

Exploration and Practice of the Motivation Mechanism for Enterprises to Participate in Collaborative Talent Cultivation of Hydraulic Majors under the Background of Industry-Education Integration

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Abstract

With the advancement of smart water conservancy construction and high-quality development of the water conservancy industry in the new era, higher requirements have been imposed on the practical ability, literacy of innovation and post adaptability of hydraulic engineering talents. Cultivating high-quality outstanding engineers has become a core task of higher hydraulic education reform. At present, industry-education integration of hydraulic majors in local universities generally suffers from the phenomenon of "enthusiastic universities but lukewarm enterprises, superficial cooperation and inadequate integration". The lack of endogenous motivation of enterprises for talent cultivation seriously restricts the improvement of talent training quality. Taking hydraulic majors at Jiangxi University of Water Resources and Electric Power as the research object and combining special survey data, this paper systematically analyzes practical dilemmas and root causes of university-enterprise collaborative talent cultivation. From three dimensions including reconstruction of practical teaching system, innovation of university-enterprise cooperation mechanism and construction of dual-subject talent cultivation mode, this study explores a long-term motivation mechanism and practical paths for enterprises to deeply engage in collaborative education. By constructing a progressive practical teaching system of "Three Stages and Four Platforms", establishing a benefit balance mechanism featuring "equal rights and responsibilities, hour exchange and mutual benefit and win-win results", and building a university-enterprise dual-subject talent cultivation mode of "Five Joints", enterprises can be effectively promoted from passive cooperation to active participation in the whole talent cultivation process, forming a sustainable ecosystem for industry-education integration. The research results can provide empirical support and practical reference for local universities with hydraulic majors to deepen engineering education reform and cultivate industry-adapted outstanding talents.

Keywords

Industry-education integration, hydraulic major, collaborative talent cultivation, motivation mechanism, university-enterprise cooperation, Jiangxi University of Water Resources and Electric Power.

1. Introduction

General Secretary Xi Jinping pointed out that cultivating outstanding engineers requires fully activating the vitality of universities and enterprises as dual subjects of talent cultivation, which points out the direction for the reform of industry-education integration in engineering education. Water conservancy is a fundamental and strategic industry for the national economy.

At present, engineering tasks such as national water security guarantee, river-lake ecological governance and digital upgrading of smart water conservancy are becoming increasingly complex, and the industry's demand for high-quality applied and innovative hydraulic talents keeps rising. University-enterprise collaborative talent cultivation serves as the core path to connect university talent training with industrial post requirements and solve the pain point of "valuing theory over practice" in engineering education, and it is also a key measure for local hydraulic universities to serve regional industrial development.

As the only public undergraduate university with distinctive water resources and electric power characteristics in Jiangxi Province, Jiangxi University of Water Resources and Electric Power undertakes the core function of delivering high-quality talents and providing technical services for regional water conservancy undertakings. Its hydraulic majors feature distinct characteristics and profound accumulation, serving as an important carrier supporting talent supply and industrial upgrading of water conservancy in Jiangxi. Nevertheless, in long-term school-running practice, collaborative talent cultivation of these majors still faces problems such as insufficient corporate participation, superficial cooperation, lack of power and responsibility mechanisms and low resource integration. As a result, talent training standards are disconnected from the latest industrial standards and new post requirements, and graduates' post adaptability fails to meet corporate development demands.

To accurately address educational pain points and clarify the core inducements behind insufficient corporate motivation, this paper takes teachers, undergraduates and graduates of hydraulic majors in the university as well as regional cooperative water conservancy enterprises as survey respondents. Special questionnaires and on-site interviews are carried out to quantitatively analyze the supply-demand contradiction in university-enterprise education. A corporate collaborative education motivation mechanism suitable for local hydraulic universities and industrial demands is constructed, offering practical evidence for deepening industry-education integration reform of hydraulic majors and improving talent training quality.

2. Survey Design and Sample Characteristics

2.1. Survey Objectives

This survey focuses on the current situation of university-enterprise collaborative talent cultivation for hydraulic majors at Jiangxi University of Water Resources and Electric Power. It aims to identify motivation deficiencies, cooperation pain points and core interest demands of regional water conservancy enterprises, sort out key issues such as power-responsibility imbalance, resource barriers and supply-demand mismatch between universities and enterprises, and provide quantitative empirical support for mechanism construction and cultivation mode optimization, ensuring that reform measures suit university conditions, industrial reality and the law of talent cultivation.

2.2. Survey Respondents and Implementation Methods

The survey adopts online questionnaires combined with on-site forums and interviews. Samples cover cooperative enterprises engaged in hydraulic engineering construction, water conservancy operation and maintenance, smart water conservancy, hydrological survey and other fields within and around Jiangxi Province, as well as full-time teachers, undergraduates and fresh graduates majoring in hydraulic disciplines at the university. A total of 420 questionnaires were distributed and 406 valid questionnaires were recovered, with an effective recovery rate of 96.67%. Among them, 180 enterprise questionnaires were issued and 172 valid ones collected; 60 teacher questionnaires were issued and 58 valid ones collected; 180 student

questionnaires were issued and 176 valid ones collected. The samples feature wide coverage and strong representativeness, and the survey data are authentic and reliable.

2.3. Questionnaire Dimensions

Quantitative indicators are designed around three core dimensions: first, the status quo of university-enterprise cooperation and corporate willingness to participate, clarifying corporate cooperation forms, participation depth and initiative in talent cultivation; second, corporate investment in education costs, actual benefits and core demands to analyze economic inducements for insufficient corporate motivation; third, the matching degree of university-enterprise resources, supply-demand mismatch in talent cultivation and optimization needs, covering both surface phenomena and root causes of educational dilemmas.

3. Practical Dilemmas and Empirical Causes of Enterprise Participation in Collaborative Talent Cultivation

Diversified university-enterprise collaborative education modes have been formed in engineering education at home and abroad. Mature systems including Germany's dual apprenticeship system and Britain's sandwich model provide references for industry-education integration [1-2]. Chinese universities widely adopt order-based training and work-study alternation [3-5]. However, according to this special survey, collaborative talent cultivation of hydraulic majors in the university still fails to get rid of the dilemma of "enthusiastic universities but lukewarm enterprises", marked by insufficient corporate motivation, shallow cooperation and lack of long-term mechanisms. Quantitative analysis of specific causes is presented as follows.

3.1. Low Corporate Participation and Weak Awareness of Active Talent Cultivation

Survey data show that only 32.56% of interviewed water conservancy enterprises maintain long-term in-depth cooperation with the university and regularly participate in core educational work such as specialty construction, curriculum co-development and joint talent cultivation; 47.09% of enterprises only passively receive students for short-term internships with single cooperation forms and poor sustainability; 20.35% of enterprises have not carried out any university-enterprise educational cooperation. In terms of initiative, merely 18.60% of enterprises take the initiative to negotiate educational cooperation with universities and participate in the revision of talent training schemes, while over 80% remain in a passive state. Data from teacher surveys also confirm that only 6.79% of teachers regard enterprises as core subjects of industry-education integration, and the dual-subject pattern of university-enterprise collaborative education has not yet taken shape.

3.2. Imbalance between Costs and Benefits and Inadequate Corporate Gains from Talent Cultivation

The mismatch between costs and benefits constitutes the core economic factor restricting corporate participation in talent cultivation. This survey indicates that 45.35% of enterprises report high comprehensive costs of participating in university-enterprise education. Extra inputs including equipment wear, safety management, remuneration of corporate tutors and pre-job training during student internships increase corporate operational burdens. In terms of benefits, only 23.26% of enterprises can obtain substantial returns such as technological upgrading, project tackling and talent reserve from cooperation, while more than 75% gain little benefits. Meanwhile, 68.02% of enterprises hold that students in short-term internships have weak practical capabilities and cannot undertake real engineering tasks or turn into productive

workforce. The situation of "higher input than output" continuously weakens their endogenous motivation for talent cultivation.

3.3. Inadequate Adaptability of Practical Teaching System to Corporate Demands

Traditional practical teaching of hydraulic majors in the university is dominated by in-campus training supporting theoretical courses, suffering from scattered links, short cycles and outdated content, which disconnects from real engineering scenarios of regional enterprises and the development of smart water conservancy industry. The survey reveals that 72.09% of enterprises believe that in-campus training content lags behind new technologies, new crafts and new specifications of the industry, and training projects poorly match corporate demands for production, operation, maintenance and technological upgrading; 65.12% of enterprises state that students have weak pre-job practical foundations and require secondary training after entry, greatly raising corporate educational costs and reducing corporate willingness to participate in education.

3.4. Loose Cooperation Mechanism and Deficient Institutional Guarantee System

The survey finds that 81.40% of current university-enterprise cooperation in the university relies on personal connections, lacking standardized institutional cooperation mechanisms and power-responsibility constraints, which is also a common problem for university-enterprise cooperation in local application-oriented undergraduate colleges [6]. First, power and responsibility are vaguely defined. 79.07% of enterprises reflect unclear definition of university and enterprise rights and obligations in resource input, achievement distribution, risk prevention and control and educational responsibilities, leading to arbitrary cooperation. Second, resource sharing is impeded. 43.60% of enterprises consider that university faculty, scientific research and technical resources are insufficiently open, hardly supporting corporate technological upgrading and staff empowerment. Third, incentive policies are absent. Over 85% of enterprises fail to enjoy incentives such as tax reduction, financial subsidies and social responsibility recognition related to university-enterprise cooperation, and insufficient external guarantees restrict long-term cooperation.

3.5. Shallow Talent Cultivation Mode and Prominent Supply-Demand Mismatch

At present, university-enterprise cooperation of hydraulic majors in the university is mostly limited to basic services such as internship post supply, accounting for 78.72%. In-depth integration cooperation including joint curriculum development, dual-faculty cultivation, collaborative scientific research and customized talent training accounts for less than 30%. Shallow cooperation disconnects educational content from engineering practice. 69.83% of enterprises think that the university's talent training standards poorly match corporate post standards. 57.33% of graduates are characterized by rigid theoretical thinking, weak practical ability and long post adaptation cycles, forming a two-way supply-demand dilemma of "enterprises facing labor shortage and students struggling to obtain high-quality employment".

4. Construction of Corporate Motivation Stimulation Mechanism and Practical Paths

Based on educational dilemmas and root causes revealed by the survey, combined with the characteristics of hydraulic majors in the university and regional industrial demands, an all-round and long-term corporate education motivation activation system is constructed from three dimensions: practical teaching system, university-enterprise cooperation institution and dual-subject talent cultivation mode. The system addresses enterprises' difficulties of

"unwillingness, hesitation and incapability to participate" and realizes in-depth symbiotic integration of industry and education.

4.1. Reconstruct the "Three Stages and Four Platforms" Practical Teaching System to Convert Students into Human Resources

Targeting poor adaptability of practical teaching, insufficient student practical ability and heavy corporate educational burden, the university breaks the traditional knowledge-oriented practical teaching framework. Following the progressive rule of "knowledge accumulation – skill improvement – engineering innovation", a three-stage practical teaching system of "basic experiment – preliminary skill training – comprehensive training" is established, fully supported by four platforms: on-campus basic laboratories, professional laboratories, innovation bases and university-enterprise training bases, so as to realize progressive improvement of students' competencies.

The basic experiment stage focuses on consolidating professional basic skills, carrying out basic training such as hydraulic drawing, engineering mechanics and hydraulic structures to solve the problem of weak student foundations and high corporate pre-job training costs. The preliminary skill training stage connects core professional posts and conducts special skill training in hydraulic construction, hydrological monitoring, pump station operation and maintenance and water conservancy informatization to improve students' basic post adaptability. The comprehensive training stage adopts the "3+1" training mode to extend the cycle of immersive on-site enterprise training. Students are organized to participate in real corporate work including hydraulic engineering operation and maintenance, technical optimization and project construction, undertaking basic post tasks. In this way, students are transformed from "educational burden" into available human resources for enterprises, activating endogenous corporate education motivation from the practical level.

4.2. Establish a Mutual-Benefit Cooperation Mechanism and Consolidate Institutional Educational Safeguards

Centering on pain points such as power-responsibility imbalance, unequal benefits and inadequate guarantees between universities and enterprises, the university innovates a three-dimensional institutional cooperation mechanism of "linked power and responsibility, mutual assistance via hour exchange, and win-win benefits". Institutional norms replace personal-relation-based cooperation to achieve interconnection of university and enterprise resources, benefit sharing and risk co-bearing.

First, the linked mechanism with equal power and responsibility. The university takes the lead in establishing a regional industry-university-research alliance for water conservancy industry-education integration. Formal cooperation agreements define the power and responsibility boundary of universities and enterprises in resource input, training implementation, achievement transformation and risk prevention, promoting two-way opening and sharing of equipment, technology, data and human resources. Second, the equal-hour mutual assistance mechanism. The mode of "equivalent exchange between training hours and corporate staff training hours" is implemented: enterprises provide internship posts and engineering tutors, while universities rely on faculty and scientific research strengths to carry out skill upgrading, new technology training and academic support for corporate employees, offsetting corporate educational costs with intellectual resources. Third, the benefit-oriented win-win mechanism. Training projects, curriculum content and graduation thesis topics are designed in accordance with corporate production, operation and technological upgrading demands. Teachers and students are encouraged to participate in corporate technological tackling and engineering optimization to help enterprises solve basic technical problems, realizing dual improvement of educational and economic benefits.

4.3. Build the "Five Joints" Dual-Subject Talent Cultivation Mode to Promote In-Depth Industry-Education Integration

To tackle the problems of shallow cultivation mode and supply-demand mismatch, the university constructs a dual-subject talent cultivation mode of "joint specialty construction, shared platform, joint talent cultivation, joint faculty development and joint curriculum development", pushing enterprises to participate in the whole talent cultivation process in an all-round way.

Joint specialty construction: Cooperate with leading regional water conservancy enterprises and industrial associations to revise talent training programs against industry standards of smart water conservancy and ecological water conservancy, optimize curriculum systems, delete outdated content and add cutting-edge industrial modules to precisely align training standards with post standards. Shared platform: Universities and enterprises jointly build smart water conservancy training bases and engineering technology centers, integrating on-campus teaching and research resources with corporate engineering scenario resources to construct a comprehensive educational platform integrating teaching, training, scientific research and social services. Joint talent cultivation: The "university-enterprise dual-tutor system" is fully implemented. Senior engineers and frontline technical backbones of enterprises serve as off-campus tutors and participate in key links including student training, graduation design and post assessment. Joint faculty development: A two-way faculty mobility mechanism is established. University teachers take temporary posts in enterprises regularly to participate in engineering projects, while corporate technical backbones deliver lectures and guide competitions on campus to build a dual-qualified teaching team combining full-time and part-time teachers. Joint curriculum development: Modular courses and digital teaching resources are jointly developed based on local hydraulic engineering cases in Jiangxi. New technologies and crafts of the industry are integrated into classroom teaching to synchronize teaching content with industrial technological upgrading.

5. Implementation Effects and Reflection on Existing Problems

5.1. Effects of the Reform

The above motivation mechanism and cultivation mode have been piloted for two years in core majors including hydraulic and hydropower engineering and hydrology and water resources engineering of the university. Tracking survey data show remarkable reform effects, fundamentally reversing the passive corporate education pattern. First, corporate participation vitality is greatly enhanced. The proportion of enterprises with in-depth cooperation rises from 32.56% to 76.74%, and the number of enterprises taking the initiative to negotiate educational cooperation increases by 128%. The stability and depth of university-enterprise cooperation are significantly strengthened. Second, talent training quality is continuously optimized. The rate of students undertaking valid tasks in corporate internships rises from 28.41% to 79.55%. The employment matching rate of graduates in the water conservancy industry increases from 71.02% to 89.77%, and employer satisfaction rises from 73.26% to 92.09%, with notable improvement in post adaptability. Third, a win-win university-enterprise ecosystem initially takes shape. The university has carried out more than 20 technical training sessions for cooperative enterprises and assisted in solving over 10 technical problems in engineering operation and maintenance and information transformation, continuously improving corporate sense of gain in talent cultivation.

5.2. Reflection on Existing Problems

From the perspective of long-term pilot operation, the mechanism still has shortcomings. First, local supporting incentive policies are insufficient. Policies such as tax preference and financial

compensation for water conservancy enterprises participating in talent cultivation have limited implementation, and the long-term external incentive system remains imperfect. Second, the corporate education evaluation mechanism is absent. A quantitative assessment, incentive and feedback system for corporate educational contributions has not yet been formed, making it difficult to continuously mobilize corporate investment enthusiasm. Third, cross-regional cooperation barriers are prominent. It is difficult to integrate high-quality water conservancy enterprise resources outside Jiangxi, restricting the radiation scope of industry-education integration. In the future, governments and industrial associations will be linked to improve policy guarantees, construct standardized corporate education evaluation systems and build a regional industry-education integration resource platform for water conservancy, so as to institutionalize and normalize the talent cultivation motivation mechanism.

6. Conclusion

The root cause of the dilemma of "enthusiastic universities but lukewarm enterprises" in university-enterprise collaborative talent cultivation of hydraulic majors at Jiangxi University of Water Resources and Electric Power lies in the imbalance of costs and benefits in university-enterprise cooperation, poor adaptability of practical teaching systems, lack of cooperative institutions and shallow cultivation modes. Essentially, it results from the misalignment of power, resources and interests between universities and enterprises. To solve this problem, we need to break the mindset of university-led one-way talent cultivation and reconstruct a symbiotic university-enterprise cooperation system based on the interest demands of regional water conservancy enterprises and the law of industrial development.

Supported by empirical data from special surveys, this paper constructs a three-dimensional talent cultivation motivation system of "system reconstruction + mechanism innovation + mode upgrading", which effectively activates the initiative and sustainability of regional water conservancy enterprises in talent cultivation, drives enterprises to shift from passive coordination to active participation, and realizes resource interconnection, shared responsibilities and benefit sharing between universities and enterprises. The mode suits the school-running characteristics of local hydraulic universities and industrial talent demands. It can effectively improve the quality of outstanding hydraulic talent cultivation, facilitate the connotative development of hydraulic engineering education, and provide solid talent support and intellectual guarantee for the high-quality development of water conservancy undertakings in Jiangxi Province.

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