ISSN: 2637-6067 DOI: 10.6918/IJOSSER.202603_9(3).0003

Discussion on Reform Measures for Online-Offline Teaching Mode of 'Water Conservancy and Hydropower Engineering Construction' Course from the Perspective of Industry Education Integration

Shuanglong Li [1, *], Yang Zhang [1], Jingtai Niu [1], Junhua Wang [2], Qiaoxiong Chen [3]

[1]College of Water Conservancy, Jiangxi University of Water Resources and Electric Power, Nanchang, 330099, China

[2]Jiangxi Water and Hydropower Construction Group Co., Lto, Nanchang 330200, China

[3]Teacher development and service center, Jiangxi University of Water Resources and Electric Power, Nanchang, 330099, China

[*] Corresponding author: lsl_7631@163.com

Abstract

In China's modern education system, industry-education integration has been elevated to a strategic educational arrangement supporting high-quality development. This paper conducts an in-depth analysis of existing issues in the online-offline teaching model for the course 'Water Conservancy and Hydropower Engineering Construction' from the perspective of industry-education integration. The corresponding solutions, such as establishing an industry-education integration course platform, implementing 'dual classroom' collaborative teaching, and conducting formative assessment across dimensions, including course platforms, course resources, teaching models, and assessment systems, were discussed. Taking students majoring in Water Resources and Hydropower Engineering as a case study, the implementation of these measures has yielded enhanced teaching outcomes. The research findings may provide valuable insights for reforming blended online-offline teaching models grounded in industry-education integration.

Keywords

Water Conservancy and Hydropower Engineering Construction; Industry-education integration; Online-offline teaching model; Reform measures.

1. Introduction

In 2019, the National Development and Reform Commission and five other ministries jointly issued the 'National Pilot Program for Industry-Education Integration' [1], emphasizing that deepening industry-education integration is a strategic measure to advance education as a priority, drive development through talent, foster industrial innovation, and achieve high-quality economic growth. Higher education reforms guided by industry-education integration establish long-term mechanisms for collaborative talent cultivation between universities and enterprises. This approach not only addresses structural talent shortages in industries but also accelerates the commercialization of university research outcomes. Ultimately, it achieves the organic integration and value synergy between the education chain, talent chain, industrial chain, and innovation chain.

The blended learning model is a systematic teaching paradigm that organically integrates the strengths of online digital learning with traditional classroom instruction [3]. By incorporating pre-class online preparation, in-class offline discussions, and post-class online reinforcement,

ISSN: 2637-6067 DOI: 10.6918/IJOSSER.202603_9(3).0003

it forms a dynamic teaching loop that enhances instructional outcomes, enables personalized student development, and optimizes resource efficiency. As an applied undergraduate institution, our university established an online course repository for the 'Water Conservancy and Hydropower Engineering Construction' course in 2021 and has progressively implemented blended learning across water resources-related majors.

2. Analysis of the Current Status of Blended Learning Models for the Course 'Water Conservancy and Hydropower Engineering Construction'

The course 'Water Conservancy and Hydropower Engineering Construction' serves as a core subject in water resources disciplines, characterized by its strong practical orientation, high interdisciplinary nature, and rapid knowledge updates. Certain complex construction techniques and organizational aspects involve not only materials science and mechanics but also closely relate to engineering management science. Consequently, traditional teaching models often result in superficial coverage of content, incomplete understanding of key concepts, and weak practical training capabilities. Although the gradual adoption of blended learning models has improved teaching effectiveness through closed-loop design spanning pre-class, in-class, and post-class activities [4, 5], current teaching practices reveal that the blended learning approach for 'Water Conservancy and Hydropower Engineering Construction' still faces the following challenges:

(1) Course resources are disconnected from industry practice, and micro-level university-industry collaboration remains inadequate. Current blended online-offline teaching prioritizes theoretical knowledge delivery online while lacking real-time integration of industrial technologies (such as the latest hydraulic construction techniques and equipment). This results in outdated online course materials that fail to keep pace with evolving industry technologies.

(2) The implementation of blended online-offline teaching designs suffers from coordination gaps. Current hybrid teaching models are predominantly led by school faculty, with industry professionals participating only sporadically as 'guest lecturers'. There is a lack of mechanisms for collaborative course design between academic and industry instructors, failing to systematically integrate real-world industry cases into the teaching process, and low engagement levels among industry mentors.

(3) Course assessment relies excessively on examinations and lacks evaluation of practical skills. Current evaluations primarily consist of offline written exams, online test scores, or video viewing duration, lacking quantitative assessments of the practical competencies valued by employers. This results in inadequate development of students' practical abilities.

3. Discussion on Reform Measures for Blended Learning Models

3.1. Establish an 'Industry-Education Integration' Course Platform to Expand Industry-Based Teaching Resources

Building upon the existing online course platform 'Xueyin Online', we will establish an industry-education integration course platform. This initiative will implement a mentorship system pairing industry mentors with university faculty to jointly manage the platform. The platform will integrate technical expertise and teaching resources from both enterprises and academic institutions, creating an interactive ecosystem for sharing industrial practical resources and academic intellectual resources. Enterprises will contribute cutting-edge construction technologies and project case studies for online instruction, while universities will open access to hydraulic engineering research resources and the latest research findings to support technological development, achieving mutual empowerment.

ISSN: 2637-6067 DOI: 10.6918/IJOSSER.202603_9(3).0003

3.2. Implementing a Dual-Teacher Collaborative Teaching Model With Online-Offline 'Dual Classrooms'

Through the aforementioned 'industry-education integration' course platform, a system of paired groups comprising teaching faculty and industry mentors has been established. These teams collaboratively design blended learning approaches combining online-offline 'dual classroom' instruction, enabling industry mentors to deeply engage in the entire process of course delivery across both formats. Specific implementation measures include: (1) Industry mentors participate in defining course learning objectives and instructional content; (2) Industry mentors contribute to the online teaching process to optimize pedagogical approaches.

3.3. Implement Formative Assessment to Optimize The Course Evaluation System

Current courses primarily rely on offline paper-based exams (e.g., 70% exam score, 30% coursework), online test scores, or video viewing duration. They lack quantitative assessments of practical competencies valued by employers, resulting in insufficient development of students' practical skills. Therefore, task-driven approaches using real-world engineering construction cases can be employed to evaluate students' abilities in online virtual simulation training and offline engineering case analysis. These should be incorporated into the evaluation system as dynamic indicators for process assessment.

4. Implementation Effect

Over the past two years, Jiangxi University of Water Resources and Electric Power has leveraged national industry-education integration initiatives to reform the blended online-offline teaching model for its Hydraulic and Hydroelectric Engineering course, achieving notable educational outcomes. Key implementation results are summarized as follows:

(1) Established a dynamic course resource update mechanism to enhance teaching content relevance. Collaborating with water conservancy enterprises to regularly update course materials, integrating industry resources such as the latest construction technologies, equipment, and typical project cases into both online-offline teaching content. This ensures the curriculum remains cutting-edge, aligning students' acquired skills directly with industry demands and boosting their career development capabilities.

(2) Industry mentors deeply engaged in instructional design, breaking down barriers to dual-instructor collaboration. An online industry-academia teaching platform was established, enabling industry mentors to deeply participate in the entire online-offline course operation process. A 'industry mentor + school instructor' pairing system was implemented to jointly complete blended 'dual-classroom' instructional design. This formed a virtuous cycle of 'resource co-creation, process co-management, and outcome sharing', transforming industry experience into teaching resources.

(3) Course assessments incorporate process-based evaluations to strengthen practical skills development. A process-based assessment system has been established. Driven by real-world construction case studies, it evaluates students' abilities in online virtual simulation training and offline engineering case analysis. These evaluations serve as dynamic indicators for process assessment, with timely feedback provided to students. This approach reinforces practical skills development and effectively addresses the challenge of producing graduates with high scores but low practical competence.

ISSN: 2637-6067 DOI: 10.6918/IJOSSER.202603_9(3).0003

5. Conclusion

Addressing the current issues in the blended learning model of the 'Water Conservancy and Hydropower Engineering Construction' course, this study discussed reform measures from the perspectives of course platforms, course resources, teaching methods, and assessment evaluation. These measures were implemented in practice, and the results indicate that the proposed measures can enhance teaching effectiveness to a certain extent.

Acknowledgments

This work was financially supported by the Jiangxi Provincial Education and Teaching Research Reform Project 'Reform and Practice of Online-Offline Blended Teaching Mode for the Course "Water Conservancy and Hydropower Engineering Construction" from the Perspective of Industry-Education Integration + AI Empowerment' (No. BKJG-2026-18-36), and the Water Conservancy Higher Education Teaching Reform Project (No. 2025SLGJ14).

References

[1] Long Yuannan, Hu Qinglin. Exploration and Practice of a Multi-dimensional Collaborative Training Model for Professional Degree Postgraduates Based on Industry-Education Platforms: Taking Water Resources Engineering as an Example. Journal of Higher Education, 2025, 11 (11): 154-159.

[2] Zhang Wei, Xu Yanwen, Tong Chaofeng. Research on the Teaching Reform of Hydraulic Engineering Courses Based on School-Enterprise Integration-Taking That of Coasta Engineering Course as an Example. University Education, 2024, (01): 33-36.

[3] Yang Zhaodi, Pei Lei, Zhang Guiling, et al. Construction of a Dynamic Multidimensional Blended Learning Evaluation System Integrating Online and Offline Instruction. Journal of Higher Education, 2023, 9(25): 87-90.

[4] Li Shuanglong, Chen Qiaoxiong. Individualized talent training mode of hydraulic and hydropower engineering major based on multi-source information fusion analysis [J]. International Journal of Social Science and Education Research, 2025, 8 (6): 242-245.

[5] Deng Zhiping, Pan Min, Niu Jingtai. Exploring a Blended Teaching Model for Hydraulic Engineering Construction Based on the OBE Approach. Science & Technology Vision, 2021, (14): 11-13.