Article

Research on the Construction of an Effective Teaching Operation System for the Second Classroom in Vocational Colleges from the Perspective of the Modes of Transmits Knowledge

Fei He [1], Yongling Ye [2,*] and Jiao Fan [3]

[1] Chongqing Open University, Chongqing, China
[2] Business School, Hechi University, Hechi, China
[3] Chongqing Vocational College of Applied Technology, Chongqing, China
* Correspondence: Yongling Ye, Business School, Hechi University, Hechi, China

Abstract: Vocational education plays a critical role in cultivating highly skilled professionals equipped to meet the dynamic demands of the modern workforce. However, traditional classroom settings often struggle to fully facilitate the transfer of tacit knowledge, necessitating supplementary educational frameworks. Drawing on the essence of knowledge transmission modes and the successful implementation of the second classroom in developed countries such as the United States, Japan, Germany, and the United Kingdom, this paper constructs an effective teaching and win-win operation system tailored for the second classroom in vocational colleges. The proposed framework addresses existing pedagogical limitations by integrating theoretical learning with practical application. It systematically includes establishing a win-win operation concept that aligns student development with institutional goals, perfecting a comprehensive dual evaluation system to accurately measure both academic and extracurricular competencies, and building effective operation carriers that foster interactive learning environments. By optimizing these components, the system aims to implement the value-added transfer of tacit knowledge and ensure highly effective teaching outcomes. Furthermore, this research highlights how structured extracurricular engagement can bridge the gap between explicit instruction and practical skill acquisition. Ultimately, the successful deployment of this operation system will not only enhance the overall quality of vocational education but also significantly improve students' comprehensive abilities, adaptability, and long-term career readiness in a competitive global market.

Keywords: knowledge transmission; vocational colleges; second classroom; effective teaching; tacit knowledge; educational reform

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1. Introduction

As technological paradigms evolve and educational concepts advance, vocational colleges must adapt to contemporary demands in knowledge delivery and effective teaching. Vocational college graduates often possess extensive explicit knowledge but lack implicit knowledge, leading to a disconnect between professional skills and job requirements. Additionally, while there is a significant number of professional courses, practical understanding remains insufficient, posing long-standing challenges to effective teaching in vocational education [1].

2. Knowledge Delivery Models, the Second Classroom and Effective Teaching

2.1. Knowledge Delivery Models

Knowledge can be categorized into explicit knowledge and tacit knowledge [2]. Explicit knowledge refers to information that can be systematically organized and

expressed through language, writing, or coding. Tacit knowledge, on the other hand, is inherently personal and difficult to articulate, as it is deeply rooted in individual experience and intuition.

There are four modes of knowledge transfer: socialization of knowledge, which involves the transfer of tacit knowledge to tacit knowledge through methods such as mentorship or familial learning; externalization of knowledge, where tacit knowledge is converted into explicit knowledge through activities like publishing books or applying for patents; combinations of knowledge, which involve the interaction of explicit knowledge with explicit knowledge, such as in exam-oriented tests, collaborative papers, or translations, though these processes are not inherently innovative; and internalization of knowledge, where explicit knowledge is transformed into tacit knowledge through practices like application, comprehension, and experiential learning [3].

The knowledge transfer model serves as a framework to analyze the conditions under which explicit and tacit knowledge can be interchanged [4, 5]. It also examines the relationships among knowledge innovation, the combination of knowledge, and the dissemination of knowledge.

2.2. The Second Classroom

The first classroom refers to the classroom for learning professional theories, which essentially corresponds to the combination of knowledge (explicit knowledge → explicit knowledge). The second classroom involves the interactive practice of knowledge, corresponding to the internalization of knowledge (explicit knowledge → implicit knowledge) and the socialization of knowledge (implicit knowledge → implicit knowledge). The third classroom encompasses extracurricular academic activities, which primarily correspond to the externalization of knowledge (implicit knowledge → explicit knowledge).

The second classroom is centered on enterprise practice activities and represents a collaborative process in which vocational colleges and enterprises jointly participate in talent cultivation [6]. It integrates practical teaching with students' involvement in real-world work, with implementation methods typically including industry-university-research integration, on-the-job practice, and similar approaches. The second classroom primarily refers to practical components such as school-enterprise cooperation classes, school-enterprise cooperation practice teams, enterprise part-time jobs, enterprise internships, and professional internships.

The second classroom is referred to as a classroom because these practical components are managed under a structured practical teaching plan. When the requirements are met, students can earn corresponding credits, which may replace credits for certain professional courses. The second classroom is primarily designed to enhance students' implicit knowledge and practical abilities to meet employers' demand for versatile and application-oriented talents. In a broader sense, the second classroom includes extracurricular academic activities from the third classroom. However, this article adopts the narrower definition of the second classroom.

2.3. Effective Teaching

The concept of Effective Teaching emerged from the scientific teaching movement in the West during the 1920s and 1940s. The essence of effective teaching lies in maximizing the value of students [7]. The term "effective" in effective teaching refers to the enhancement of knowledge or employment value that a student gains after a period of instruction by the teacher. The term "teaching" in effective teaching encompasses all actions and strategies employed by a teacher to initiate, sustain, and promote the accumulation of knowledge in students.

Generally, student value is defined as student cognitive value minus student learning cost. Perceived Value refers to the subjective evaluation of the knowledge gained by students during the teaching process, including factors such as explicit knowledge, implicit knowledge, and the mode of knowledge delivery [8]. Effective teaching is characterized by not falling below the average level of knowledge value added within a

specific time and space while aligning with societal values and employment demands. In the context of applied talent development, if the teacher's knowledge delivery is competitive for employment and entrepreneurship and meets the knowledge increment required for students' career prospects, it qualifies as effective teaching. Otherwise, it is deemed ineffective teaching.

Effective teaching that adheres to the knowledge delivery model and facilitates knowledge transfer in the second classroom contributes to transforming teachers' knowledge silos into interconnected knowledge networks for college students [9].

3. Operational Experience of Effective Teaching in the Second Classroom in Developed Countries from the Perspective of Knowledge Delivery Models

Since 2020, the second classroom in developed countries has achieved significant advancements by adhering to the knowledge delivery model. In the United States, corporate education surpasses national education at 51%, and non-property partnerships between enterprises and vocational colleges are prevalent across all levels. In Japan, two-thirds of enterprises maintain in-depth collaborations with vocational colleges, with 90% of large enterprises establishing property rights partnerships with these institutions [10].

3.1. Contractual Education in the United States

The United States is a contractual society, and the most notable feature of the second classroom is the use of written contracts to regulate and coordinate its activities. The U.S. federal government attracts businesses to participate in second classroom education through various preferential policies, including tax breaks, financial subsidies, and the establishment of special funds. Additionally, specific legislation defines the rights and responsibilities of all parties involved in cooperative education and sets standards for school-enterprise collaboration. Vocational colleges in the United States have dedicated organizations, such as the Cooperative Education Department, which is established universally. This department acts as the project coordinator for stakeholders in the second classroom and ensures the smooth operation of school-enterprise cooperative education by systematically managing the allocation of teaching resources between the first and second classrooms for students.

3.2. Japan's "industry-Academia-Government" Co-Education Model

In Japan's second classroom "industry-academia-government" model, "industry" refers to the industrial sector and enterprises, "education" refers to vocational colleges and secondary colleges, and "government" refers to the government and affiliated research institutions [11]. Under the unified guidance and support of the Japanese government, vocational colleges, enterprises, and government-affiliated research institutions actively implement the "industry-academia-government" joint education model. This approach aims to cultivate innovative technical talents for Japanese society and enterprises, fostering a virtuous cycle of mutually beneficial cooperation among all parties. Common forms of collaboration in this model include schools and enterprises jointly developing second classroom education plans, professional guidance and consultation activities between schools and enterprises through part-time systems, and the co-construction of practical training infrastructure within enterprises and on campuses by industry, academia, and government.

3.3. Germany's Dual System of Education

Germany's "Dual System" is a school-enterprise cooperative education system supported by federal government legislation, which addresses a core issue in the training model: the seamless integration of explicit knowledge in the first classroom and implicit knowledge in the second classroom. "Dual" refers to college students in professional education who are trained in two environments. One is vocational colleges, whose primary function is to impart professional theoretical knowledge; the other is off-campus training sites, such as enterprises, where students accumulate implicit professional knowledge through practical experience. Students in the dual system hold dual identities

as both students and apprentices. Teachers are categorized into two groups: academic instructors and workplace mentors. Assessments are divided into practical skills tests and professional knowledge evaluations.

3.4. The "Sandwich" Study System in the UK

The "Sandwich" Program in the UK, also referred to as the work-study alternation system, is primarily characterized by the implementation of a "learning - practice - relearning" industry-education integration model. During the phase of explicit knowledge acquisition in the first classroom, students spend a designated period outside the school engaging in implicit knowledge learning in the second classroom, before returning to the first classroom to resume explicit knowledge learning. This form of "sandwich" education, likened to a piece of meat placed between two slices of bread, is termed "sandwich" education [12]. The work-study alternation extends the duration of regular degree and diploma programs by an additional year, which is dedicated to work practice. Regarding work-study schedules, the "sandwich teaching method" alternates by academic year or month, and students receive remuneration from corporations during their second classroom period.

3.5. Lessons Learned from Effective Second Classroom Teaching

The second classroom education in developed countries such as the United States and Japan operates as a school-enterprise cooperation education system initiated and supported by the government. Vocational colleges and enterprises collaborate actively to achieve mutual benefits. Vocational colleges focus on cultivating students based on job capabilities defined by enterprise experts, with the proportion of students' learning time in the first and second classrooms typically balanced at a 1:1 ratio. From an international perspective, the provision of supportive policies and intermediaries by the government facilitates school-enterprise cooperation, creating a win-win situation for both parties. Adopting a knowledge transfer model is essential for addressing the challenges of effective teaching in the second classroom through such cooperation [13].

4. The Operational System of Effective Teaching in the Second Classroom from the Perspective of the Knowledge Transfer Model

Based on the knowledge transfer model and the experience of the second classroom in countries such as the United States and Japan, achieving the implicit knowledge value-added corresponding to the internalization and socialization of knowledge in the second classroom requires a focus on maximizing student value and establishing a robust support system [4]. Furthermore, it necessitates fostering a value win-win scenario among stakeholders to ensure the effectiveness of teaching in the second classroom within vocational colleges.

4.1. Establish the Concept of Win-Win Operation in the Second Classroom

The key to effective teaching in the second classroom is to achieve a win-win situation for students, teachers, vocational colleges, and enterprises, forming a virtuous cycle of positive-sum game and value addition among the stakeholders of the second classroom [14].

The idea of maximizing enterprise value. The starting point for establishing the win-win operation concept of the second classroom is the increase in enterprise value [15]. By relying on the government's subsidy policy for the second classroom and enterprises utilizing students for on-the-job positions, they can complete projects at a lower cost and with high efficiency, generate benefits and profits, and train and equip talents through practice.

The idea of maximizing student value. For college students, through real on-the-job training, participation in actual projects, and front-line practice, implicit knowledge is accumulated. The enhancement of students' implicit knowledge and effective teaching is achieved, ultimately reaching the goal of cultivating application-oriented talents in vocational colleges.

The concept of maximizing the value of vocational colleges. The value of vocational colleges is reflected in the employment rate of students, the quality of employment, and the satisfaction of graduates with vocational colleges. When the value of vocational colleges is realized, it further strengthens effective teaching in the second classroom and ultimately achieves a long-term win-win situation in the second classroom [16].

4.2. Improve the Dual Evaluation System of the Second Classroom

To achieve the delivery and value-added of tacit knowledge in the second classroom, the implicit efforts and implicit quality of teachers and mentors who organize the delivery of tacit knowledge in the second classroom correspond to the implicit performance (that is, organizational citizenship behavior, which refers to the actions that teachers and mentors voluntarily undertake that are beneficial to effective teaching but have not been confirmed in the organization's formal assessment system) that need to be recognized by performance assessment. Otherwise, effective teaching in the second classroom is like a tree without roots. Therefore, the evaluation of both visible and hidden achievements in the second classroom constitutes a dual evaluation system.

The enterprise perspective performance evaluation system requires the construction of the cost system of the second classroom, including direct costs such as fees paid to students, cooperation fees, and indirect costs such as the opportunity cost of the mentor's organizational citizenship behavior. At the same time, it is necessary to establish the revenue system of the second classroom, including direct benefits such as social service cooperation benefits and student on-the-job benefits, as well as indirect benefits such as talent reserve and corporate social responsibility image.

The student perspective performance evaluation system focuses on two key points. First, based on the knowledge transfer model, it implements binary equivalent evaluation of students' implicit knowledge and explicit knowledge value-added, coordinating the proportion relationship between subjective qualitative indicators (such as implicit knowledge comprehension, team awareness, on-the-job experience) and objective quantitative indicators (such as job skill attainment, recommended employment rate, training base utilization rate). Second, the effective teaching evaluation criteria must unify the value standards of vocational colleges, enterprises, and students.

From the perspective of vocational colleges, it is a prerequisite for the government to establish a subsidy system and bridge for the second classroom and encourage enterprises to actively engage in school-enterprise cooperation to achieve effective teaching in the second classroom [17]. The knowledge transfer model indicates that the dual performance evaluation system for vocational colleges needs to set subjective qualitative indicators for teachers' organizational citizenship behavior and the transfer of implicit knowledge, as well as objective quantitative indicators for the quantitative assessment of the practical teaching syllabus and the quantitative training objectives for applied talents.

4.3. Build an Effective Carrier for the Second Classroom

The second classroom relies on online intelligent platforms, such as virtual simulation software, entrepreneurship and innovation applications, and online training platforms, to effectively construct and manage carriers like the second classroom, the second teaching team, the second class, and the second classroom teaching process [7].

A collaborative second classroom can be jointly developed by schools and enterprises. The second classroom, including virtual classrooms, serves as a medium for implicit knowledge transmission [18]. Schools and enterprises can collaborate in two primary ways: signing agreements to jointly establish practice sites within enterprises and non-profit training bases within schools, and equipping these initiatives with online simulation classrooms.

The school-enterprise collaboration extends to the creation of a second teaching team, which includes virtual teams, as the primary facilitators of implicit knowledge transmission. This co-constructed teaching team is developed through two main approaches: enterprise training instructors and vocational college training masters engage in mutual training to build a practical teaching team that operates both online and offline;

enterprises and vocational colleges exchange personnel, with enterprises sending mentors to vocational colleges as part-time professors and vocational colleges sending teachers to enterprises as part-time advisors. The government provides subsidies to support the undercompensated contributions of the second teaching team.

Schools and enterprises also collaborate to establish second classes, including virtual classes, which serve as the recipients of implicit knowledge transfer. This collaboration involves jointly naming classes, implementing models such as "one enterprise, one class, one major," and organizing full-time special classes, targeted classes on campus, part-time closed practice classes, apprenticeship classes off campus, and virtual classes. Both schools and enterprises participate in managing these second classes, with enterprise head teachers appointed as part-time professors by vocational colleges and school head teachers appointed as part-time advisors by enterprises.

The school and enterprise jointly manage the second classroom teaching process to ensure effective implicit knowledge transfer. This co-management involves strengthening the monitoring of the practical training process through an integrated online and offline monitoring system, which assesses students' implicit knowledge acquisition and evaluates the teaching effectiveness of instructors and mentors. Additionally, schools and enterprises collaborate to enhance the management of on-the-job internships by jointly establishing behavioral norms and compliance requirements for the second classroom. The teaching process is primarily monitored and evaluated in real time using government-subsidized online intelligent platforms [18].

5. Conclusion

There are four modes of knowledge transfer. The second classroom refers to the environment where implicit knowledge is exchanged. Adhering to the mode of knowledge transfer enhances effective teaching in the second classroom and integrates the knowledge silos of teachers and mentors into the broader knowledge network of college students.

The experience of the second classroom in various countries demonstrates that government support policies and intermediary mechanisms play a crucial role in facilitating the second classroom. These measures, aligned with the knowledge transfer model, form the foundation for effective teaching in this context.

An effective teaching and collaborative operation system for the second classroom can be established by adhering to the knowledge delivery model and leveraging online digital intelligence platforms. This includes fostering a collaborative operational concept for the second classroom, enhancing its dual evaluation system, and developing effective operational frameworks to achieve implicit knowledge value addition and improved teaching outcomes.

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