

Construction Achievements and Experience Summary of the FIDIC Conditions and Contract Management Course

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Abstract:

FIDIC Conditions and Contract Management is the core professional course of the national first-class major of engineering management at Changsha University of Science and Technology, and it is selected as the online and offline hybrid first-class undergraduate course of Hunan Province. The curriculum team carries out teaching reform and innovation from the aspects of teaching content, teaching methods and means, assessment reform, platform construction, resource construction, etc., creates a teaching organization form of “task-driven guidance before class, multi-interaction in class, and communication expansion and improvement after class,” and promotes the integration of production and teaching through three-dimensional application offline and online. Through the reform and innovation of curriculum construction, students’ learning interests and their innovation ability and practical skills have been significantly improved.

Keywords:

Curriculum construction
Reform and innovation
Achievements
Lessons learned

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1. Introduction

FIDIC Conditions and Contract Management is the core professional course of the national first-class major of engineering management at Changsha University of Science and Technology, which is closely combined with engineering practice and seamlessly integrated with the international project contracting market. This course systematically introduces FIDIC contract conditions, contract negotiation, contract conclusion, contract performance, contract dispute and dispute resolution,

project risk and insurance, project measurement payment, project subcontracting management, project change management, project claim management, and other knowledge in construction contract management ^[1]. Through the study of this course, students can broaden their international vision, cultivate their spirit of excellence, inspire their feelings and mission of serving the country through science and technology, and reserve knowledge and skills for better “going global.” The course was selected as the online and offline hybrid first-

class undergraduate course in Hunan Province in 2020 and has made certain achievements through construction in recent years.

2. Key problems to be solved in curriculum and teaching reform

2.1. The knowledge system required by international talents in contract management

With the acceleration of the pace of “going out” of Chinese enterprises’ foreign engineering contracting, the total amount of contracted business is also growing rapidly, and its share in the international engineering contracting market is increasing. Although the technology of Chinese construction enterprises has made rapid progress, the shortage of high-level international project contract management personnel has caused repeated setbacks in the international project contract market. This course reconstructs the teaching content and updates the knowledge system with the new FIDIC contract conditions, covers the key issues in the management of international engineering contracts, and solves the knowledge system problems required by international talents to a certain extent ^[2,3].

2.2. Organic integration of ideology, politics, and professional knowledge

Through the analysis of typical international engineering cases, the course organically integrates ideological and political education with professional learning, cultivates students’ excellent international vision and spirit of excellence as a national craftsman, and inspires students’ feelings and mission of serving the country through science and technology. It aims to establish students’ values of “core technology,” “scientific management,” and “great power tools” to promote the great rejuvenation of the Chinese nation and the realization of the Chinese dream, and the development concept of “world community with a shared future” ^[4].

2.3. Single evaluation method of the learning process

Through several years of continuous exploration and verification and the course assessment reform, a diversified evaluation method has been formed, and

a multi-dimensional, whole-process, and all-round assessment mechanism has been built, fully reflecting the characteristics of online and offline hybrid courses. Assessment item 1 (attendance and class performance 10%): Tracking students’ attendance and daily listening through teaching assistance platforms such as “Superstar Learning,” etc.; assigning topic discussion questions, encouraging students to actively express different views, and focusing on cultivating students’ ability to analyze and solve problems. Assessment item 2 (class test and homework 20%): Releasing classroom test questions for each chapter through “Superstar Learning” platform to check students’ grasp of the major and difficult knowledge, assigning chapter homework tasks, pushing reading materials, and guiding students to analyze problems and think deeply. Assessment item 3 (midterm exam 20%): Assessment of phased knowledge of major and difficult points, focusing on students’ ability to use theoretical knowledge to analyze problems and innovative consciousness, etc. Assessment item 4 (final exam 50%): Problem analysis is used to test students’ ability to use theoretical knowledge to analyze problems and innovative consciousness, etc.

2.4. Single learning platform and information resources

The original online platform is mainly a comprehensive school network teaching platform and “Superstar Learning” platform, the platform is relatively simple, and the resources are only limited to theoretical learning. The course team and a high-tech information enterprise in Changsha jointly built the “FIDIC Conditions and Contract Management Online Learning Platform of Changsha University of Science and Technology,” which includes two modules: theoretical learning and professional software practical training, including teaching videos, enterprise classes, excellent majors, learning resources, news hotspots, related topics and other columns, school-enterprise linkage, and resource sharing. Not only is it the home of online learning for students, but also provides a re-learning platform for the management personnel of enterprises and institutions in the field of civil engineering construction.

3. Effectiveness of course content and resource construction

3.1. Effectiveness of course content construction

3.1.1. Reconstructing the teaching content and updating the knowledge system with the new FIDIC contract conditions

FIDIC contract documents are internationally common contract documents that have been widely recognized and adopted by relevant organizations of the United Nations, international financial organizations such as the World Bank and the Asian Development Bank, etc., as well as many countries. FIDIC Civil Engineering Construction Contract Conditions (Red Book) have been revised again after nearly 20 years since 1999. In order to further meet the demand for international engineering contract management talents under the “Belt and Road” Initiative, the course team closely combined the original Red Book framework system to design the course content and establish an “international engineering” contract management knowledge system. On the premise of ensuring that the content is not distorted, we get rid of the dull confusion of contract terms and make them vivid and popular. According to the knowledge goal, skill goal, and quality goal, we gradually improve our logical thinking to make the course content clearer.

3.1.2. Enriching the teaching content and expanding the international vision with typical international engineering cases

In order to better integrate with the international engineering contracting market, and be more conducive to the understanding and application of contract terms, the course team has extensively collected typical international engineering cases in recent years, and sorted out and processed them to serve the course teaching. So far, a total of 12 typical cases suitable for course teaching have been collected, covering all important knowledge points in this course system^[5].

3.1.3. Designing a “hybrid” teaching organization by means of information technology and promoting the effective combination of online and offline

According to the specific teaching content of each lesson, information means are used selectively, from online to

offline and then to online. The whole teaching design adheres to the concept of “student-centered and teacher-led,” and synchronously carries out online and offline, helping students to actively participate in learning and improve their learning enthusiasm and knowledge understanding, so as to achieve the expected teaching goals^[6,7].

3.1.4. Carrying out practical training with engineering information platform to ensure that theory is connected with practice

The “Engineering Measurement Payment Management Cloud Platform” is introduced in the course teaching, and each student is assigned an account and password, so that students can enter the platform at any time to carry out practical operations of engineering measurement payment, engineering change management, and other modules, which can well cultivate students’ hands-on ability and achieve an organic combination of theory and practice.

3.2. Effectiveness of curriculum resource construction

3.2.1. Online platform construction

In addition to making full use of the school’s integrated platform for online teaching and Xueyin Online (“Superstar Learning” platform) as online teaching platforms, this course has also jointly developed an online learning platform with high-tech enterprises, including two modules: theoretical learning and information practical operation. It is not only an online learning home for students in school. It also provides a re-learning platform for the management personnel of enterprises and institutions in the field of civil engineering construction. The platform specifically includes teaching videos, enterprise classes, excellent majors, learning resources, news hotspots, and related topics and other columns, school-enterprise linkage, resource sharing, and integration of engineering project management electronic sand table, engineering bidding electronic sand table, and other practical training platforms to achieve multi-platform linkage.

3.2.2. Online resource construction

Based on the university’s network teaching platform, “Superstar Learning” platform and the university-

enterprise linkage, “FIDIC Conditions and Contract Management Online Learning Platform of Changsha University of Science and Technology,” there are 85 online teaching videos (including 20 course teams and 65 corporate classes, with a total duration of 2,800 minutes), about 200 non-video resources, about 400 test questions, about 100 latest industry trends and contract management frontier, about 100 engineering subcontracting, engineering risks, engineering changes, engineering claims, about 1,000 contract texts, flow charts, organizational structure charts, technical schemata, etc. There are about 100 news reports, policy interpretation, expert commentary, about 50 risk management, schedule management, change management, BIM application virtual simulation projects.

4. Effectiveness of curriculum implementation and assessment reform

4.1. Improvement of teaching methods

4.1.1. Engineering case teaching method

Teachers combine knowledge points with engineering cases, create scenarios, raise questions, arouse students' thinking, guide heuristic thinking, stimulate learning interest, and integrate thoughts and politics into professional. They take typical cases of international engineering risk management: international EPC project “step by step,” risk management “escort” teaching as examples, and design case analysis ideas.

4.1.2. Guided reading teaching method

Adhering to the concept of “student-centered, teacher-lead,” the guided teaching method has been formed, in which teachers grasp the guiding points, refocus on guiding doubts, guiding thoughts, guiding creativity, giving play to the leading role of teachers and the body role of students, making the class into a bilateral activity between teachers and students, two-way information transmission, teachers' “guiding road” and students' “learning road” can form an optimal combination with the teaching design “ideas”^[8].

The whole teaching design is carried out asynchronously online and offline. Pre-class preview materials and MOOCs resources are released on the online teaching platform, learning tasks and pre-

class quizzes are released on the “Superstar Learning” platform, and students will provide feedback on their learning difficulties to the teacher, helping students to actively participate in learning, improve their learning enthusiasm and knowledge understanding, so as to achieve the expected teaching goals^[9].

4.1.3. Project practical training teaching method

The project measurement payment management cloud platform can be used to experience role-playing. Students can play the roles of the construction unit, supervision unit, construction unit, as well as various units under the measurement of metrological engineer, supervisor, project manager, owner representative, etc., in the process of using the platform, so as to have a clearer understanding of the division of work and responsibilities of these roles in the real industry. Using specific engineering projects is task-driven. Measurement payment is the core content of cost management in contract management, the measurement payment management process can deepen the understanding of how to control the cost of engineering projects in the construction stage and the whole life cycle stage of the entire project, and get familiar with the information management in the current construction process of the industry through the use of project management cloud platform^[10].

4.2. Application of information teaching

Combined with the characteristics of the course and the concept of blended teaching, we use “Superstar Learning” platform and network teaching platform, etc., to conduct pre-class guidance reading. In class, we use flipped classroom, rain classroom, live connection, enterprise class, and multiple interactions of various platforms. After class, we use various communication tools to communicate and answer questions. At the same time, we make full use of the “FIDIC Conditions and Contract Management Online Learning Platform of Changsha University of Science and Technology” jointly built by the university and enterprise to share the resources of the university and enterprise.

4.3. Change of teaching organization form

Through the teaching practice in recent years, the teaching

organization of “task-driven guidance before class, multi-interaction in class, communication and expansion after class” has been formed, and the learning atmosphere of “need to think, know how to think, need to express, know how to express” has been gradually formed, and the class activity has been steadily improved.

4.4. Reform of assessment methods

Diversified evaluation methods are adopted to build a multi-dimensional, whole-process, and all-round assessment mechanism, fully reflecting the characteristics of online and offline hybrid courses. Taking the teaching of this course in 2024 as an example:

Assessment Item 1: Attendance and class performance (10%)

The “Superstar Learning” platform is used to track students’ attendance and daily attendance. This semester initiated 14 sign-up times, the sign-up rate is 100%. We arranged six thematic discussions, launched a rush answer and selected more than 40 times, encouraged students to actively express different views, and focused on cultivating students’ ability to analyze and solve problems.

Assessment Item 2: Classroom test and homework (20%)

The classroom test questions of each chapter are published nine times on the “Superstar Learning” platform to check the students’ grasp of the knowledge of the major and difficult points. We assign 10 homework tasks after class and publish learning materials on the network teaching platform, including courseware, pre-class preview materials, case analysis, video resources, etc., to guide students to consolidate and improve advanced knowledge; The group was divided into complementary groups, forming a task group of five people, making comprehensive comments on the assigned tasks, focusing on cultivating students’ teamwork ability.

Assessment Item 3: Mid-term exam (20%)

In the eighth week of the semester, the “Superstar Learning” platform is used to carry out online assessments of the phased major and difficult knowledge, focusing on the situation of students mastering basic knowledge, and all the questions are objective questions.

Assessment Item 4: Final exam (50%)

In the form of an offline subjective question paper,

students’ ability to use theoretical knowledge to analyze problems and innovation consciousness are tested.

5. Curriculum characteristics and innovation

5.1. School-enterprise cooperation and resource sharing to serve students and feedback society

5.1.1. School-enterprise cooperation to build an online open learning platform

The “FIDIC Conditions and Contract Management Online Learning Platform of Changsha University of Science and Technology” jointly built by the university and enterprise includes two modules: theoretical learning and professional software practical training, including teaching videos, enterprise classes, excellent majors, learning resources, news hotspots, related topics and other columns, school-enterprise linkage, and resource sharing.

5.1.2. Wide range of service targets and large number of beneficiaries

This platform is not only the online learning home of students but also provides a re-learning platform for the management personnel of enterprises and institutions in the field of civil engineering construction. Therefore, the service object is very wide and the number of online learners is large; taking an online special lecture on “Industry Latest Policy and Wind Vane Interpretation” by course leader Mingshun Li as an example, the number of online learners is more than 2,000 people.

5.2. Informatization resources are abundant, and policy and regulation news reports are selectively included in the lessons.

There are more than 100 cases including engineering risks, engineering changes, engineering claims, etc. There are more than 1000 visual images and charts including contract text, flow charts, and other aspects. There are more than 100 audio-visual videos including various news reports, policy interpretations, expert explanations, and other aspects. There are more than 50 virtual simulation projects including engineering progress simulation and other aspects. At the same time, the online learning platform updates the hot news in the professional field in real time, making the informatization resources of this course very abundant.

5.3. Multi-platform linkage, offline and online three-dimensional application to promote the integration of production and education

We make full use of various platforms for linkage teaching, combined with a variety of professional software applications, so that students can carry out personalized learning online and offline at any time. There are 14 practice teaching bases jointly established with outstanding enterprises in the industry, and the course teaching is compatible with enterprise projects. Students can experience the process and method of contract management in the industry on the spot, and complete the learning process of guiding practice by theory and verifying theory by practice.

5.4. Integration of ideology and politics into professional learning, unification of learning and thinking with knowledge and action

Combined with the content and characteristics of the course, we make full use of the analysis of typical international engineering cases and cultivate the spirit of great craftsmanship in students' pursuit of excellence; establish students' feelings of serving the country through science and technology, as well as a scientific outlook on development. Through the discussion on the development of the international project contracting market under the new situation and the transformation and development strategy of China's project contracting enterprises under the "Belt and Road" development mode, the students can fully understand the great wisdom of China's "Belt

and Road" initiative, and establish the values of "core technology," "scientific management," and "major country weight" to promote the great rejuvenation of the Chinese nation and the realization of the Chinese dream, as well as the development concept of "a community of shared future for the world."

6. Conclusion

"FIDIC Conditions and Contract Management" is an online and offline hybrid construction course. Since its self-establishment, the course has carried out teaching reform and innovation from the aspects of teaching content, teaching methods and means, assessment reform, platform construction, resource construction, etc. In view of the learning pain points, contract management knowledge has been linked with international practices, engineering cases, and professional discipline competitions. We create a teaching organization form of "task-driven guidance before class, multi-interaction in class, and communication expansion and improvement after class," promote school-enterprise cooperation to build an online open learning platform, carry out offline and online three-dimensional application to promote the integration of production and education, the integration of ideology and politics in professional learning, and unification of learning and thinking with knowledge and action. Through reform and innovation, students' interest in learning and their innovation ability and practical skills have been significantly improved.

Disclosure statement

The authors declare no conflict of interest.

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