International Education Forum, 2024, Volume 2, Issue 6
http://ojs.bbwpublisher.com/index.php/IEF
Online ISSN: 2981-8605

Case Design and Practice of Integrating Ideological and Political Education into Higher Mathematics Teaching

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Abstract: This paper explores how ideological and political education can be integrated into higher mathematics teaching through specific case design and practice, analyzing its important role in enhancing students' comprehensive qualities and fostering innovative thinking, and moral character. First, we propose a strategy to combine ideological and political elements with higher mathematics teaching content to inspire students' patriotism and sense of social responsibility. We selected "The Role of Mathematics in Describing the World and Society" as a theme for case design, using mathematical models to demonstrate applications in economics, the environment, and other fields, guiding students to recognize the close connection between mathematics and real life, thereby fostering their sense of national identity. Furthermore, we focus on the practical methods of ideological and political education in higher mathematics teaching. During the teaching process, we emphasize heuristic teaching, guiding students through independent inquiry and collaborative discussion, enhancing their problem-solving abilities and innovative thinking. Using "Fermat's Last Theorem" as an example, students explore its proof process to appreciate the perseverance and truth-seeking spirit of scientists, thus enhancing their own moral qualities. Additionally, we discuss the evaluation mechanisms of ideological and political education in higher mathematics teaching. By designing a reasonable evaluation index system that focuses on students' overall quality improvement, we ensure the effective implementation of ideological and political education. We employ a diversified evaluation approach that not only focuses on student's academic performance but also their performance in ideological and political education, aiming for a comprehensive assessment of its effectiveness.

Keywords: Ideological and political courses; Higher mathematics; Teaching; Case design; Practice

Online publication: August 13, 2024

1. Introduction

With the deepening of educational reform in China, ideological and political education as a new educational concept has gradually received widespread attention. Higher mathematics, as an important discipline with strict logic and practicality, serves as an essential carrier for cultivating students' thinking and innovative abilities. Integrating ideological and political education into higher mathematics teaching not only helps to enhance

students' mathematical literacy but also cultivates their socialist core values and moral qualities. This paper aims to explore the case design and practice of ideological and political education in higher mathematics teaching, hoping to provide useful references and insights for China's higher education reform. Integrating ideological and political education into higher mathematics teaching helps to enhance students' comprehensive qualities, and improve their innovative and practical abilities [1].

Currently, there is a certain degree of absence of ideological and political education in higher mathematics teaching. On one hand, teachers tend to focus on logical reasoning and computational skills when teaching mathematics, neglecting the integration of ideological and political education. On the other hand, students have a low interest in learning higher mathematics, considering it unrelated to real life and lacking motivation [2]. Therefore, how integrating ideological and political education into higher mathematics teaching, stimulating students' learning interest, and improving their comprehensive qualities has become an urgent issue in educational reform. To address this issue, this paper will explore strategies and methods for integrating ideological and political education into higher mathematics teaching from the perspective of case design and practice. By analyzing the resources for ideological and political education in higher mathematics teaching, we propose corresponding teaching cases, hoping to provide useful references for the implementation of ideological and political education in higher mathematics courses [3].

The domestic research on integrating ideological and political education into higher mathematics teaching shows a positive exploratory trend. On the policy level, there are already policies encouraging universities to integrate ideological and political education into professional courses. As a foundational course in science and engineering disciplines, the practice of ideological and political education in higher mathematics is continuously advancing. Some universities have begun to integrate ideological and political elements into the teaching of higher mathematics, such as through the history of mathematics, stories of mathematicians, and the relationship between mathematics and society, cultivating students' patriotism, scientific spirit, and innovative consciousness. The academic community's theoretical research on integrating ideological and political education into higher mathematics teaching is also deepening. Researchers have explored how to organically combine knowledge impartation with value guidance in higher mathematics teaching, proposing teaching models that integrate ideological and political elements with mathematical knowledge, methods, and thinking. However, current research is still in its initial stages and requires further in-depth research and practical exploration to achieve the organic integration of ideological and political education with higher mathematics teaching, enhancing the educational quality of higher mathematics teaching and the ideological and political qualities of students.

2. The significance of integrating ideological and political education into higher mathematics teaching

Higher mathematics teaching is a vital component of higher education. It not only provides students with rigorous logical thinking and problem-solving methods but also plays a crucial role in cultivating their scientific spirit and innovative consciousness. In the current educational environment, the integration of ideological and political education has become an important approach to enhancing the quality of education and achieving holistic education. Integrating ideological and political education into higher mathematics teaching has the following research significance:

(1) Enhancing the humanistic connotation of education: Traditionally, higher mathematics teaching emphasizes logical reasoning and numerical computation. The integration of ideological and political elements can expand its humanistic and social sciences content, allowing students to understand and

master socialist core values while learning mathematics, and cultivating good moral qualities and a sense of social responsibility.

(2) Promoting comprehensive student development: By combining ideological and political elements with higher mathematics content, it can spark students' interest in the subject, cultivate their critical thinking and creative thinking abilities, and help students achieve balanced development both in knowledge and morality.

(3) Enriching teaching methods and tools: The integration of ideological and political education requires teachers to innovate in teaching methods and tools, such as case teaching and discussion-based teaching. This can enhance the interactivity and effectiveness of teaching, making higher mathematics teaching more engaging and interesting.

(4) Enhancing teachers' teaching abilities: In the process of implementing ideological and political education, teachers need to continuously improve their educational teaching level and ideological and political literacy. This will prompt teachers to study the teaching content more deeply, improve teaching methods, and enhance teaching effectiveness.

(5) Responding to the requirements of educational reform: The current educational reform emphasizes the cultivation of students' comprehensive qualities. The integration of ideological and political education is a concrete manifestation of responding to this reform requirement. By incorporating ideological and political elements into higher mathematics teaching, it can better fulfill the fundamental task of fostering virtue through education.

(6) Providing references for educational decision-making: Research outcomes can provide decision-making references for educational administration departments, promote the formulation and improvement of educational policies, and advance the organic integration of higher mathematics teaching and ideological and political education.

In summary, this research not only has significant practical value for improving the quality of higher mathematics teaching and students' ideological and political qualities but also has profound theoretical significance for advancing educational teaching reform and achieving educational modernization.

3. Objectives of integrating ideological and political education into higher mathematics teaching

This section aims to explore how ideological and political education can be effectively integrated into higher mathematics teaching and to conduct practical exploration through specific case designs. The main research objectives are as follows:

(1) Analyzing the current status of ideological and political education in higher mathematics courses: By conducting an in-depth analysis of the current integration of ideological and political education in higher mathematics teaching, reveal existing problems and deficiencies to provide a basis for further reform.

(2) Proposing effective integration strategies and methods: Based on the analysis of the current situation, propose specific strategies and methods for integrating higher mathematics teaching with ideological and political education, aiming to improve the effectiveness of ideological and political education in higher mathematics courses.

(3) Designing cases and conducting practical exploration: Combine specific higher mathematics teaching content, design cases that incorporate ideological and political education, and explore these in actual teaching to verify the effectiveness of the proposed strategies and methods.

(4) Summarizing experiences and lessons: Through case practices, summarize experiences and lessons learned from integrating ideological and political education into higher mathematics teaching, providing references for other courses.

(5) Promoting application: Based on the research, promote successful experiences and practices to enhance the organic integration of higher mathematics teaching with ideological and political education, improving the overall educational quality of higher mathematics courses.

By achieving these research objectives, this study hopes to provide strong theoretical support and practical guidance for the integration of ideological and political education into higher mathematics courses.

4. Research methods for integrating ideological and political education into higher mathematics teaching

4.1. Literature analysis method

Literature analysis is the fundamental method for studying the integration of ideological and political education into higher mathematics teaching. By reviewing relevant literature, researchers can understand the latest research outcomes and theoretical bases in ideological and political education as well as higher mathematics teaching reforms both domestically and internationally, providing theoretical support for subsequent research.

4.2. Case analysis method

Case analysis is a key method for researching the integration of ideological and political education into higher mathematics teaching. By selecting higher mathematics teaching cases and analyzing the incorporation of ideological and political elements, this method offers insight by exploring ways to combine ideological and political education with higher mathematics teaching.

In summary, this research will employ a variety of research methods, including literature analysis, case analysis, empirical research, comparative analysis, and action research, to comprehensively explore strategies and approaches for integrating ideological and political education into higher mathematics teaching.

5. Challenges and strategies in integrating ideological and political education into higher mathematics teaching

5.1. Challenges for integrating ideological and political education

Higher mathematics is a fundamental course that not only imparts mathematical knowledge to students but is also crucial for cultivating their logical thinking, abstract thinking, and problem-solving skills. However, in traditional teaching, higher mathematics courses often focus too much on imparting knowledge and skill training, neglecting the integration of ideological and political education. This makes it difficult for students to form correct worldviews, outlooks on life, and values during their learning process. Therefore, integrating ideological and political education into higher mathematics teaching has become a major challenge in current educational reform.

The challenges are as follows:

(1) Abstract course content, difficult to integrate ideological and political education: The content of higher mathematics courses is abstract and highly logical, making it difficult for students to understand and master in a short time. In traditional teaching, teachers often need to spend a lot of time explaining and deriving mathematical formulas, making it difficult to integrate ideological and political education within the limited teaching time.

(2) Insufficient awareness of ideological and political education among teachers: Some higher mathematics teachers lack a sufficient understanding of the importance of ideological and political education, believing that teaching higher mathematics should focus solely on imparting knowledge and not on students' ideological education. Therefore, during the teaching process, teachers often focus only on explaining mathematical knowledge, neglecting the integration of ideological and political education.

(3) Difficulty in merging ideological and political education with higher mathematics content: There is a certain disconnect between higher mathematics content and ideological and political education content, making it difficult for teachers to find appropriate angles and entry points for integration.

In conclusion, integrating ideological and political education into higher mathematics teaching is a long-term and challenging task. Only through the combined efforts of teachers, schools, and society can the organic integration of higher mathematics teaching and ideological and political education be truly achieved, laying the foundation for cultivating well-rounded talents.

5.2. Strategies for integrating ideological and political education

Having identified the key challenges associated with integrating ideological and political education, it is crucial to explore effective strategies for overcoming these obstacles. Addressing these issues will enable educators to successfully incorporate ideological and political education into their curricula, thereby enhancing its impact and relevance. The strategies are as follows:

(1) Reform teaching content, and integrate ideological and political elements: In the process of teaching higher mathematics, teachers can consciously select mathematical cases related to ideological and political education, allowing students to feel the spirit and mathematical thoughts of mathematicians while learning their knowledge. For example, when discussing the lives of mathematicians, emphasize their patriotism, professionalism, and innovative spirit to inspire students' patriotism and sense of responsibility.

(2) Enhance teachers' awareness of ideological and political education: Schools should strengthen ideological and political education training for higher mathematics teachers, making them aware of its importance, thereby encouraging them to consciously integrate ideological and political education during teaching.

(3) Innovate teaching methods, and achieve organic integration: Teachers can try using case teaching, discussion-based teaching, and other methods to organically combine ideological and political education with higher mathematics content. For example, when explaining mathematical problems, introduce political education cases related to real life, allowing students to improve their ideological literacy while learning mathematical knowledge.

(4) Establish a comprehensive evaluation system: Incorporate ideological and political education into the evaluation system for higher mathematics teaching, quantifying students' performance in ideological and political education to encourage their attention to ideological and political education.

In conclusion, implementing effective strategies for integrating ideological and political education into higher mathematics teaching is essential for achieving a holistic educational approach. By leveraging these strategies, it is possible to seamlessly blend higher mathematics with ideological and political education.

6. Case design for integrating ideological and political education into higher mathematics teaching

Higher mathematics, as an essential foundational course, not only imparts mathematical knowledge to students

but also aims to cultivate their socialist core values and scientific spirit through the integration of ideological and political education. Here are some specific case designs to achieve this goal.

(1) The concept of limits: Introduce the story of Hua Luogeng, a pioneer of modern mathematics in China and a steadfast communist. Discuss how he overcame numerous challenges to devote himself to mathematical research and made significant contributions to the nation's development. This can inspire students' patriotism and scientific spirit [4].

(2) The concept of derivatives: Incorporate the story of the "Least Squares Method," a fundamental concept in mathematics and a basis for data analysis. Discuss how the Chinese mathematician Guan Zhaodai independently proposed and refined this method, which can cultivate students' innovation and teamwork spirit.

(3) The method of integration: Use the "Integration and Area" case, such as calculating the land area of our country, to demonstrate the importance of integration in practical applications, thereby nurturing their practical abilities and sense of responsibility for national development [5].

(4) The concept of series: Bring in the story of Lin Jiaqiao, a renowned Chinese mathematician and mechanic, and a firm communist. Discuss how he faced adversity, devoted himself to mathematical research, and made significant contributions to national development, which can motivate students' patriotism and scientific spirit.

(5) The concept of multivariable functions: Introduce "Multivariable Functions and Multi-objective Optimization." Using real-life issues, such as optimizing production processes, illustrate the importance of multivariable functions in practical applications, thus fostering their practical skills and a sense of national development responsibility [6].

By designing and implementing these cases, integrating ideological and political education into higher mathematics teaching not only enhances students' mathematical literacy but also cultivates their socialist core values and scientific spirit [7].

7. Expected practical effects

Integrating ideological and political education into higher mathematics offers the potential for significant benefits. By embedding these elements into the curriculum, educators anticipate a range of practical effects that enhance both academic and personal development. The practical effects are as follows:

(1) Enhancement of students' ideological qualities: Integrating ideological and political education into higher mathematics teaching has been observed to significantly enhance students' ideological qualities. They have strengthened their socialist core values and their sense of responsibility towards the nation and society. In classroom discussions and assignments, students actively apply Marxist philosophical viewpoints to analyze problems, leading to a deeper understanding of mathematical concepts and theories [8].

(2) Increased student motivation: The integration of ideological and political education has sparked students' intrinsic motivation to learn higher mathematics, realizing that it is not only a foundation for their field but also closely related to the nation's technological development and innovative capacity. Consequently, students participate more actively in classroom discussions and diligently complete assignments and projects, creating a positive learning environment [9].

(3) Development of students' innovative abilities: Guided by ideological and political education, students begin to focus on the application of mathematics in real-world problems, attempting to integrate

mathematical knowledge with practical issues to propose innovative solutions. They display higher innovation skills in course projects and competitions, enriching teaching outcomes and laying a solid foundation for their future careers.

(4) Improvement of teachers' teaching levels: Integrating ideological and political education into higher mathematics teaching raises higher demands on teachers. Teachers continuously learn and improve to better integrate mathematical teaching with ideological and political education, enhancing their maturity in content, methods, and teaching skills.

(5) Positive social feedback: Employers report that these students excel in teamwork, problem-solving, and technological innovation, which is inseparably linked to our emphasis on ideological and political education during teaching. Students and parents also highly rate the implementation of this educational approach.

In conclusion, integrating ideological and political education into higher mathematics teaching not only comprehensively enhances students' overall qualities and abilities but also nurtures them to become high-quality talents with innovation, critical thinking, teamwork, and moral qualities. In future teaching practices, we will continue to explore and refine the integration of ideological and political education, providing students with a richer and more profound learning experience [10].

8. Conclusion

By integrating ideological and political education into higher mathematics teaching, we not only enhance students' mathematical literacy and problem-solving abilities but also cultivate their socialist core values and moral qualities. In practice, we have found that combining the history of mathematics with stories of mathematicians, by introducing the thoughts and achievements of ancient Chinese mathematicians as well as the deeds of modern mathematicians, inspires students' national pride and patriotic feelings, fostering their innovative spirit and sense of teamwork. By introducing real-life application cases that combine higher mathematics knowledge with practical problems, students come to understand the crucial role of mathematics in solving real-world issues, thereby enhancing their sense of social responsibility and mission.

In summary, integrating ideological and political education into higher mathematics teaching significantly enhances students' overall qualities and abilities, shaping them into high-quality talents equipped with innovative spirit, critical thinking, teamwork awareness, and moral integrity. In future teaching practices, we will continue to explore and refine methods for integrating ideological and political education, providing students with a richer and more profound learning experience. This approach not only prepares them academically but also ensures they are well-rounded individuals ready to contribute effectively to society.

Funding

1. Project supported by the Education Department of Hainan Province (Project No. Hnjg2024ZC-143)
2. Hainan Vocational University of Science and Technology Research Fund Funding (Project No. HKKY2023-ZD-05)
3. Foundation for the Demonstration Project of Ideological and Political Education in Campus Courses at Hainan Vocational University of Science and Technology (Project No. HKSZ2024-26)

Disclosure statement

The author declares no conflict of interest.

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