Journal of Contemporary Educational Research, 2023, Volume 7, Issue 5
http://ojs.bbwpublisher.com/index.php/JCER
ISSN Online: 2208-8474
ISSN Print: 2208-8466

Design and Analysis of Civics Education in the Course "Measurement and Pricing of Installation Works"

Li Song*, Jingjing Sun

Chongqing Energy College, Chongqing 402260, China

Corresponding author: Li Song, 309134003@qq.com

Abstract: In order to implement moral education, ideological and political work must be carried out throughout the whole process of education and teaching. Taking the course "Measurement and Pricing of Installation Works" as the subject and professional knowledge and skills as the carrier, we explored the elements of ideological and political education contained in this course as well as the value of ideological and political education to this course, in order to realize the teaching goal of "trinity," which includes value shaping, knowledge transfer, and skill cultivation.

Keywords: Elements of ideological and political education; Trinity

Online publication: May 29, 2023

1. Introduction

The combination of professional courses and "Curriculum Civics" in higher vocational institutions has become an essential part of education development in the new era. The teaching concept of "Curriculum Civics" includes the integration of ideological and political education into all aspects of curriculum teaching and reform, so as to realize the three-pronged education [1]. The ideology and politics of professional courses should emphasize on the teaching practice of professional courses, the cohesion of knowledge in the dissemination of value, and the value leadership in the dissemination of knowledge [2]. The ideology and value leadership are integrated into the curriculum standards, lecture plans, teaching contents, and evaluation. We focus on cultivating students' truthfulness, pragmatism, practical innovation, excellence, rigor and conscientiousness, hard work, and pursuit of excellence, so that they can grow into professionals who care about the society and carry the responsibility of the times.

2. Design and implementation of civics education in the course "Measurement and Pricing of Installation Works"

"Measurement and Pricing of Installation Works" is not only a professional core course for senior students in cost engineering, but also a technical, economic, and comprehensive compulsory course. The course includes a wide range of subjects (including electrical, water supply and drainage, fire protection, ventilation and air conditioning, heating, *etc.*), the reading of architectural drawings, and equipment installation as a professional basis, while focusing on determining the amount of installation work by calculation and reasonable pricing.

2.1. Teaching objectives

Combining the professional standards of the Ministry of Education, enterprise certification, and the talent training program formulated by our school, the curriculum standard of "Measurement and Pricing of Installation Works," and the professional requirements of the school to design the teaching contents, the knowledge objectives, competency objectives, quality objectives, and civic objectives are formulated, as shown in **Table 1**.

Table 1. Teaching objectives

Knowledge objectives	(i) To master the basic knowledge of installation project cost and the method of reading drawings. (ii) To master the rules in calculating the quantity of installation works and relevant cost provisions. (iii) To master knowledge related to the specification of bill of quantities for installation works, and to master the principle and steps of preparation for the installation project budget.
Competency objectives	(i) To be able to read conventional construction drawings. (ii) To be able to apply the correct list quota subheadings according to the construction techniques of installation works. (iii) To be able to account for the volume of work according to the measurement method of the list of each specialty of installation works. (iv) To be able to use software to complete modeling, measurement and pricing, and other related work.
Quality objectives	(i) To cultivate a meticulous-and-patient working style among students. (ii) To cultivate students with planning, organizing, and coordinating skills. (iii) To cultivate students' sense of teamwork and improve their interpersonal communication skills. (iv) To exercise students' logical thinking skills and hands-on skills.
Civic objectives	(i) To cultivate an independent, rigorous, and factual working style as well as team consciousness among students; to cultivate the spirit of continuous innovation and good professional ethics in students. (ii) To cultivate students' "craftsmanship" and socialist core values (patriotism, dedication, integrity, and friendliness).

2.2. Conception of civics education

By digging deeper into the elements of ideological and political education contained in this course and the ideological and political education functions of this course and taking professional knowledge and skills as the carrier, it is possible to achieve the teaching goal of "trinity" (value shaping, knowledge transfer, and skill cultivation). The specific design plan is shown in **Table 2**.

Table 2. Design plan of "Curriculum Civics"

Key knowledge points	Civics material	Civics element	Expected results
Project 1: Overview of installation project costing			
(i) Division and composition of construction and installation work cost. (ii) Calculation method of construction and installation work cost.	(i) Sharing of successful projects to improve competitiveness in the infrastructure sector by focusing on budgeting in all phases of the project.	(i) Cultivate students' rigor and meticulousness as well as engineering consciousness in applying what they have learned.	(i) Inspire students' patriotic enthusiasm and national self-confidence. (ii) Enhance awareness of security.

(Continued on next page)

(Continued from previous page)

Key knowledge points	Civics material	Civics element	Expected results
	(ii) Safety and civilization construction costs as non-competitive costs reflecting safety and environmental protection. (iii) Introduction of projects exceeding budget cases. (iv) Real-time update of cost information.	(ii) Cultivate students' patriotic spirit and national self-confidence. (iii) Cultivate the spirit of "learning to keep up with the times."	
Project 2: Measurement and pricing of water supply and drainage projects			
(i) Reading of construction drawings of water supply and drainage works. (ii) Calculation of quantity of water supply and drainage works, and preparation of bill of quantities. (iii) Preparation of pricing documents for water supply and drainage projects.	(i) Large price differences for pipes of different diameters. (ii) Case study of huge losses due to calculation errors. (iii) Specification for calculation of Quantity of General Installation Works GB50856-2013. (iv) Chongqing General Installation Project Pricing Quotas (2018 Edition).	(i) Cultivate standardized, rigorous, and meticulous professionalism among students; as well as the engineering consciousness and innovative spirit of what they have learned. (ii) Develop students' awareness of national standards and norms.	(i) Increase students' motivation to learn. (ii) Enhance the teaching effect.
Project 3: Construction electrical engineering measurement and pricing			
(i) Reading of construction drawings of construction electrical works. (ii) Calculation of quantities of construction electrical works and preparation of bill of quantities. (iii) Preparation of construction electrical engineering billing documents.	(i) Safety hazards caused by jerry-built materials. (ii) Case study of huge losses due to calculation errors.	(i) Train students to work in a safe, disciplined, and meticulous manner. (ii) Develop standardized calculation and a rigorous, meticulous, and factual working style.	(i) Enhance students' learning motivation. (ii) Improve students' independent learning ability. (iii) Enhance the teaching effect.
Project 4: Construction fire engineering measurement and pricing			
(i) Reading of construction drawings of construction fire engineering.	(i) Analysis of fire safety accident cases.	(i) Cultivate standardized, rigorous, and meticulous professionalism among students;	(i) Enhance students' independent learning ability. (ii) Improve students' keen career sense.

(Continued on next page)

(Continued from previous page)

Key knowledge points	Civics material	Civics element	Expected results
(ii) Calculation of quantities and preparation of bill of quantities for construction fire protection works. (iii) Preparation of construction fire engineering billing documents.	(ii) Relevant initiatives taken by the state to attach importance to fire-fighting work. (iii) Case study of huge losses due to calculation errors.	as well as the engineering consciousness and innovative spirit of what they have learned. (ii) Cultivate students' patriotic spirit and national self-confidence.	
Project 5: Ventilation and air-conditioning project measurement and billing			
(i) Reading of construction drawings of ventilation and air-conditioning works. (ii) Calculation of the quantity of ventilation and air-conditioning works, and preparation of bill of quantities. (iii) Ventilation and air-conditioning project billing documents preparation.	(i) Analyze the impact of the epidemic on the HVAC industry and its future development direction. (ii) Case study of huge losses due to calculation errors.	(i) Cultivate a sense of norms, love for work, professionalism, and solidarity. (ii) Cultivate scientific thinking methods and a sense of responsibility and mission to explore the unknown.	(i) Motivate students to explore knowledge. (ii) Exercise students' ability to think about problems, analyze them, and solve them.
Project 6: Installation of costing software applications			
(i) Master the basic ideas of software calculation for each construction and installation work. (ii) Able to use software to model, export the complete bill of quantities, and complete the preparation of billing documents.	(i) Introduction to the development and application of software for measurement and pricing of installation works. (ii) Case study of consequences resulting from computer viruses, reminding students to download software from the official website.	(i) To develop legal and normative awareness. (ii) Cultivate rigorous and meticulous professionalism. (iii) Look at problems with a development perspective.	(i) Enhance students' motivation to learn. (ii) Improve students' rigorous and meticulous professionalism. (iii) Enhance students' sense of identity and self-confidence in subject knowledge.

Abbreviations: HVAC, heating, ventilation, and air conditioning

2.3. Implementation of civics education

The course is taught in a flipped classroom, with task-driven and hands-on exercises.

In the "Overview of Installation Project Costing" module, which is issued before introductory tasks, students are required to review representative works in the field of infrastructure, report and discuss in small groups in class, demonstrate the characteristics of each building, and compare the budget indicators of each

stage. In order to eliminate the vicious competition of enterprises in abandoning the safety and security costs of construction personnel and environmental protection measures, the state has stipulated the safety and civilization construction fee as a non-competitive fee for bidding. This reflects the country's effort toward people-oriented production concept and determination to protect the environment [3]; the cultivation of students' rigorous and meticulous professionalism as well as engineering consciousness in applying what they have learned; the cultivation of students' patriotic spirit and national self-confidence; and the cultivation of students' awareness of safety and confidentiality.

In the measurement and pricing modules for each installation, engineering case drawings are released before class, and students are required to read the drawings and go through the online open course. Students are supposed to operate in groups during class and compare the results obtained; with any inconsistent result, they must look for the reasons for the inconsistency and make appropriate corrections. Teachers will then discuss certain problems in cost engineering by introducing cases, especially on incompatible units, misplaced decimal points, and inaccurate dimensional measurements.

In the "Installation of Costing Software Applications" module, engineering tasks are issued, projects are completed in groups, and engineering cases are used as a carrier to master knowledge points in the process of analyzing problems, cultivate legal and normative awareness, as well as cultivate rigorous and meticulous professionalism.

2.4. Teaching reflection

(i) Implementation effect and results

In order to investigate the effect of civics education in "Measurement and Pricing of Installation Works," a survey questionnaire was carried out at the end of the semester. A total of 80 questionnaires were distributed, and 75 copies were collected; the recovery rate was 93.75%. The results of the survey showed that the students were positive about the effectiveness of civics education in "Measurement and Pricing of Installation Works."

(ii) Problems

Some students are reluctant to invest more time and effort outside class, and large gaps exist in the completion of tasks issued by the teacher, with varying degrees of mastery.

(iii) Improvement measures

Explore deeper connotations, break down tasks more interestingly, and stimulate students' interest in learning. Increase supervision and control before and after class to jointly improve teaching effectiveness.

3. Value of civics education in "Measurement and Pricing of Installation Works"

(i) Promote socialist core values and cultivate good professional conduct

Through the development of the construction industry, cutting-edge technology, and China's construction projects from ancient times to the present epidemic, the use of teaching examples related to construction quality and price control helps strengthen students' sense of professional ethics and establish a sense of social responsibility and professional reverence in their hearts.

With regard to engineering cost activities throughout the various aspects of capital construction activities (feasibility study, design, construction, completion, and acceptance), the calculated project cost not only determines the economic benefits of micro-engineering subjects, but also governs the investment efficiency of funds and social benefits of the project. In the process of practice, cost engineering personnel must not only have excellent professional knowledge and dedication to the work style, but also have a broad mind for their own work, their own micro-economic subjects, and their own country to ensure responsible cost engineering data.

(ii) Promote the spirit of excellence

With economic development and social progress, enterprises need down-to-earth, hardworking, and meticulous talents with professional skills and excellence who pursue the spirit of excellence. For cost engineering personnel, strict work ideas and meticulous calculations are the embodiment of the spirit of excellence, as each digit after a decimal point may greatly affect the economy or quality.

(iii) Cultivate the innovative spirit of keeping up with the times and pursuing excellence

Guided by the thought of socialism with Chinese characteristics in the new era, we need to ensure that theoretical knowledge is taught well and there is proper guidance of values. We must also proactively pay attention to architectural innovation and understand the dynamics of Building Information Modeling (BIM), assembly building, and other forewords to keep up with the times and pursue excellence.

4. Conclusion

The course "Measurement and Pricing of Installation Works" contains rich elements of curriculum ideology and politics, which must be constantly thought of and extended. The reform of curriculum ideology and teaching is time-sensitive, and the integration point of curriculum ideology and politics is constantly changing with societal development. Therefore, we need to constantly pay attention to the new developments in the industry, brainstorm, and upgrade the industry.

Disclosure statement

The authors declare no conflict of interest.

References

[1] Liu X, 2019, The Teaching Design of "Course Civics" of "Title English" in Higher Vocational Colleges and Universities, Taking "Vocational Skills Teaching Project" as an Example. Electrical and Mechanical Education Innovation, 2019(10): 157–158.

[2] Chen Y, 2019, Exploration of "Course Thinking Politics" in the Teaching of "Engineering Drawing". Modern Communication, 2019(18): 186–187.

[3] Guo Y, 2019, Reform of Ideological and Political Education in Higher Vocational Engineering Cost Major Courses Exploration. Journal of Jiujiang Vocational and Technical College, 28(6): 17–18.