

Research on Practical Pathways for Cultivating the Spirit of Craftsmanship among Vocational College Students under the Framework of Industry-Education Integration

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Abstract: Driven by the continuous deepening of the integration of production and education and the transformation and upgrading of the manufacturing industry, cultivating the craftsman spirit of higher vocational students has become a key measure to improve the quality of technical and skilled personnel training. Based on the background of integration of industry and education, taking Changchun Technical University of Automobile as a case, this study comprehensively and systematically analyzed the core adjustment faced by the cultivation of craftsman spirit of higher vocational students, systematically explained the internal logic of the cultivation of craftsman spirit with integration of industry and education, and proposed a four-dimensional collaborative practice path of curriculum collaboration, field collaboration, teacher collaboration and evaluation collaboration. The four dimensions support each other and work together to form a systematic scheme to solve the practical dilemma, which effectively solves the practical dilemma of the cultivation of craftsman spirit in higher vocational colleges. This study provides a systematic practical framework for deepening the cultivation of craftsman spirit in higher vocational colleges under the background of the integration of industry and education, and has theoretical value and practical significance for promoting the high-quality development of vocational education.

Keywords: Industry-education integration; Spirit of craftsmanship; Vocational college students

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1. Introduction

1.1. Research background

China's economy is transitioning from high-speed to high-quality development^[1]. The intelligent, digital, and green transformation of manufacturing has imposed higher demands on technical personnel competencies. As a spiritual pillar for building a manufacturing powerhouse, the craftsmanship spirit must be cultivated within

authentic production scenarios. The 20th National Congress report emphasizes cultivating “more high-quality technical personnel, capable artisans, and master craftsmen.” The *Opinions on Deepening the Reform of the Modern Vocational Education System* stipulate that vocational education must adhere to industry-education integration and foster students’ professional competencies and craftsmanship spirit in real production environments ^[2].

1.2. Research questions

Previous research indicates that although vocational colleges have explored craftsmanship cultivation, salient challenges persist: (1) disconnection between knowledge and action: education remains confined to knowledge transmission, lacking immersive experience and behavioral internalization; (2) misalignment between supply and demand: cultivation content does not align with industry standards, and graduates’ competencies fall short of expectations; (3) insufficient enterprise engagement: enterprises demonstrate limited participation depth, and a substantive collaborative mechanism is lacking; (4) absence of systematic evaluation: cultivation lacks structured instruments and dynamic tracking mechanisms. In response, this study focuses on “practical pathways for cultivating the craftsmanship spirit among vocational students under industry-education integration,” selecting Changchun Technical University of Automobile as a representative case ^[3].

2. Four-dimensional collaborative practical pathway

Craftsmanship cultivation is a systemic endeavor involving curriculum, practical settings, faculty, and evaluation. These four dimensions address “what to teach,” “where to cultivate,” “who cultivates,” and “how to evaluate,” jointly constituting a systematic practical framework ^[4].

2.1. Course collaboration: Establishing an integrated curriculum system of “specialization + ideological education + culture”

The curriculum is the fundamental carrier. Professional courses serve as the primary platform, ideological and political (IP) courses as the value guide, and cultural courses as the medium for immersion.

Professional courses: The craftsmanship spirit should be embedded throughout knowledge delivery, skills training, and project implementation. During knowledge delivery, industry leaders’ growth narratives stimulate professional identity. During skills training, authentic production standards develop quality awareness and procedural discipline. During project implementation, challenging tasks cultivate perseverance and innovative thinking. The core logic is guiding students to internalize craftsmanship qualities through “learning by doing” ^[5].

IP courses: IP courses anchor values and provide ideological orientation. Master craftsmen’s exemplary deeds, contemporary craftsmanship connotations, and vocational education’s mission should be integrated into teaching. A module on “Career Ideals and the Craftsmanship Spirit” may be incorporated into Ideological Morality and Rule of Law, while Current Affairs and Policies can address skilled talents’ significance in the manufacturing power strategy.

Cultural courses: Cultural courses exert subtle yet profound influence, serving as a conduit from cognitive “awareness” to affective “identification.” The case institution, located adjacent to China FAW Group, has developed distinctive courses such as The Development History of China’s Automotive

Industry and The Spirit of Red Flag Craftsmanship, guiding students to appreciate the cultural roots of the craftsmanship spirit ^[6].

2.2. Domain collaboration: Establishing a three-tier practical education ecological system of “virtual–physical–social”

The practical field is the critical intermediary transforming cognition into action. A progressive three-tier ecosystem—virtual simulation, physical workshops, and social practice—should be constructed ^[7].

Virtual simulation field: Leveraging VR/AR technologies, this field creates high-fidelity reproductions of production environments, offering low-cost, high-safety, repeatable experiential opportunities ^[8]. The Automotive Intelligent Manufacturing Virtual Simulation Center at the case institution simulates the entire workflow from component processing to vehicle assembly, allowing students to practice standard operations repeatedly and build procedural awareness.

Physical workshop field: The physical workshop is the core space and the critical juncture where virtual training translates into tangible capability. The case institution has jointly established a productive training base with FAW Hongqi Manufacturing Center. Under enterprise mentors’ guidance, students complete hands-on internships in authentic production environments, directly experiencing quality standards, delivery deadlines, and collaborative workflows—facilitating a qualitative leap from “simulated practice” to “authentic performance.”

Social practice field: Social practice extends craftsmanship cultivation beyond campus, helping students situate professional values within a broader framework. Programs encompassing Red Education base visits, community volunteer services, and industry field research guide students to integrate craftsmanship with social responsibility, elevating their spiritual outlook from “individual skill refinement” to “social value creation” ^[9].

2.3. Collaborative teaching staff: Establishing a “three-guidance staff integration” education team

Faculty are the primary agents of craftsmanship cultivation. A collaborative team comprising IP mentors, professional instructors, and enterprise master craftsmen should be established, combining value guidance, skills transmission, and spiritual role-modeling.

IP mentors: IP mentors assume value guidance and ideological formation functions, expounding the theoretical connotations and contemporary relevance of the craftsmanship spirit, guiding students to establish correct career perspectives, and organizing reflective activities to transform extrinsic cultural exposure into intrinsic value commitment.

Professional instructors: Through rigorous scholarly attitudes, meticulous teaching, and exemplary conduct, professional instructors embed craftsmanship elements into routine instruction. The case institution has articulated “three unifications”: unification of knowledge delivery and skills demonstration, of standardized requirements and individualized guidance, and of rigorous expectations and humanistic care.

Enterprise master craftsmen: Enterprise masters provide the most vivid and compelling education through their frontline experience and technical expertise. The case institution has established accessible master craftsman studios, inviting national-level masters for face-to-face exchanges. Through sharing their growth trajectories and technical challenges, they interpret the essence of craftsmanship—“dedication, precision, meticulousness, and the pursuit of excellence.”

2.4. Evaluation synergy: A three-dimensional “process + outcome + development” mechanism

Evaluation functions as both navigator and calibrator. A comprehensive mechanism encompassing process, outcome, and development should be established for full-process documentation, multi-faceted diagnosis, and continuous improvement.

Process-oriented evaluation: This dimension tracks students’ deepening understanding and behavioral transformation throughout the learning journey. Evaluation dimensions include: depth of intellectual engagement in classroom learning; operational standardization in virtual training; professional conduct in enterprise internships; and service awareness in social practice. The case institution has developed a Process Record Handbook for joint documentation by students, enterprise mentors, and school instructors ^[10].

Outcome-oriented evaluation: This dimension assesses mastery of core knowledge and professional competency attainment at the conclusion of a training phase. The case institution adopts a tripartite method combining theoretical examination, practical assessment, and competency presentation. Theoretical exams assess systematic understanding; practical assessments evaluate quality consciousness and innovative capacity; competency presentations examine value identification and career planning clarity.

Development-oriented evaluation: This dimension examines career development trajectories after graduation, assessing long-term effectiveness. The case institution has established a regular graduate tracking mechanism using questionnaires, telephone interviews, and employer visits to gather information on job adaptability, career advancement, and employer satisfaction. Results are fed back into program refinement, forming a closed-loop cycle of “cultivation–evaluation–feedback–improvement” ^[11].

3. Conclusion and outlook

3.1. Research conclusions

This study arrives at three principal conclusions. First, industry-education integration provides indispensable institutional conditions for cultivating the craftsmanship spirit. Its unique advantages—creating authentic scenarios, integrating diverse resources, coordinating multiple stakeholders, and enabling long-term tracking—can effectively address the four structural dilemmas. Second, the four-dimensional collaborative pathway constitutes a systematic practical framework: course synergy addresses “what to teach,” field synergy addresses “where to cultivate,” faculty synergy addresses “who cultivates,” and evaluation synergy addresses “how to evaluate,” operating in concert to form a comprehensive framework. Third, the case study validates the pathway’s feasibility and effectiveness. Leveraging its location in China’s automotive industrial base and the resources of China FAW Group, the case institution has achieved significant improvements in professional identity, craftsmanship competencies, and employment outcomes, confirming the pathway’s theoretical soundness, practical viability, and replicable value ^[12].

3.2. Practical recommendations

Three recommendations are offered. First, strengthen top-level design and systematically plan cultivation programs. Colleges should embed craftsmanship cultivation into the strategic framework of talent development, formulating systematic plans with clear objectives and responsible entities to ensure systemic coherence and sustainability. Second, deepen school-enterprise cooperation and establish institutionalized collaborative mechanisms. Colleges should develop structured consultation mechanisms with core partner

enterprises, transforming collaborative arrangements into operational provisions, and transforming enterprises from “spectators” into “genuine partners.” Third, refine institution-specific characteristics and develop replicable models. Each institution should develop distinctive craftsmanship programs with identifiable character, providing transferable templates for peer institutions.

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Disclosure statement

The author declares no conflict of interest.

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