culture is also influenced by various factors such as the teaching environment, teachers' comprehensive ability level, and the writing of textbook content, and has a direct impact on its dissemination and learning outcomes. Therefore, in implementing mathematics education, in order to achieve the goal of promoting the dissemination of mathematics culture, mathematics teachers are required to continuously strengthen self-improvement, update their concepts and knowledge base, optimize the content of textbooks, and create a good atmosphere for the learning of mathematics culture. At the same time, it is also necessary to increase the proportion of mathematization in the course content. By adding extracurricular reading and other methods, students can feel its unique charm and stimulate their enthusiasm for learning [3].

3. Teaching Significance Based on the Perspective of Mathematical Culture

3.1 Enhancing and Promoting Learning Motivation

The logic, concepts, and theorems contained in mathematical knowledge are often abstract and difficult for students to quickly understand, often causing a setback in their learning enthusiasm. If relevant cultural knowledge can be appropriately added when learning various formulas and theorems, and content such as the history of mathematical development, the lives of mathematicians, or knowledge related to other disciplines can be used to reduce the difficulty and dryness of learning mathematical formulas and theorems [4], enhance the fun of the teaching process, and promote students' interest in learning.

3.2 Beneficial for Cultivating Students' Appreciation Ability

Mathematics has its own unique logical beauty. Through the education of mathematical culture, the beauty of mathematics can be fully explored and demonstrated to students and students' aesthetic awareness and artistic sentiment can be cultivated, achieving a comprehensive improvement of their overall quality [5].

3.3 Can Improve Students' Overall Quality Level

The focus of teaching is limited to providing guidance on students' knowledge points, strengthening independent thinking ability, training logical calculation ability, and innovative ability. This is a traditional mainstream teaching method, but it often overlooks the education and cultivation of students' cultural literacy level and humanistic spirit. By introducing mathematical culture education into the daily teaching of teaching courses, it can help to change this situation, enrich the curriculum content of mathematical education, enhance the vitality of the teaching process, and enable students to develop good learning concepts and noble moral qualities under the influence of mathematical culture.

4. Teaching Strategies Based on the Perspective of Mathematical Conception

4.1 Change Teaching Concepts and Strengthen Teachers' Own Qualities

The timely implementation of work, including the dissemination of mathematical culture and the transmission of knowledge, cannot be separated from teachers' practice and regular work. As the leaders and implementers in the education process, the comprehensive ability level of teachers has a direct and significant impact on the quality of teaching outcomes. Only those teachers with sufficient knowledge reserves and cultural literacy, as well as excellent teaching skills, can achieve the smooth infiltration of mathematical cultural knowledge in the teaching process [6, 7]. Therefore, teachers should constantly innovate their own concepts, enrich their knowledge and ability levels, and achieve an organic combination of mathematical knowledge and culture, in order to ensure the effective implementation of the dissemination of mathematical culture.

4.2 Enriching Teaching Content and Adding Mathematical Cultural Education

Updating and enriching the current teaching content is one of the necessary means to better achieve the teaching objectives of mathematical culture. Traditional mathematics textbooks emphasize the explanation and explanation of mathematical knowledge points. By adding corresponding cultural background knowledge to each knowledge point, including historical stories, celebrity anecdotes, and cultural spirits, the connotation of knowledge points can be enriched, promoting students to receive good cultural influence when learning various mathematical concepts, theorems, and formulas, and improving teaching effectiveness [8, 9],

4.3 Optimize Teaching Methods and Promote Learning Interest

In order to better stimulate students' interest in learning, enable them to better grasp the application methods of mathematical knowledge through learning, and understand the cultural connotations corresponding to knowledge points, it is necessary to pay attention to the correlation between teaching content and actual life. Starting from daily life scenarios, mathematics teaching content should be combined with practical applications. At the same time, it is necessary to expand the cultural background included in the introduction of knowledge points, and provides good guidance and guidance to students, Ultimately, it promotes the improvement of learning efficiency. For example, before learning about sequences, functions, sphere area and volume, students can prepare in advance and search for relevant mathematical and cultural background knowledge through online searches. Then, in the classroom, the teacher and students discuss relevant knowledge and culture together, so that students can better absorb and master these knowledge points, and understand how to apply them to practical scenarios [10].

4.4 Strengthening Teaching Effectiveness through Various Scientific and Technological Means

With the help of various information technology tools, especially the use of multimedia technology, mathematical cultural knowledge can be presented to students in a more comprehensive and detailed manner. By presenting teaching content visually and vividly to students through various displays such as images, videos, slides, and audio, it not only facilitates teachers' explanation and guidance, but also makes it easier for the audience to understand, absorb, and

Memorizing difficult and complex knowledge of advanced mathematics can enhance students' learning outcomes.

4.5 Setting up Elective Courses to Improve Cultural Literacy

In the classroom, due to heavy learning tasks, urgent time constraints, and a large number of exercises and exams, there are not many hours available to teach mathematical cultural knowledge. To improve this phenomenon, teachers can set up corresponding elective courses on mathematical culture, allowing interested students to further understand various histories, backgrounds, stories, and famous works related to mathematical culture through elective forms. Because the pace of elective courses is relatively slow and the course duration is relatively ample, teachers can spend more time providing detailed guidance on the above content, helping students cultivate enthusiasm for learning and improve cultural literacy.

5. Conclusion

In summary, introducing mathematical culture into mathematics education plays a crucial role in enhancing students' enthusiasm and learning enthusiasm, forming innovative thinking abilities, and enhancing comprehensive abilities and cultural literacy. On the other hand, adding educational content on mathematical culture in classroom teaching can also showcase the cultural and historical values and spiritual significance contained in the subject of mathematics to students, promote their understanding of the background and environment of mathematical application, and enable them to proficiently apply mathematical knowledge to solve related problems in various daily life scenarios. Through the influence of mathematical culture, students can significantly improve their comprehensive ability level and cultural literacy, thus laying a solid foundation for future development.

Reference

- [1] Guojun Zhao and Yujin Sun. Mathematical Education in Higher Education from the Perspective of Mathematical Culture [J]. Journal of Nanjing University of Engineering: Social Sciences Edition, 2013, 13 (4): 4(In Chinese)
- [2] YanYuan, Mathematical Education in Higher Education from the Perspective of Mathematical Culture [J]. Chizi, 2015 (12): 1(In Chinese)
- [3] Yuan Tian,Zhiping Wang and Xin Wang ,Ways and methods of integrating mathematical culture into higher mathematics teaching [J]. Science and Technology Wind, 2023(23):54(In Chinese).
- [4] Yuhai Wang and Zhuo Yu. Integrating mathematical culture into higher mathematics teaching Effective ways and methods. Journal of Jilin University of Education, 2022, 38(01): 103(In Chinese).
- [5] Yuan Tian.Strategies for integrating mathematical culture in higher mathematics teaching [J]. Journal of Anshan Normal University, 2021, 23(02): 12(In Chinese).
- [6] Bishen Zhang. Research on strategies for integrating mathematics culture and history of mathematics into university mathematics teaching [J]. Journal of Inner Mongolia Normal University (Education Science Edition), 2019, 32(12): 115(In Chinese).
- [7] Taoqing Hong, Wan Liu and Jianfeng Zhang. The construction and implementation path of the provincial first-class course spatial analytic geometry [J]. Journal of Ludong University (Natural Science Edition), 2022, 38(03): 207(In Chinese).
- [8] Yufeng Gao. Problem-based online course teaching strategy——Taking the“Advanced Algebra & quot; course in mathematics majors in normal colleges and universities as an example [J]. Journal of Tonghua Normal University, 2022, 43(06): 108(In Chinese).
- [9] Xiuqing Chen. An exploration of the ideological and political education of college mathematics courses [J]. University Mathematics, 2022, 38(03): 48(In Chinese).
- [10] Pengfei Wang and Feng Yin. Probability theory case teaching practice based on curriculum ideological and political education [J]. Journal of Xinzhou Normal University, 2022, 38(02): 85(In Chinese).