

Exploration of Ideology and Politics Education in Analytical Geometry Under Blending Teaching

Xuerong Shi^{1*} Zuolei Wang¹ Hao Lu² Bingjie Qiu²

1. School of Mathematics and Statistics, Yancheng Teachers University, No.2 Hope Avenue Road, Yancheng 224002, China

2. College of Teacher Education, Nanjing Normal University, No.1 Wenyuan Road, Yadong New Town, Nanjing 210023, China

* E-mail of the corresponding author: sxryctc@163.com

The research is financed by Jiangsu Province Education Science "14th Five-Year Plan" 2021 Annual Project.No.B/2021/01/100 and Yancheng Rural Education Special Project. No. (XCZX21088).

Abstract

With the rapid development and continuous innovation of information technology, traditional teaching model is confronted with great challenge and, sometimes, it is difficult to achieve teaching goals via single offline teaching, especially under the influence of the COVID-19. In this paper, taking space rectangular coordinates and space vector in the course of space analytical geometry as the carrier, ideological and political elements in the course of space analytical geometry is mined via multi-channel from various aspects. Fusion point of ideology and politics elements in space analytical geometry is searched and the implementation path is investigated under blending teaching. The aim is to promote the achievement of the ideology and politics education of space analytical geometry.

Keywords: Blending teaching, Ideology and politics education, Analytical geometry

DOI: 10.7176/JEP/13-21-15

Publication date: June 30th 2022

1. Introduction

The Ideology and Politics Conference of Universities in December 2016 and the Guide of Xi Jinping's Socialist Thought with Chinese Characteristics for a New Era into Curriculum and Teaching Materials point out the necessity of ideology and politics education, and indicate the direction as well as the goal that each discipline should realize the organic integration of ideological and political elements according to its own characteristics, combined with its unique advantages and resources. How to skillfully integrate the ideological and political elements into the teaching process of professional courses has become an important task of teaching reform in higher education institutions.

With the continuous teaching reform in higher education, the integration of ideology and politics education is not only reflected in the field of humanities such as philosophy, but also receives wide attention in the field of natural sciences. The research contents cover the ideology and politics education of mathematics in primary and secondary schools (Wu 2020, Cheng 2020, Liu & Wu 2021, Zhou 2021, Ye & Shen 2021), the ideology and politics education in vocational colleges and universities (Wang 2021, Zhang et al. 2021, Liu et al. 2021, Shi 2021, Wang & Wang 2021), as well as the ideology and politics education of mathematics in higher education institutions (Wang 2021, Gao et al. 2021, Zhao et al. 2021, Lin & Liu 2021, Jiang & Li 2021), etc. The research results mainly focus on the following aspects: (1) theoretical research on the generation path of ideology and politics education (Ou 2019, Fan 2019, Chu 2020, Cong & Li 2020); (2) practical research on the classroom teaching of ideology and politics education (Xu 2020, Yang et al. 2020); (3) case studies on ideology and politics education (Miao 2019, Pan et al. 2020); teaching models of ideology and politics education (Fan et al. 2021), etc.

In recent years, due to the global outbreak of the COVID-19, the traditional offline teaching model has been impacted to a certain extent. Face-to-face classroom teaching has exposed certain drawbacks such as the inability to meet the learning needs of students at different times and in different regions. The complicated and changeable teaching needs require changing the traditional teaching model to meet the learning needs of different students. Meanwhile, with the renewal of computers and the development of internet technology, information technology has gradually been applied into all fields of social life, and education informatization has become one of the hot spots for education scholars. As a result, the blending teaching model has been widely applied and carried out (Chen 2022, Bian & Zhao 2021, Bian et al. 2022, Wu 2022).

In view of the current complicated and changeable teaching environment and the demand of talent cultivation, in this article, in terms of the characteristics of space analytical geometry, the integration path and the implementation way of ideology and politics education in space analytical geometry under the blending teaching model is discussed by taking space rectangular coordinates and space vector as examples, which provides a new idea for the development of ideology and politics education in current professional courses.

2. The Blending Teaching Model

Initially, the blending teaching model refers to combination between online and offline teaching. Nowadays, with the development of information technology, it has been evolved into a teaching context that combines online learning environment and classroom discussion based on advanced communication devices (Bian & Zhao 2021). The blending teaching model integrates multiple approaches and effectively enhances students' learning depth through optimizing online platforms and network resources. On the surface, it seems to be a teaching model without fixed approaches; but in fact, it is the optimization of educational resources.

The blending teaching model presents the following characteristics: (1) it involves two ways: online and offline; (2) both online and offline ways are indispensable parts of teaching activities, with the former being the basis of the latter, and the latter being the extension of the former; (3) the mixture of online and offline ways does not involve specific contents; (4) there is no unified mode but with a common goal, that is, to integrate the advantages of online and offline ways to optimize the traditional teaching model; (5) it reconstructs the traditional classroom teaching. Online resources are the premise and foundation of blending teaching. Using online resources can move the classroom lectures forward to meet the learning needs of students at different times and places and make them be aware of the problems in the knowledge they have learned, so that they can bring confusions into offline classroom. This not only achieves the purpose of solving confusions, but also guarantees the quality of classroom teaching. Offline activities are a necessary stage of blending teaching. After teachers' offline checks and improvements, classroom teaching activities can be carefully designed to consolidate the knowledge students have learned online and let students apply it flexibly, so as to achieve more advanced teaching objectives.

3. Necessity of Ideology and Politics Education in Space Analytical Geometry under Blending Teaching

The Guideline of Ideology and Politics Education in Higher Education Institutions proposes that comprehensively promoting the construction of ideology and politics education to help students to establish correct worldview, outlook on life and values is a proper and necessary part of talent cultivation. We should focus on the strength of teachers, the curriculum construction and the channel of classroom teaching, so that all colleges and universities, all teachers and all courses can shoulder the responsibility of educating people and making various kinds of courses and ideology and politics education develop together (Ministry of Education of the People's Republic of China, 2020). Accelerating the reform and innovation of ideology and politics has become a consensus in higher education. However, due to various subjective and objective reasons, the mechanism of collaborative education in China's colleges and universities has not been fully constructed so far. It is still an important part of higher education reform to further promote the ideology and politics education in colleges and universities, because the construction of ideology and politics education is the primary task to comprehensively improve the quality of talent cultivation and the realistic need for the innovative development of ideology and politics under the new situation.

The outbreak of the COVID-19 has impacted every industry in the world, and education is no exception. Due to the epidemic, the teaching model has undergone a profound shift. In response to the requirements of not stopping teaching and learning while stopping offline schools under the COVID-19, the online teaching has become an important change in the history of education. However, there are certain drawbacks of online teaching, such as the weakening of teacher-student interactions. Due to the lack of close interactions, teachers convey information by voice on the screen, and students receive information by watching the screen. It lacks emotional communication and is not conducive to the overall training of students. Moreover, in the online teaching process, since students and teachers are in different spaces, teachers cannot be informed of the specific status of students in real time, nor can they judge whether students are focused or not, thus it is difficult to achieve the ideal teaching effect. In view of the above phenomenon, if we can integrate the ideological and political elements into the teaching process to influence students implicitly by applying network resources, we can cultivate their correct outlook on life, values and worldview, and thus mobilize their autonomy and enthusiasm in learning. Then, the above-mentioned drawbacks can be well solved. Therefore, the ideology and politics education in the blending teaching model has become a key part in current education. As one of the three basic courses of mathematics in colleges and universities, the course of space analytical geometry has both the logic of algebra and the intuition of geometry, which is not only highly relevant to the ideology and politics education, but also shares the same direction with the ideology and politics education in terms of talent cultivation. This has provided a guarantee for the implementation of the ideology and politics education. How to implement the ideology and politics education in space analytical geometry to combine professional education with ideology and politics education requires teachers of space analytical geometry to think about and discuss now.

4. Exploration of Ideology and Politics Education in Space Analytical Geometry under Blending Teaching

The space rectangular coordinates and space vector are the foundation and basic tool of analytical geometry,

respectively. In this section, takes the space rectangular coordinates and space vector in analytical geometry as examples, the path of excavating ideological and political elements as well as implementing the ideology and politics education in the teaching process of analytical geometry are discussed, so as to provide a guiding basis for the ideology and politics education in other contents.

4.1 Excavating Ideological and Political Elements

Textbooks are only semi-finished products that carries knowledge and require teachers to interpret in the teaching process. Knowledge itself is also a carrier, which carries certain ideas. The task of teaching is to guide students to discover the profound ideas hidden behind the knowledge through textbooks. According to the logic of algebra and the intuition of geometry carried by analytical geometry, in this section, take space rectangular coordinates and space vector in the course as the carrier, ideological and political elements is to be excavated from the aspects of mathematical culture, national sentiment, dialectical perspective, inquisitive spirit, social emotion, etc., so as to seek the key part for the integration of analytical geometry and ideology and politics education from multiple directions and angles. The results are shown in Table 1.

4.2 Designing Ideology and Politics Education

The teaching objectives cannot be achieved without a reasonable teaching design. After the teaching objectives are clearly defined, the teaching process should be designed according to the teaching objectives. As for ideology and politics education based on professional courses, the principal role of students should be highlighted when designing the teaching process, so that students' cognition, emotion and value can be cultivated. In this section, on the basis of exploring ideological and political elements, we take space rectangular coordinates and space vector as an example to carry out teaching design.

4.2.1 Space Rectangular Coordinates

Before the class, teachers can arrange the following tasks through online platforms: ① search information about Su Buqing, the first geometrician in the East and the king of mathematics, and learn about his achievements in geometry and patriotic deeds; ② seek and learn about information about the ancient Chinese culture of Eight trigrams of Yin and Yang; ③ review the origins of the space rectangular coordinates and learn about the information about its founder, Descartes.

Table 1. Ideological and Political Elements along with Integration Parts in Space Rectangular Coordinates, Space Vector and Vector Addition

Relevant Knowledge	Ideological and Political Elements	Integration Parts
Space Rectangular Coordinates	patriotism education, national pride and firm determination to study for the rise of China	The development of space rectangular coordinates; the achievements in geometry of Su Buqing, the first geometrician in the East and the king of mathematics, as well as his patriotic deeds.
	Dialectic thoughts	The axis is divided into positive and negative; the two-dimensional lines divide the plane into four quadrants; the three-dimensional lines divide the space into eight trigrams. The positive and negative axis are opposed to each other, and the four quadrants and eight trigrams are circulated, which corresponds to the division of space in space rectangular coordinates.
	Patriotism education, national pride	Descartes, a Frenchman and the founder of the space rectangular coordinates; he admired Chinese culture and studied Chinese thoughts of yin and yang and eight trigrams.
Space Vector	Connecting what students have learned to real life and developing their social emotions.	Combining specific contents such as force, displacement and velocity in physics to understand vectors, making teaching closer to life and simpler.
Vector Addition	Cultivating students' inquisitive spirit.	Addition is only a formal representation of an operation; it is the rule it represents that is the essence of the operation. Students are guided to look beyond the surface and see the essence through the phenomenon.

Teachers can use audiovisual materials in appropriate time during teaching. For example, when talking about the history of analytical geometry, teachers can play videos about mathematician Su Buqing to let students review his story, so as to stimulate students' patriotism and national pride, and strengthen their firm belief of studying for the rise of China. When introducing concepts of space rectangular coordinates, teachers can show students the dynamic space rectangular coordinates with the help of mathematical software and online

multimedia. By applying the ancient Chinese culture of Eight trigrams of Yin and Yang, teachers can convey connections between space rectangular coordinates. The axis is divided into Yin and Yang; the two-dimensional lines divide the plane into four quadrants; the three-dimensional lines divide the space into eight trigrams. Corresponding to the space division in space rectangular coordinates, teachers can strengthen students' dialectical thinking.

After the class, teachers can arrange some targeted homework to further expand students' knowledge and vision, such as using space rectangular coordinates to solve some practical problems.

4.2.2 Space Vector

Before the class, teachers can arrange tasks through online platforms: to learn about characteristics of force, displacement, velocity, etc. in physics, as well as the differences between them and temperature, length, mass, time, etc.

During the class, teachers can introduce the concept of vectors with the specific contents of force, displacement and velocity in physics, making students realize that mathematics comes from life and is a simplification of practical problems, so that students can link what they have learned to real life and realize emotional elevation.

After the class, teachers can require students to find practical examples related to vectors to reinforce their understanding and application of the knowledge.

4.2.3 Vector Addition

Before the class, teachers can post tasks to students to consolidate and review the knowledge of force synthesis, displacement synthesis and velocity synthesis in physics, and summarize the characteristics possessed by those operations. During the class, according to students' understanding of the rules of operations such as force synthesis, displacement synthesis and velocity synthesis, the definition of addition of vectors is abstracted and expressed as the symbol of "+". On the one hand, the fact can be further reinforced that mathematics comes from life and is applied to life. On the other hand, students are reminded that "+" is only a formal representation of an operation, and the rules it represents are the essence of the operation. Students are guided to look at problems not only at the surface, but also look beyond the surface, so as to cultivate their inquisitive spirit.

4.3 The Teaching Process of Ideology and Politics Education in Space Analytical Geometry under Blending Teaching

The formulation and implementation of teaching objectives are the two main stages of the ideology and politics education in space analytical geometry. In the blending teaching model, teaching objectives and tasks should be formulated according to online and offline teaching purposes and expected results, such as the space rectangular coordinates and the division of plane and space, ideology and politics education is to strengthen students' dialectical thinking and cultivating their national pride. The goal of online teaching is to let students use online platforms to review ancient Chinese culture of Eight trigrams of Yin and Yang, understand the historical origins; to comprehend the generation and development of space rectangular coordinates; and to make course preparations on the course platform with corresponding tasks. In the offline teaching process, teachers can adopt various teaching methods according to the pre-course plan, and assist teaching with the help of internet platforms such as cloud class, WeChat and QQ software, so as to introduce Chinese traditional culture and its influence on Western modern science into the classroom, and to cultivate students' dialectical thinking and national pride by combing it with the knowledge of space rectangular coordinates, thus completing the task of ideology and politics education. After the class, extra-curricular activities can be conducted using the online platform to improve the comprehensive ability of students.

In addition, ideological and political elements can also be incorporated in other teaching sessions. For example, the roll-call session can cultivate students' contract spirit and time concept; for students who do not listen carefully in class, humanistic education can be conducted to guide them to respect others' work and develop good studying habits; students can be organized to conduct group discussions to cultivate their collaboration spirit; and in the summary session, students can be asked to report results in the whole class to develop their inductive and summarizing ability. The specific process is shown in Figure-1.

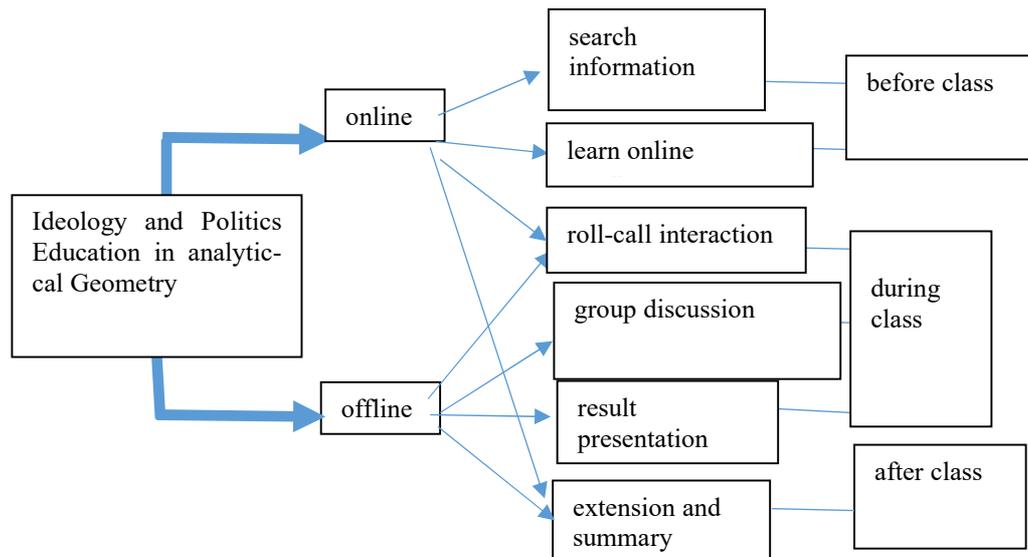


Figure 1. The Teaching Process of Ideology and Politics Education in Space Analytical Geometry under Blending Teaching.

5. Conclusion

Freshmen have just left high school and entered the university campus, so their worldview, values and outlook on life are not yet mature, and their psychology is still in the development stage. When they enter a new environment of learning and living, on the one hand, the course pressure is too much and they may become bored with school. On the other hand, as they are in an era of diversified thinking, they are also susceptible to the influence of negative social energy and thus develop wrong values, outlook on life and worldview.

In response to the above-mentioned phenomenon, it is necessary and inevitable to carry out ideology and politics education for freshmen in the current teaching reform of higher education. With the implementation of ideology and politics education in major universities, how to improve the quality of ideology and politics education has become a hot spot and difficulty of research. Especially in the current era of information explosion, students can access to all kinds of information through network resources. However, at the same time, the rapid development of information technology also provides convenient conditions for ideology and politics education. Therefore, carrying out blending teaching of ideology and politics education to combine complementary advantages of online learning and traditional offline classroom is expected to be a key to solving the current dilemma of ideology and politics education.

As one of the three basic courses of mathematics in university, the implementation of ideology and politics education in analytical geometry plays a pivotal role in guiding students' healthy physical and mental development. In the teaching process, teachers should always keep in mind the purpose of educating people and fully exploit the ideological and political elements from multiple links through various means and ways to help students establish correct values, outlook on life and worldview, so as to lay the foundation for their subsequent study and work.

References

- Wu, H. (2020), "Analysis of ideology and politics education in junior high school mathematics-taking the Pythagorean Theorem and its Proof as an example", *Hubei Education (Educational Teaching)*, **11**, 32-34.
- Cheng, H. J. (2020), "Effective ways to integrate ideology and politics education and elementary mathematics", *Guizhou Education*, **20**, 8-9.
- Liu, X.Y. & Wu, T. (2021), "A preliminary study on the value of mathematics exercises in the context of ideology and politics education", *Math Teaching & Learning in Senior Middle School*, **13**, 4-7.
- Zhou, J. (2021), "Research on the problems of ideology and politics education and its countermeasures in elementary school mathematics under the perspective of ideology and politics education", *Xinkecheng*, **24**, 9.
- Ye, C. & Shen, J. M. (2021), "The organic infiltration of ideology and politics education by excavating the ideological and political elements in teaching materials-taking the middle school mathematics textbook in Suke edition as an example", *Tibetan Education*, **7**, 22-25.
- Wang, S.J. (2021), "Strategies for integrating the concept of ideology and politics education into higher education mathematics teaching", *Modern Vocational Education*, **30**, 152-153.
- Zhang, L.Q., Liu, X.F. & Zhao J.C. (2021), "Research on the design of higher vocational mathematics courses in

- the context of ideology and politics education”, *Journal of Taiyuan Urban Vocational College*, **6**, 156-159.
- Liu, L.Y., Mu, Y.Y. & Zheng, J. H. (2021), “Research on Strategy and Path of Construction of Ideological and Political Education Courses in Secondary Vocational Education School”, *Journal of Tianjin Vocational Institute*, **23** (6), 123-128.
- Shi, L. (2021), “Exploring the integration of ideology and politics education in the teaching of Higher Mathematics in higher vocational institutions”, *Journal of Green Science and Technology*, **28**(3), 242-244.
- Wang, H.S. & Wang, Z. (2021), “Strategies for integrating the concept of ideology and politics education into higher education mathematics teaching”, *Knowledge Window (Teacher's Edition)*, **1**, 99.
- Wang, X. (2021), “Integrating ideology and politics education in mathematics teaching”, *Mathematics Learning and Research*, **20**, 114-115.
- Gao, H.P., Li, Z.J. & Zhang, H.Y. (2021), “Some cases of ideology and politics education in higher mathematics course”, *Test and Research*, **19**, 23-24.
- Zhao, D.H., Wei, H.R. & Liu, L. (2021), “Preliminary Study of Public Mathematics Curriculum Ideological Elements Mining”, *College Mathematics*, **37**(3), 46-52.
- Lin, Y. & Liu, W.M. (2021), “On the teaching reform of ordinary differential equation course under the background of ideological and political education in courses”, *Journal of Hubei Normal University (Natural Science)*, **41** (2), 108-112.
- Jiang, S.N. & Li, X.H. (2021), “Practical strategies for ideology and politics education in mathematical analysis in the context of information technology”, *Computer Knowledge and Technology*, **17**(5), 114 -115.
- Ou, P. (2019), “The value implication, basic characteristics and generation path ideology and politics education in higher vocational colleges”, *China Higher Education*, **20**, 59-61.
- Fan, Z.Y. (2019), “The path of integrating the concept of ideology and politics education into the mathematics curriculum of higher education”, *Proceedings of the 2019 National High-end Forum on Innovation and Development of Education and Teaching*, 335-336.
- Chu, X. J. (2020), “The Connotation, Content Selection and Presentation of Courses for Ideological and Political Education in University Mathematics Course”, *Journal of Huainan Normal College*, **22** (1), 144-148.
- Cong, F.Z. & Li, X.F. (2020), “ A historical and philosophical perspective on the ideology and politics education in higher mathematics courses”, *Higher Education Forum*, **2**, 54-56.
- Xu, J. (2020), “A study on the diagnosis and improvement program of five-year senior vocational classroom teaching-taking mathematics course as an example”, *Henan Education (Vocational Education)*, **5**, 24-25+38.
- Yang, W., Chen, H.C., Liu, S.Y., Gao, S. P. & Li, B.B. (2020), “Exploration and practice of ideology and politics education in university mathematics courses: an example of teaching linear algebra in Xi'an University of Electronic Science and Technology”, *University Education*, **3**, 77-79.
- Miao, L.A. (2019), “Exploring the design of mathematics courses in colleges and universities integrated into the design of ideology and politics education”, *Shandong Education (Higher Education)*, **12**, 36-37.
- Pan, L. L., Xu, G.J., Tai, B.L. & Zhang, Y. (2020), “Logic and Method for Sciences and Engineering Courses Infiltrated with Ideological and Political Education—Exemplified by the Convexity of a Curve”, *Studies in College Mathematics*, **23** (1), 22-25+50.
- Fan, H. L., Cao, M.Y., Yuan, Y.P. & Zhang, L. (2021), “Advanced Mathematics Classroom Teaching Incorporates Curriculum Ideology and Politics Cases—Take the Concept of Definite Integral as an Example”, *Science & Technology Information*, **19**(8), 158-160.
- Chen, J. (2022), “On the cultivation model of innovative talents in universities based on blending teaching”, *Journal of Education of Renmin University of China*, **1**, 87-98.
- Bian, S.H. & Zhao, Y. R. (2021), “Strategies for learning, analysis and applications in a blending teaching environment in higher education”, *Journal of Shanxi University of Finance and Economics*, **43** (S2), 135-138.
- Bian, L., Li, T., Guan, L., Xu, X.F. & Zhang Q. H.(2022), “Design and Practice of Organic Chemistry Experiment Blended Teaching Based on Constructivism”, *Chinese Journal of Chemical Education (in English and Chinese)*, **43** (2), 64-68.
- Wu, L. (2022), “An exploration of blending teaching in higher education based on learning cycle theory”, *Education and Vocation*, **6**, 100-103.
- Ministry of Education of the People’s Republic of China (2020), “Notice of the Ministry of Education on the issuance of the Guidance Outline of Ideology and Politics Education Construction in Higher Education [EB/OL]”, May 28.