Course Ideological and Political Teaching Reform and Practice --with an Example of "Software Application of BIM Architectural Design"

Hanmeng Xiong, Li Xu

School of Architecture and Engineering, Xinyu University, Xinyu, 338004, China.

Abstract

Aiming at the problem that the current BIM course pays more attention to the teaching of professional skills and professional knowledge and ignores the goal of cultivating morality. This paper takes the "Software Application of BIM Architecture Design" as an example, and on the basis of analyzing the characteristics of this course, introduces the ideological and political teaching reform and practice of this course, and discusses the practice of integrating the ideological and political education and the implementation of the goal of cultivating morality into the classroom teaching of professional courses. So as to realize the organic integration of professional courses and curriculum ideological and political education.

Keywords

BIM; Curriculum ideology; Cultivating morality; Teaching practice.

1. Introduction

In 2016, General Secretary Xi Jinping delivered important speeches at the ideological and political work conference of colleges and universities across the country. The meeting pointed out that on the basis of the teaching of ideological and political theory courses, we must continuously improve the affinity and pertinence of ideological and political theory education, so that all kinds of courses and ideas political theory education is the same as possible [1,2]. Curriculum ideology and politics is a new type of teaching mode based on this requirement. It advocates that in the process of teaching in colleges and universities, it always adheres to the goal of educating people from morality people, and integrates and practice the core values of socialism into college classrooms. The entire process of teaching enables the coordinated development of curriculum ideas and the courses and promotes each other [3,4].

In response to the spirit of national "14th Five-Year Plan" and the "13th Five-Year Plan" for the development of the construction industry, building information modeling (BIM) and intelligentization have become the main trends in the current construction industry [5]. As a new type of information technology in the construction industry, BIM technology has been continuously promoted and applied in the field of construction in recent years due to its unique advantages such as simulation, visualization, coordination, and drawing capabilities [6]. With the continuous improvement of BIM-related professional technical positions and talent demand, the construction industry is facing a shortage of BIM-related professional talents. Domestic universities have begun to attach importance to the cultivation of BIM talents and have successively opened BIM-related majors or courses [7-9]. However, current BIM courses tend to focus on imparting professional skills and knowledge, and the emphasis on curriculum ideology construction and the implementation of the goal of nurturing students' moral character is not enough. The awareness of integrating the cultivation and practice of socialist core values into classroom teaching still needs to be improved. Therefore, based on the

characteristics of the "Application of BIM Building Design Software" course, this paper introduces the ideological and political teaching reform and practice of this course, and explores the practice of integrating curriculum ideology and implementing the goal of nurturing students' moral character into professional course teaching, in order to achieve the organic integration of professional courses and curriculum ideology.

2. The entry point for the reform of ideological and political education in courses

In 2016, the School of Architecture and Engineering of Xinyu University offered BIM-related courses for the first time. In 2018, the talent training program and curriculum of the engineering cost major were revised and the BIM direction course system was officially established. "Software Application of BIM Architecture Design" is a professional course for the engineering cost major of Xinyu University, which is offered in the fourth semester with a total of 32 class hours. As an important professional course in the field of BIM technology, through this course, students can understand the development status and application prospects of BIM technology, be familiar with the important role of BIM architectural design software in building design, master the process of BIM software operation, and have the ability to independently complete the project BIM architectural model design, laying a good foundation for future work in BIM-related professional and technical positions.

With the continuous improvement of BIM-related professional and technical positions and talent demand, the construction industry is facing a shortage of BIM-related professional talents. However, the current course of "Software Application of BIM Architecture Design" tends to focus on imparting professional skills and knowledge. In the teaching process, teachers' attention to course ideological and political education and the implementation of the goal of cultivating moral character and educating people is not enough. The awareness of incorporating the cultivation and practice of socialist core values into classroom teaching needs to be improved. In teaching, teachers tend to adopt a single teaching method and only focus on teaching professional software operation and use. They fail to fully integrate ideological and political elements into the classroom, and cannot fully stimulate students' learning enthusiasm and interest, resulting in less communication and interaction between teachers and students. Therefore, this article will explore how to fully integrate ideological and political elements into the teaching of professional courses, so as to make ideological and political education run through the entire teaching process of "Software Application of BIM Architecture Design", and fully stimulate students' learning enthusiasm and interest.

3. The practical path of curriculum ideological and political teaching reform

3.1. Establishing curriculum ideological and political education concept and enhancing the active integration of professional courses and ideological and political education

In accordance with the document Jiaogao [2020] No.3, "the guideline for building curriculum ideology and politics in higher education" clearly proposes to "promote the construction of curriculum ideology and politics based on the characteristics of different majors". For engineering courses, "we should pay attention to strengthening students' engineering ethics education, cultivating their spirit of striving for excellence as great craftsmen of the country, and inspiring their nationalistic feelings and mission responsibilities in science and technology" [10]. This paper deeply explores the elements of curriculum ideology and integrates them into the teaching of this course, focusing on "the basic principles of being a person and doing things,

the requirements of socialist core values, and the ideal and responsibility of achieving national rejuvenation". The course closely follows industry development, emphasizes practicality, and focuses on enhancing students' application abilities. The ideological and political case studies cover both the past and the present, including both large and small cases, featuring both the remarkable modern architecture of China and the traditional ancient architecture. On one hand, although BIM technology was introduced late in China, it has developed rapidly. Through the development process of BIM technology in China, students can sense China's path to becoming a great power and feel a sense of national pride. On the other hand, although the BIM software was introduced from abroad, it also integrates Chinese traditional architecture during software operation, allowing students to personally experience the beauty of Chinese architecture and the beauty of excellent traditional culture, thus enhancing cultural confidence. In addition, learning a new technology not only involves mastering it, but also applying it. The purpose of mastering technology is to contribute to the country and the nation. BIM technology plays a great role in the protection and restoration of historical and revolutionary buildings. Through expressing their patriotic feelings with professional skills, students' professional values can be elevated.

Through teaching this course, teachers will cultivate and practice the core values of socialism in the classroom, implementing the goal of fostering virtues and abilities in students. They will guide students to have a strong sense of patriotism and the "Four Confidences", deeply understand the Lu Ban culture and craftsman spirit embodied in the application of BIM technology in China, strengthen students' engineering ethics education, cultivate their spirit of striving for excellence as great craftsmen of the country, guide them to have a sense of standardization, rigorous and responsible work attitude, and independent thinking ability, and have the ability to face and solve problems with a scientific attitude, and to be honest and self-respecting, upholding the dignity and honor of the profession. Through learning this course, students can be inspired with a strong sense of national pride, patriotism, high political and cultural identity, establish confidence in the system and culture, establish correct socialist core values, and take on the historic mission of realizing the great rejuvenation of the Chinese nation with courage, and cultivate good professional literacy and professional ethics.

3.2. Carry out ideological and political education course design to organically integrate professional courses with ideological and political elements

As the demand for BIM-related professional technical positions and talents continues to increase, the construction industry is facing a shortage of BIM-related professional talents. To better equip students with cutting-edge knowledge in this discipline, deepen their understanding and awareness of this professional course, and better adapt to industry development, this course is based on the training program and teaching outline, with teaching knowledge points sorted out, combined with ideological and political case analysis, to achieve the organic integration of ideological and political elements with professional course content through the following five approaches, so that ideological and political education runs through the entire teaching process of the course "Software Application of BIM Architecture Design", thus fully stimulating students' learning enthusiasm and interest.

(1) Combining BIM technology development with China's major engineering projects, showcasing the application and rapid development of BIM technology in China's major engineering projects, and stimulating students' strong national pride and patriotism.

(2) Combining BIM technology with China's Leishenshan and Huoshenshan hospitals, strengthening students' political identity and institutional confidence, and discussing the responsibilities and obligations of engineers and engineering ethics from the perspective of engineering ethics, strengthening engineering ethics education.

(3) Combining BIM technology design concepts with traditional Chinese architecture, guiding students to inherit and develop excellent traditional Chinese culture, enhancing national self-confidence and cultural identity, and guiding students to inherit and develop excellent traditional Chinese culture.

(4) Combining BIM output with national specifications and standards, enhancing students' awareness of norms, teamwork, and professional ethics, maintaining the dignity and honor of the profession, and cultivating students' spirit of scientific exploration.

(5) Combining BIM model application with the restoration and transformation of historical Chinese buildings, guiding students to establish professional ideals and beliefs, inspiring students' strong sense of social responsibility, and guiding students to bravely shoulder historical missions.

Table 1 summarizes the specific teaching content and corresponding ideological and political elements of each chapter for this course.

Table 1: "Software Application of BIM Architecture Design" course content and corresponding ideological and political elements.

Chapter	Teaching points	Ideological and political education elements and integration points	Teaching forms and methods	Expected results
Chapter 1: Development history of BIM technology	Introduction to the development of BIM technology	1. National pride and patriotic enthusiasm. 2. Confidence in adhering to the socialist path. 3. Spirit of hard work and perseverance.	Using a blended learning approach combining online and offline teaching methods. We will introduce the case of the Hong Kong-Zhuhai-Macao Bridge project and provide teaching materials such as videos and pictures on the Learning Platform for students to preview and contemplate before class. During class, teachers will explain the materials and engage in interactive discussions with students to enhance the learning outcomes.	1. Inspire students' strong sense of national pride and patriotism. 2. Guide students to firmly believe in the socialist path, uphold their original aspirations, and shoulder their responsibilities. 3. Cultivate students' spirit of hard work and perseverance;
Chapter 2: Current application of BIM technology	Revit building design fundamentals	1. "I will be selfless and dedicated, and not fail the people" - The selflessness, fearlessness, and sense of honor of	Adopt a mixed online and offline teaching method, through the online platform before class to release the case materials of Leishenshan and Huoshenshan projects and preview and	1. Introduce the BIM application in the construction of Leishenshan and Huoshenshan hospitals, and inspire students with the selfless,

			Communist Party members of China. 2. Confidence in the system and a strong sense of political identity. 3. Engineering ethics.	thinking questions, during the class discuss the specific application of BIM technology, and after class review and exchange online.	fearless and guiltless spirit. 2. Guide students to think about the obligations and responsibilities of engineers and their projects from ethical, humanistic, ecological, and social perspectives.
Chapter 3: BIM modeling	1. Elevation, axis grid. 2. Wall, curtain wall, door and window, floor slab, ceiling, roof, opening, stair and other components. 3. Site	1. Inherit and develop excellent traditional Chinese culture. 2. Foster cultural self-confidence. 3. Independent thinking and innovation spirit.	Using a "teacher demonstration and guidance + student practice" approach, maintaining good teacher-student interaction, helping students deal with modeling details. BIM technology is matched with Chinese traditional wooden structure architectural forms through component "families". Traditional Chinese architecture elements such as mountain walls, flower windows, and roofs from Hangzhou Fuyang Tianzhong Mountain and Huizhou architecture are introduced to promote students' independent thinking and innovative spirit.	1. Starting from traditional Chinese architecture and showcasing Chinese civilization, guiding students to inherit and develop excellent traditional Chinese culture, and enhancing national confidence. 2. Cultivating students' innovative spirit and inspiring them to promote the creative transformation and innovative development of Chinese civilization.
Chapter 4: Application of bill of quantities	1. Create component detail table. 2. Edit the detail table. 3. Export the detail table.	1. The spirit of excellence and craftsmanship. 2. Being cautious, responsible and paying attention to details. 3. The scientific spirit.	Using a heuristic teaching method, students are required to self-check and peer-review the quantity list in detail. Task-driven learning encourages students to actively identify and reflect on problems and scientifically solve them.	1. Cultivate students' spirit of pursuing excellence like a craftsman. 2. Guide students to adopt a careful and responsible attitude and pay attention to details.

		4. The spirit of teamwork and collaboration.	After class, outstanding models are selected.	
Chapter 5: BIM drawing output	1. Revit annotation application. 2. Drawing layout. 3. Drawing export and printing.	1. Sense of standardization. 2. Exploratory and research spirit. 3. Honesty and trustworthiness, maintaining the dignity and honor of the profession.	Before class, the national drafting standards and regulations, as well as the contents of the most complete ancient Chinese architectural technical book "Yingzao Fashi", are published on the online platform. In class, the development history of China's drafting standards is presented in the form of pictures. The teaching method of the course is to explain the historical stories behind the national regulations and interact with students. After class, relevant video materials are released to strengthen students' perception.	1. Foster students' awareness of ethical standards and industry norms to follow. 2. Cultivate students' spirit of exploring the essence of things and studying the development of things with focus. 3. Enhance students' professional literacy, maintain integrity and self-respect, and uphold the dignity and honor of their profession.
Chapter 6: BIM three-dimensional model output	1. Rendering. 2.Walkthrough. 3.Model output.	1.Patriotism. 2.Professional ideals and beliefs. 3.Sense of mission and responsibility.	The teaching method adopts an "online + offline" approach. Online resources provide basic information, videos, and pictures of historical architecture for students to understand the characteristics of buildings and the role of BIM technology. Offline classes focus on demonstrating the application of BIM 3D technology in the restoration and transformation of historical architecture. Through the study of architecture, students can gain a deeper understanding of history and be inspired by the patriotism, hard work, and dedication of historical figures.	1. By explaining the historical stories behind historical buildings, inspire students to remember history and stimulate their patriotic feelings. 2. Guide students to establish professional ideals and beliefs. 3. Inspire students to have a strong sense of social responsibility and guide them to bravely shoulder historical missions.

3.3. Adopting a combination of online and offline teaching methods to enhance the effectiveness of ideological and political education in this course

This course has strong practicality and is closely related to the industry's development. The traditional offline teaching mode has a single teaching method and poor resource sharing and openness. By adopting a combination of online and offline teaching methods, the ideological and political elements contained in professional courses can be fully displayed, and the organic fusion of value guidance and knowledge transmission can be realized, thus continuously improving the teaching effectiveness of ideological and political education in the course. In the teaching process of this course, according to different teaching contents and characteristics, appropriate hotspots or cases are selected to carry out ideological and political education in a combination of online and offline methods, and the ideological and political connotations are subtly transmitted to the students.

For example, in the first lecture, a mixed online and offline teaching method is used, and the case of the Hong Kong-Zhuhai-Macau Bridge project is introduced. The teaching content and videos, pictures, and other case materials are posted on the learning platform for students to preview and think about before class. During class, through teacher explanations and teacher-student interactions, students are inspired with a strong sense of national pride and patriotism, and guided to be confident in the socialist road, uphold their original aspirations, and shoulder historical missions, cultivating the spirit of hard work in students. In the second lecture, a mixed online and offline teaching method is used to introduce the cases of the Lei Shen Shan and HuoShenShan engineering projects, and to explain the application of BIM technology in Lei Shen Shan and HuoShenShan engineering projects. Students learn about the stories behind the buildings, and are influenced by the selfless and fearless spirit of Communist Party members, strengthening their institutional confidence and guiding them to have a high degree of political identity. In the fifth lecture, before class, national mapping standards and regulations, as well as the content of "Yingzao Fashi," the most complete ancient Chinese construction technology book, are posted on the online platform. In class, pictures are used to show the development history of China's mapping standards, and the historical stories behind national regulations are explained through classroom lectures and student interactions. After class, relevant video materials are posted to guide students to be aware of the moral standards and industry norms to follow, and to cultivate a scientific spirit to discover, think about, and solve problems. In the sixth lecture, a mixed online and offline teaching format is adopted. Basic information, videos, and pictures of historical buildings are provided online for students to understand the characteristics of the buildings and the role of BIM technology. Offline, BIM 3D application operations for the restoration and transformation of historical buildings are explained. Through the historical stories behind the explanation of historical buildings, students are inspired to remember history, stimulate their patriotism, inspire a strong sense of social responsibility, and guide them to shoulder historical missions. Through the study of this course, ideological and political education runs through the entire teaching process of the "BIM Building Design Software Application" course, not only guiding students to establish career ideals and beliefs, enhance their sense of mission in the times, but also cultivating their interest and enthusiasm in the course, greatly improving the effectiveness of ideological and political education.

4. Reform achievements

Figure 1 represents the opinions of the class of 2020 students on the incorporation of ideological and political elements into professional courses. From the figure, it can be seen that the vast majority of students (61.8% of whom consider it very helpful and 32.6% of whom

consider it helpful) approve of the new teaching mode and believe that the incorporation of ideological and political elements into professional courses has increased the initiative and interest in learning the course.
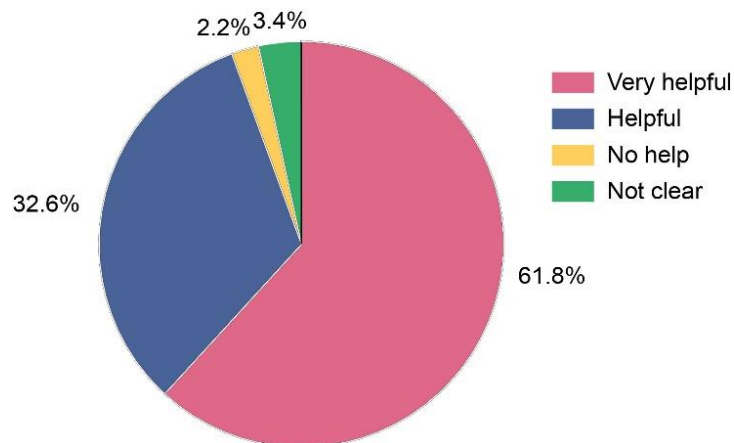

Figure 1: The opinions of the class of 2020 students on the integration of ideological and political elements into professional courses.

The course integrates ideological and political elements into the teaching of professional courses for students majoring in engineering cost in class of 2018-2020, lasting for three academic years. As shown in Table 2, the passing rate of the course for the class of 2018-2020 engineering cost majors increased to 94.74%, 100.00%, and 97.75%, respectively, while the passing rate was only 87.32% when using the traditional teaching method. It can also be seen from the table that after the course underwent ideological and political teaching reform, the overall scores of the course increased from 75.68 points to 79.38 points, 78.41 points, and 77.96 points, respectively, and the proportion of students with scores above 90 points increased from 4.26% to 5.26%, 12.29%, and 8.99%, respectively. This is because after the course underwent ideological and political teaching reform and practice, students had a higher acceptance of course teaching, and their learning effects and comprehensive qualities were improved. This is mainly reflected in two aspects: (1) 100% attendance rate of students in class, and students showed a higher learning initiative and better interaction with teachers in class, and their interest in learning the course content was greatly improved; (2) outside of class, students were able to complete their homework and learning tasks independently and with better completion rates. They had a stronger initiative in studying professional knowledge of the course in their spare time and could connect their personal development with national development, with good career development and values.

Table 2: Summary of the teaching effectiveness of engineering cost courses for class of 2017-2020.

Class	Whether conducted ideological and political education reform and practice	Total Number of Students	Passing rate (/%)	Average score (score)	Percentage of students scoring 90 or above (%)

2017 Cost	Engineering	No	71	87.32	75.68	4.26
		Yes	95	94.74	79.38	5.26
2018 Cost	Engineering	Yes	122	100.00	78.41	12.29
2019 Cost	Engineering					
2020 Cost	Engineering	Yes	89	97.75	77.96	8.99

5. Conclusion

The integration of ideological and political elements into professional courses is a significant breakthrough and transformation in the teaching of professional courses. It is an important way to achieve the goal of cultivating high-quality talents in professional education. How to effectively carry out curriculum ideological and political education reform directly affects the achievement of the goal of moral education and talent cultivation. In this paper, taking the course "Software Application of BIM Architecture Design" as an example, based on the analysis of the characteristics of the course, the paper introduces the reform and practice of ideological and political education in the course, and explores the integration of ideological and political education and the implementation of the goal of moral education and talent cultivation into classroom teaching of professional courses, thereby achieving the organic integration of professional courses and curriculum ideology and politics. After the course's ideological and political education reform and practice, students have higher acceptance of course teaching, and their learning effectiveness and comprehensive quality have been improved.

Acknowledgements

References

[1] Xi Jinping emphasized at the National Conference on Ideological and Political Work in Colleges and Universities: Integrate ideological and political work into the entire process of education and create a new situation for the development of China's higher education, People's Daily, No.1, (2016).

[2] Zhang Yong, Fu Jun. Content, steps and methods of ideological and political construction in BIM technology and application course, Journal of Architectural Education in Institutions of Higher Learning, Vol. 28 (2019) No.6, p.125-131.

[3] Sun Yinlu, Jiang Hongyue, Xiong Ying. Exploration and Practice of Talent Training in Analytical Chemistry under the Background of "Course Ideological and Political Construction"-Taking Chromatography Teaching as an Example, University Chemistry, Vol. 33 (2021) No.6, p.1-4.

[4] Yang Gongyin, Cui Pengyan, Chen Yuming. Research and exploration of BIM technology and application course ideological and political reform, Journal of Yunnan Minzu University(Natural Sciences Edition), Vol. 29 (2020) No.2, p.174-177.

[5] Wang Jue. The Spirit of Great Craftsman in the Era of Building Informationization - "BIM Technology and Application" Course Ideological and Political Construction, China CIO News, (2020) No.5, p.167-168.

[6] Mu Kang, Zhou Yue. Teaching Reform and Practice of "Three Integration and One Fusion" in BIM Technology Application Course, Journal of Jiangsu College of Engineering and Technology, Vol. 20 (2020) No.1, p.98-102.

[7] Zheng Xiaoxia, Xu Zhichao, Yin Yilin. The Impact of BIM on Talent Training in Engineering Cost in Higher Education Institutions and Countermeasures, Construction Economy, Vol. 37 (2016) No.05, p.115-120.

[8] Wang Yanqi, Xu Qingyang, Shan Huimin, et al. Feasibility analysis of promoting BIM in higher education, Data of Culture and Education, (2018) No.5, p.124-126.

[9] Cao Xi. Exploration of the Integration of BIM Technology into Higher Education Engineering Management Teaching, Tomorrow's Fashion, 2017(13):141+143. (In Chinese)

[10] http://www.moe.gov.cn/srcsite/A08/s7056/202006/t20200603_462437.html.