



A Case Study of Ideological and Political Education in the Course of Analytical Geometry

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Abstract

Classroom teaching is the most important way to cultivate students' qualities and abilities. The goal of curriculum ideological and political reform is to impart curriculum knowledge to students while enabling them to establish correct values. The methods of reform can be to combine morality with teaching, morality with teaching, and education with entertainment. This article is based on the teaching content of analytic geometry, integrating moral education and knowledge teaching. With the help of geometric knowledge points, mathematical history, mathematical allusions, etc., knowledge transmission is combined with value guidance to guide students to behave correctly, do things and learn, and help students develop comprehensively. In combination with the content and requirements of the "curriculum ideological and political" construction of Mount Taishan University, taking analytic geometry as an example, this paper studies the exploration and implementation of the ideological and political elements of professional courses in normal colleges and universities, so that the basic courses of mathematics and ideological and political theory courses can work together to form a synergistic effect and achieve the goal of collaborative education.

Subject Areas

Analytical Geometry

Keywords

Advanced Education, Ideological and Political Education, Analytical Geometry

1. Introduction

Our country's higher education must regard moral education as the fundamental task of education. In the goal of talent cultivation, universities must address the

fundamental task of educating who, how, and what kind of people to educate. The integration of ideology and curriculum is of great significance for cultivating qualified socialist construction builders and successors. The ideological and political education in the curriculum fully utilizes the classroom teaching resources of various courses, creates a comprehensive educational environment, and promotes the development of the concept of moral education [1]. The ideological and political education in mathematics major courses in higher education institutions is based on the professional concept, connotation, and characteristics, combined with the construction content of “ideological and political courses” and the fundamental task of national moral education. It integrates ideological and political education into the existing teaching of mathematics major courses in higher education institutions, fully tapping into the role of the main channel of mathematics major classrooms in ideological and political work in universities so that mathematics major courses and ideological and political theory courses in universities can go hand in hand and work together to educate students. Higher education mathematics majors offer courses such as mathematical analysis, advanced algebra, analytic geometry, complex functions, and probability theory. Among them, analytic geometry is one of the important foundational courses for undergraduate mathematics majors. It is not only closely related to mathematical analysis and advanced algebra but also serves as the foundation for courses such as differential geometry and advanced geometry. Analytical geometry includes two parts: plane analytical geometry and Three-dimensional analytic geometry. Plane analytic geometry establishes a one-to-one correspondence between points and real pairs, as well as between curves and equations, through a Cartesian coordinate system. It uses algebraic methods to study geometric problems or geometric methods to study algebraic problems. Analytical geometry communicates the connections between basic objects such as numbers and shapes, algebra and geometry, and is a discipline that uses algebraic methods to study and solve geometric problems. Analyzing geometry to carry out ideological and political education in courses has its advantages, mainly manifested in: 1) The nature of the course itself is important, and it is one of the three most important basic courses in mathematics majors. Students attach great importance to it, and conducting ideological and political education in the classroom is more meaningful; 2) The course of Analytic Geometry is offered in the first semester of freshman year, with younger students. The earlier the implementation of ideological and political education, the better the effect, which is more conducive to “comprehensive education”; 3) The course of analytic geometry itself contains rich philosophical ideas, and fully tapping into its ideological and political elements can not only cultivate students’ dialectical thinking ability but also penetrate philosophical ideas into teaching, with profound significance [2] [3].

2. Overall Goal of Ideological and Political Education in the Curriculum

With the background of the certification work of mathematics and applied ma-

thematics major of Mount Taishan University, combined with the characteristics and graduation requirements of this major, and under the top-level guidance of the Guidelines for Ideological and Political Construction of Colleges and Universities Curriculum, the overall goal of ideological and political education of Analytic Geometry curriculum is set: to consolidate the spiritual pursuit of scientists' national feelings, responsibility, and the courage to climb the peak of science, the craftsman spirit of excellence, and the innovative consciousness of integration of flexibility and unity of knowledge and practice. The specific goals can be divided into five dimensions: ideological and political dimension 1: patriotism, mission responsibility, and social responsibility; Ideological and political dimension 2: scientific spirit, philosophical literacy, and thinking quality; Ideological and political dimension 3: ideal beliefs, strong willpower, and core values; Ideological and political dimension 4: craftsmanship spirit, innovation spirit, and team spirit; Ideological and political dimension 5: Transforming thinking, critical thinking, and integrating knowledge and action.

3. Construction and Integration of Ideological and Political Case Library in Teaching Courses

By conducting multidimensional cognition of the teaching content of the Analytic Geometry course, we deeply explore the political, literacy, thinking, value and other educational elements hidden or related to the subject knowledge in the knowledge unit. We construct an ideological and political case library around the achievement of ideological and political goals, design integration methods, and form a natural connection from professional education to ideological and political education, achieving both the goal of not diluting the professional knowledge system and the educational effect.

3.1. Emphasizing the Development History of Geometry and Stimulating Patriotic Passion (Ideological and Political Dimension 1)

“Geometry” is a translated term first used by Chinese Ming Dynasty scientist Xu Guangqi. After a long period of production, labor, and social life, the ancient working people of our country have already achieved remarkable geometric achievements that have attracted worldwide attention. When introducing the development and evolution of analytic geometry, introducing these great mathematical achievements appropriately can not only stimulate students' interest in learning geometry but also greatly stimulate their patriotism. For example, in the “Mo Jing” (480 BC to 390 BC), “round” is defined as “round, one of the same length”, which is basically consistent with Euclid's formulation, but more than 100 years earlier than Euclid. The Pythagorean theorem, which plays an important role in astronomical observation and calculation, was first recorded in the Zhou Bi Suan Jing around 100 BC. “Nine Chapters on Arithmetic” is a classic mathematical work in ancient China, and its research in geometry predates that of the West by over a thousand years. It provides a systematic exposition of an-

cient geometric knowledge, with main achievements in calculating the area of various planar shapes and calculating the volume of various three-dimensional geometric shapes.

3.2. Coordinate System and Cultural Confidence, National Self Esteem and Pride (Ideological and Political Dimensions 2 and 3)

When introducing the “Space Cartesian Coordinate System”, connect it with traditional Chinese yin-yang and Bagua. For example, if a one-dimensional number axis has positive or negative values, it corresponds to the two elements, namely yin-yang; A two-dimensional two-line fixed plane, divided into four blocks on the left, right, top, and bottom, is called the four quadrants of the plane; Three-dimensional lines connecting three sides, with left, right, top, bottom, front and back added, divide the space into eight small blocks, known as the spatial Bagua limit. The opposition between positive and negative yin and yang, as well as the cycle of the Four Symbols and Eight Trigrams, are reflected in the graphics. The Yin Yang Bagua is easily criticized as a feudal superstition, but in fact, it contains a lot of dialectical ideas. The significant role of traditional Chinese culture in the establishment of modern Western science. Descartes, the founder of analytic geometry, greatly admired China’s vast and profound culture, advocating the study of Chinese yin, yang, and gossip, thereby enhancing students’ cultural confidence, national self-esteem, and pride.

3.3. Chinese Tianyan and Craftsman Spirit (Ideological and Political Dimension 4)

The 500-meter aperture spherical radio telescope of the “China Tianyan” (FAST for short), led by the National Astronomical Observatory of the Chinese Academy of Sciences, is a single antenna radio telescope with independent intellectual property rights in China and the largest aperture and highest precision in the world at present. The geometric configuration of the main component system of FAST—the active reflector system—is a part of the spherical surface, namely the spherical crown. The total area of FAST’s reflective surface is 250,000 square meters, equivalent to the size of 30 standard football fields, and can see through a distance of 13 billion light-years, close to the edge of the universe. With the world’s second-largest telescope—the Arecibo 300-meter radio telescope in the United States (zenith angle 20°) —Compared to others, FAST has 2.25 times higher sensitivity and will maintain its position as a world-class device for the next 20 - 30 years. The design and construction of FAST reflect the increasingly strong comprehensive national and technological strength of our country, and we have been at the forefront of the world in multiple fields. During the construction process, the huge engineering volume, ultra-high precision requirements, and special working methods have all posed unprecedented technical challenges for FAST builders. The breakthroughs in these challenges one by one allow students to experience the craftsmanship spirit of Chinese builders who

love their work and strive for excellence.

3.4. Looking at the Essence through Phenomena (Ideological and Political Dimension 5)

The practical application of the straight generative properties of a hyperboloid on a single leaf refers to the Guangzhou Tower; The application of the straight generatrix property of hyperbolic paraboloids is that the two orthogonal generatrix clusters of the twisted shell of a positive hyperbolic paraboloid are both straight lines, and its surface is formed by the movement of straight lines, which belongs to the negative Gaussian curvature shell in geometry. However, it is not easy to see the essence through phenomena. Only with a certain level of speculative ability can we see the hidden essence behind phenomena. For example, it can guide students to think: About whether the various online news that permeates us have authenticity. Is it worth spending a lot of valuable spare time on news related to the personal lives of celebrities and internet celebrities? Wait a moment, by guiding students to think more, cultivate their ability to distinguish between truth and falsehood, and to distinguish between truth and falsehood.

4. Conclusion

A survey of teaching feedback was obtained anonymously through the Chaoxing Learning Platform at the end of the course. Among them, 96.55% of students can feel the element of “educating people” in the course learning process. They believe that 88.23% of ideological and political cases are introduced naturally and not abrupt, and can resonate well. 89.76% of students can feel the teacher’s attention to their professional learning, ideological dynamics, and other aspects during the learning process. 92.16% of students recognize the teacher’s posts in the course group sharing learning methods, future growth, striving and inspiring, national affairs, and technological development, and can gain insights or inspirations from them. Carry out discussions and practical activities on “course ideology and politics” in mathematics courses. Aiming to organically combine the content and methods of ideological and political education with mathematical knowledge and methods, achieve the unity of knowledge transmission, ability cultivation, and value guidance, and cultivate students’ mathematical literacy, philosophical thinking, scientific spirit, and patriotism.

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Conflicts of Interest

The authors declare no conflicts of interest.

References

- [1] Xi, J.P. (2016) Xi Jinping Emphasized at the National Conference on Ideological and Political Work in Colleges and Universities: Integrating Ideological and Political Work throughout the Entire Process of Education and Teaching to Create a New Situation for the Development of China's Higher Education. People's Daily, Beijing.
- [2] Wang, Q.L. (2023) Era Research on the "Trinity" Practical Teaching System under the Background of Teacher Education Professional Certification. *Journal of Baoding University*, **36**, 89-92.
- [3] Zhai, X.B. and Chen, F. (2023) Exploration of Ideological and Political Education in the Course of "Analytical Geometry" under the Background of Teacher Education Professional Certification. *Journal of Zaozhuang University*, **40**, 120-125.