The Application of Curriculum Ideological and Political Cases in the Teaching of Road Survey and Design

Aijun Chen* Bai Yang Xianyuan Tang Junhua Chen
Guilin University of Electronic Technology, School of Architecture and Transportation Engineering, Guilin, Guangxi, 541004, China

ABSTRACT
I ideological and political construction of curriculum is the key link to implement the fundamental task of moral education. Focusing on the training objectives of civil engineering professionals in the new era, combined with the teaching concepts of moral education and student-centered education, the teaching objectives for the course of road survey and design have been re-set. The implementation plan of ideological and political education has been put into practice by involving excellent engineering cases, stories of outstanding figures in this field, traffic accidents, design concepts and technological innovation to explore the methods of integrating ideological and political cases into curriculum teaching for a continuous improvement of the promotion of curriculum ideological and political education to the teaching quality of professional courses.

ARTICLE INFO

Article history
Received: 9 April 2022
Revised: 30 March 2022
Accepted: 9 April 2022
Published Online: 16 April 2022

Keywords:
Road surveying and design
Ideological and political education
Case
Integration

1. Introduction
General Secretary Xi Jinping pointed out at the National Conference on Ideological and Political Work in Colleges and Universities: "We should adhere to the central link of building morality and cultivating people, run the ideological and political work through the whole process of imparting knowledge and cultivating people, implement all-process education and all-round education and strive to create a new situation in the development of China’s higher education" [1-2]. From the perspective of educating people, curriculum ideological and political education excavates the ideological and political education elements contained in various professional courses, integrates into all aspects of classroom teaching, and realizes the organic unity of ideological and political education and knowledge system education. It is a theoretical and practical problem highly concerned in the field of higher education [3-7].

Road survey and design is an important professional course for civil engineering specialty in our university. Through the study of this course, students can master the common terminology, basic theory and basic knowledge of road survey and design, master the main tasks, basic theories, principles and requirements of road plane, longitudinal section and cross section design, master the principles and specific requirements of route selection and alignment, understand the design of road plane and three-dimensional intersection, and be familiar with the

*Corresponding Author:
Aijun Chen,
Guilin University of Electronic Technology, School of Architecture and Transportation Engineering, Guilin, Guangxi, 541004, China;
Email: binyan@csu.edu.cn
new concept of road design.
Through case teaching, we can apply theories with practice, putting students into the roles and situations of cases to spur their desire for knowledge. This paper attempts to introduce case teaching into the ideological and political education of road survey and design course to explore the integration mode of curriculum ideological and political education in professional curriculum teaching.

2. Course Teaching Objectives

2.1 The Teaching Concept of “Curriculum Ideological and Political” Education
This course adheres to the unity of imparting knowledge and educating people, focusing on educational concept of the curriculum education and student-centered teaching method throughout the whole process, combines knowledge imparting and value guidance, and regards “cultivating people with morality” as the fundamental task of education. Integrate the socialist core values and patriotism into the teaching of professional courses, improve students’ ideological and moral literacy, and improve students’ sense of social responsibility to serve the country and the people.

2.2 Main Problems to be Solved through “Curriculum Ideological and Political” Education
The first problem to be solved is the depressed classroom atmosphere and the low efficiency of learning. The second problem is that prevalent practice of overemphasizing the imparting of knowledge but overlooking the cultivation of ability and morality. The third problem is that students lack understanding and mission responsibility for the transportation industry.

2.3 The Teaching Objectives of Curriculum Ideological and Political Education
Curriculum politics adheres to the unity of teaching and educating people, takes “building morality and cultivating people” as the fundamental task of education, integrates socialist core values and patriotism into the teaching of professional courses, improves students’ ideological and moral quality, and improves students’ social responsibility to serve the country and the people. The ideological and political education goal for Road Survey and Design course is to strengthen students’ sense of social responsibility and green environmental protection consciousness, so that students can truly realize the spirit of seriousness, cooperation and arduous struggle. Students are guided to establish the correct professional spirit, cultivate positive attitude to life and acquire solid subject knowledge. Eventually, they will become compound applied talents with national feelings, craftsman spirit, innovation and practical ability.

3. The Implementation Plan of Curriculum Ideological and Political Education
The course teaching reform is carried out through five aspects: changing the concept of course ideological and political education, re-setting the course ideological and political teaching objectives, reconstructing the teaching content containing ideological and political elements, innovating the course ideological and political teaching methods and means, and constructing the course ideological and political assessment and evaluation system. Improving knowledge and cultivating people are organically combined, promoting and coordinating with each other to form a virtuous cycle of teaching and learning and achieve the purpose of “all-round education” in this course.

3.1 Change the Concept of Ideological and Political Education in Curriculum
The educators must improve the ability of ideological and political education in curriculum and learn the necessary knowledge first so that they can better shoulder the responsibility of guiding students onto the healthy track. Relying on the training and reports related to ideological and political teaching of courses organized by the school’s teacher development center, the Academic Affairs Office and the college, colleges or universities organize teachers to participate in ideological and political teaching training, ideological and political case discussions, and study ideological and political expert reports to improve teachers’ understanding of course ideological and political teaching. Mobilize the enthusiasm of teachers to carry out curriculum ideological and political, and comprehensively enhance the role of teachers’ curriculum ideological and political ability. In addition, it is necessary to actively carry out thematic studies on the teaching mode and teaching method of ideological and political courses, explore the ideological and political elements and resources in condensed courses, design the teaching of ideological and political courses, and continuously construct and expand the teaching cases of ideological and political courses.

3.2 To Reset the Ideological and Political Teaching Goals of the Course
When setting the teaching goals of the course, the teachers should fully tap the ideological and political education resources of this course, and put the ideological and
political education and imparting of knowledge and skills to an equally important position. Each knowledge topic corresponds to its corresponding moral education content, emphasizing responsibilities and duties, which subtly affects the establishment of students’ correct outlook on life, values, and world outlook, and then promotes the unity of moral education improvement and knowledge transmission, and truly realizes the all-round and whole-process education of curriculum ideology and politics.

3.3 To Reconstruct the Teaching Content Containing Ideological and Political Elements

Combining the knowledge objectives and teaching content, teachers should formulate corresponding ideological and political teaching plans by excavating and condensing the ideological and political elements in the curriculum, deepening the integration of ideological and political elements into the design, containing knowledge units, knowledge modules, corresponding ideological and political elements of the course, teaching forms and teaching methods.

3.4 To Innovate Ideological and Political Teaching Methods and Means

Displaying engineering case with both text so that students can intuitively feel the current situation of engineering development, guide students’ interest in learning, and stimulate students’ learning motivation. Case analysis teaching method is adopted to emphasize the connection between theory and practice, and guide students to flexibly use the basic theoretical knowledge of textbooks to analyze and solve practical engineering problems. Increasing classroom interaction to attract students’ attention and activate classroom atmosphere, and stimulate students’ motivation to acquire knowledge by self-study after class.

3.5 To Build a Curriculum Ideological and Political Assessment System

The one-time-determines-life evaluation system and the single-index evaluation system should be replaced by a comprehensive evaluation system of a combination of process evaluation and summative evaluation. The evaluation of process learning effect is increased, and the evaluation perspective is aimed at students’ political literacy, humanistic literacy, engineering social awareness and professional ethics and other ideological and political assessments have been expanded to form a more three-dimensional and transparent course assessment and evaluation system.

4. Teaching Cases of Ideological and Political Education

The case teaching method is the embodiment of modern pedagogy, philosophy, knowledge in the current higher education, and it is the embodiment of a modern teaching concept.

The case method originated in Harvard Law School in the 1870s and was introduced into China in the 1980s. After years of development and application, case teaching method has become one of the most important teaching methods in daily teaching in higher vocational colleges in China. As for the concept of case teaching method, different scholars have different understandings. For a long time, although there is no unified standard, but its main idea is basically the same. In 2015, the Ministry of Education issued opinions on Strengthening the Construction of Case Teaching and Joint Training Bases for Professional Degree Graduates, which defined the concept of case teaching method from an official perspective for the first time. According to the document, case teaching method is a teaching method that takes students as the center, takes cases as the basis, takes the specific case situation set by teachers as the main line, guides students to think positively, and then improves their ability.

In case teaching, teachers, cases and students are important parts of teaching activities. Among them, teachers are the main body of teaching and the important organizer of teaching activities. In the teaching process, teachers should do a good job in case presentation, problem pre-setting, discussion organization, inspiration and guidance, summary and feedback. Teachers should pay attention to arousing students’ deep thinking, grasp the teaching rhythm, control the class order, resolve the class deadlock, reduce the comments on students’ class discussion and speech, so as to ensure the smooth progress of case teaching. The case is the teaching content, the important foundation for the effective development of teaching activities and the important carrier to realize the combination of theory and practice. Teachers’ teaching organization and students’ participation should be carried out around cases. Students are the object of teaching and an important participant in the whole teaching process. Students should fully participate in the whole teaching process by familiarizing themselves with cases before class, discussing and speaking in class and summarizing and improving after class. Under the guidance of teachers, students should sort out their viewpoints, think and analyze their speech questions, and improve their theoretical cognition, practical ability and professional quality with the help of cases and situations.
In ancient times, Xunzi said: “Not Hearing something is not as good as hearing it. Hearing it is not as good as seeing it. Seeing it is not as good as knowing it. Knowing it is not as good as doing it.” It is an inevitable trend to apply the case teaching method to classroom teaching to achieve “the unity of knowledge and action”. In the course ideological and political teaching, case teaching is the most direct teaching method to integrate professional knowledge with ideological and political education. According to the course objectives and contents, teachers guide students to analyze the cases involved by sharing representative classic cases with students. Curriculum knowledge, especially the ideological and political elements contained in the case, ideological and political education for students. On the one hand, teachers activate the enthusiasm of students’ participation in classroom to check students’ sage on the curriculum. On the other hand, teachers need to cultivate students’ ability to analyze and solve problems, and dialectical thinking ability. The case teaching method combines theoretical knowledge with engineering practice, and based on the training objectives of the course, the theoretical knowledge is embodied and targeted, so as to avoid the boring and dry-dark theory teaching. Classical case teaching comprehensively analyzes the problems in practical engineering practice by using theoretical knowledge, which shortens the distance between textbook theory and engineering practice, and helps students grasp key knowledge points and seek a breakthrough to solve problems in practical engineering projects.

Case selection is the prerequisite and important guarantee for the success of case teaching method. According to the objectives of ideological and political education, choosing authentic and representative cases, which are consistent with the teaching content and in accordance with the trend of road industry, to implement the fundamental goal of ideological and political education. In road surveying and design, four types of cases are selected by digging the moral elements relevant to courses.

4.1 Excellent Engineering Cases

In recent years, with the rapid development of the national economy, China’s highway construction has been developing rapidly. The road construction reached its peak achievement, with a large number of typical road projects accomplished. One example is the 240km-long Ya xi Expressway (Figure 1), connecting Ya’an city and Xichang city, climbs from the edge of the Sichuan Basin up to the highlands of the Heng duan Mountains, runs throughout the Southwest geological disaster-prone deep mountain valleys. Known as the “Heavenly Ladder Highway”, it is recognized by experts and scholars at home and abroad as the so called anti-nature-project in the history of Chinese highway construction, built in the most severe natural environment, ranking as one of the most difficult and technically advanced highways in China, even in the world.

Another example is Tianmen Mountain Winding Highway in Zhangjiajie (Figure 2), whose construction began in 1998 and ended in 2005. Due to the unique geological and climatic constraints of the Tianmen Mountain, the construction project is called a major challenge in the history of China’s highways. Known as the “Avenue to Heaven”, the 10.77 km-long “the world’s first highway wonders” climbs sharply from 200 meters to 1,300 meters above sea level, 99 turn-around curves designed to overcome the steep slope terrain. This fully demonstrates the wisdom of China’s road designers and the great achievements of China’s highway construction.

The third example is the Qinling Terminal Mountain Highway Tunnel, known as the world’s first and longest two-way highway tunnel. It was designed, constructed, supervised and managed by China. Its three-shaft feeding and discharging longitudinal ventilation mode is highly evaluated by industry professionals at home and abroad. These excellent highway engineering projects involve the latest technology of highway development. Informing students with the latest development and great achievements in the field of highway engineering in China can stimulate students’ professional pride and sense of honor, and enhance their national and ethnic identity.
4.2 Outstanding Figures

Zhan Tianyou was the most outstanding railroad engineering expert in modern China (Figure 3). He studied in the United States at the age of 12 and was enrolled in the Civil Engineering Department of Yale University in 1878, majoring in railroad engineering. Zhan Tianyou was responsible for the construction of the Beijing-Zhangjiang Railway, and he laid the tracks in a “human” shape at the mountainside according to the terrain, going back and forth, in order to reach the Qing long Bridge, so that the route was shortened by half compared with the original plan. During the construction of Beijing-Zhang railroad, he used the blasting method to open four tunnels. Among them, the Badaling Tunnel, 1091 meters long, was excavated using the straight shaft method to speed up the progress, so that the Beijing-Zhang Railway was completed two years ahead of schedule. The British chief engineer Kinda and Cox praised it as a “unique skill”. The outstanding achievement of Zhan Tianyou in leading the construction of the Beijing-Zhang railroad, which was a great insult to the Chinese people at that time, showed the great spirit and wisdom of our people and signified the great future of our people. Zhan Tianyou’s spirit of self-reliance, indignation, fear of hardship and hard work is his inheritance and development of the great spiritual tradition and innovative talent of our people and ancient scientists and engineers, and his great spiritual legacy to our science and technology community today.

The wall-mounted road of Guo Liang was hammered into being by the villagers of Guo Liang village with steel brazier, hammer and dynamite for five years (Figure 4). The wall-mounted road, an extremely rare human landscape, not only witnessed the diligence and persistence of the people of Guo Liang, but also contains their intelligence and wisdom to fight with nature. By introducing the story of Guo Liang people who built wall-mounted road by hand, students can deeply appreciate the tenacious spirit of Guo Liang people and their sense of perpetual progress, pragmatic innovation, and learn their contemporary Yungong spirit of daring to think and do and not being satisfied with the status quo. General Mu Shengzhong is the founder of the Qinghai-Tibet Highway (Figure 5). Mu and his army of road builders waged a bloody battle on the snow line at an average altitude of 3,000 meters above sea level. They only had tsampa and fried noodles for food, ice water or snowballs for drink, thin tent for shelter when they were building the Qinghai-Tibet Highway, pioneered by General Mu. But they carried forward the spirit of “no fear of hardships and death, tenacious struggle, willing to be the road stone, uniting soldiers and civilian as one”, opened up a bright avenue with flesh and blood. Through introducing the outstanding deeds of the old pioneers who built the Qinghai-Tibet highway for the benefit of the people in spite of the hardships and dangers, we cultivate students’ sense of family and responsibility, promote the national spirit, and stimulate their patriotic enthusiasm. To make students brave enough to meet challenges and face difficulties in their future careers, taking up the historical mission of a strong transportation nation.

Figure 3. Zhan Tianyou

Figure 4. Hanging wall highway
4.3 Traffic Accident Cases

Domestic and foreign research data show that traffic safety accidents are closely related to road geometric design parameters.

For example, at about 19:21 on November 3, 2018, at the Lanzhou South Toll Station of Lanhai Expressway, Liaoning provincial driver Li Feng was driving a tower-transporting semitrailer crane from the south to the north along the Lanhai Expressway. On the 17-kilometer-long downhill section, 50 meters away from the Lanzhou South Toll Station, the crane collided with a vehicle waiting in line to pay the toll, causing a severe road traffic accident, which was closely related from the long slope.

Taihe highway ranked among China’s top ten roads of death, known as the devil U-bend, which is the most dangerous curve located in Taiyuan-Jiaogou section. Due to the dozens of curves and frequent undulations of the longitudinal slope, after a long time driving until the last curve, drivers usually become exhausted. What’s more, there is a long section of downhill road, and the brake has been heated with friction, so braking effect is weakened. The driver often doesn’t make the emergency brake until the last minute. That is why vehicles are probably overturned or rushed down the cliff. Monotonous long straight road sections also tend to lead to driver fatigue, speeding and other phenomena, thus causing traffic accidents; uphill sections of visual blind spots within the curve, easy to mislead the driver, inducing traffic accidents. Monotonous long straight road sections are also likely to cause driver fatigue, speeding and other phenomena, finally causing traffic accidents. Uphill sections of visual blind spots within the curve is easy to mislead the driver, inducing traffic accidents. Through traffic accident cases, this paper analyzes the causes of accidents, helps students understand the relationship between traffic accidents and road geometric design parameters, realize the importance of route design, and enhances students’ professional responsibility. Raising the students’ awareness of the brutality of traffic accidents, the teacher helps students realize the necessity of following professional standards and norms, and bear the responsibilities and obligations of road workers.

4.4 Design Concept Case

In recent years, with the accelerated pace of road construction in China and the country’s emphasis on environmental protection, people gradually realize that the design guiding ideology of economy-oriented is not conducive to the sustainable development of road traffic. In 2016, the Ministry of Communications issued the “Guiding Opinions on Implementing Green Highway Construction”, proposing to build green highways with good quality as the premise, resource conservation, ecological environmental protection, energy saving and high efficiency, and service improvement as the main features, so as to achieve healthy and sustainable highway construction and continuous development. Taking the route selection of the Jinjigou Reservoir section of the Sichuan Yingshan-Dazhou Expressway as an example, the design concept of “natural harmony and ecological protection” is emphasized, and the advantages and disadvantages of different route options are analyzed to determine a reasonable route option. In order to practice green transportation, in accordance with the concept of “safety, environmental protection, comfort and harmony”, Dan-A highway follow the principles of terrain selection, geological selection, ecological selection and safety selection, and fully consider the balance of filling and excavation to minimize the impact of road engineering on the environment. Through these green highway design cases, students are guided to establish the development concept that green water and green mountain is the silver mountain of gold, to initially establish the awareness of engineering environmental protection and ecological civilization concept, and to cultivate the concept of sustainable development.

4.5 Technological Innovation Cases

New technologies in the field of road survey are embedded in the course “line selection and alignment”, so that students have an understanding and knowledge of new technology of road survey, but also the students are stimulated on the technical innovation and innovation of strong interest and enthusiasm. For example, the virtual
geographic environment system for highways based on 3S technology means that the virtual geographic environment system built using remote sensing technology, geographic information system and global positioning technology can play a huge supporting role in the mapping of mountain roads. Ground three-dimensional laser scanning technology can solve the shortcomings of traditional measurement methods such as single data acquisition information, low efficiency, occupying a large number of manpower, high physical labor intensity and high risk of road operation. Digital highway technology means that in the process of highway engineering planning, survey, design, construction, operation and maintenance the integration, the integration, digitalization of data collection, design and highway management are realized by using modern surveying and mapping technology, and the total station, GPS, remote sensing technology, gyroscopic inertial measurement and GIS technology are integrated to realize the three-dimensional space mapping of highway sky and ground.

5. The Integration Method of Curriculum Ideology and Politics

5.1 Direct Integration

The form of direct integration of knowledge points is "adding flowers on the brocade", that is, in a certain knowledge point or skill point of various courses ideological and political elements are directly sublimated to achieve the icing on the cake without dominating the effect. When a certain knowledge point itself has a certain value orientation, direct integration of the knowledge point can be used. This method can also be adopted when there are a large number of knowledge points containing value requirements in humanities and social sciences courses.

5.2 Task Integration

Task integration method is to graft ideological and political elements into a knowledge point or skill point of professional courses through course learning or training tasks, so as to achieve a win-win effect. When many basic theoretical knowledge and simple skills have no obvious value orientation, task integration can be used to integrate ideological and political elements with various courses. Task integration is based on a task-driven pedagogy, which is used to teach new knowledge and master new skills. Tasks can be either to complete certain entities, or to answer questions, solve problems, case analysis (knowledge application tasks), etc. As long as the problem is solved and knowledge is acquired through the process of problem solving, it can be called a "task".

5.3 Project Integration

For some practical courses, it is difficult to integrate tasks because all tasks do not have value orientation, so project integration can be adopted to integrate ideological and political elements. For more complex ideological and political education elements, it is impossible to integrate into a single task, and the project integration method should be used. The project is a combination of multiple tasks carried out to achieve a certain result, and the combination of tasks carried out in the course of the same project may vary from student to student. Compared with mission-driven teaching, project teaching methods are more suitable for the summary and sublimation of the previous stage of course knowledge and skills.

5.4 Organic Integration of the Whole Course

Standing for the whole course, firstly, a complex ideological and political topic is divided into several parts, and then each topic is integrated into different chapters of the course, finally, the integrity of ideological and political topic is realized. This is a systematic method of integrating "ideological and political elements", which is the comprehensive application of the previous methods.

6. The Implementation Effect of Case Teaching

In addition to learning the theoretical knowledge of professional courses, the ideological and political cases are combined with the course content through case teaching to guide students to establish and practice socialist core values and realize the guidance of students' ideological value. By 2021, the "Road Survey and Design" course has completed its third round of on-campus teaching practice. In order to grasp the practical effect of the course ideological and political teaching reform in a timely manner, students of civil engineering major of grade 2019 (small class, 45 students/class) were selected and the questionnaire survey function of blue Moyun Class wisdom teaching tool was used to conduct the questionnaire survey at the beginning and end of the semester. The content of the questionnaire mainly involves five aspects: the essential meaning of curriculum ideology and politics, influencing factors, main objectives, teaching mode and teaching content. The survey results show that after a semester of curriculum ideological and political teaching reform and practice, students’ acceptance and identity of curriculum ideological and political teaching has increased significantly, that is, most students’ attitude towards curriculum
ideological and political teaching reform has changed from indifference to support. 95.5% of the students think that case teaching and discussion teaching had a positive influence on improving the ideological and political teaching effect. 88.8% of the students think that ideological and political teaching not only improves the driving force of learning specialized courses, but also expands extracurricular knowledge. On the whole, students have a high degree of satisfaction with the implicit education function of specialized courses, a strong sense of learning, and a higher rate of classroom attendance. Students can actively participate in classroom teaching and answer teachers’ questions carefully. Students’ independent learning ability is enhanced and the classroom atmosphere is active. Students give full affirmation to the teaching methods of the course.

References


