

CULTIVATING CRAFTSMANSHIP SPIRIT THROUGH SCHOOL–ENTERPRISE COOPERATION: A COLLABORATIVE SYSTEMS THEORY PERSPECTIVE

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Abstract: In the context of the new era, school–enterprise cooperation serves as a crucial pathway for the promotion and cultivation of craftsmanship spirit. It also constitutes a systematic endeavor that connects multiple informational elements between institutional talent development and enterprise workforce demands. Collaborative Systems Theory provides a methodological foundation for addressing the interplay among shared objectives, collaborative intent, and communication linkages across organizations. As such, school–enterprise cooperation requires the theoretical support of Collaborative Systems Theory to co-construct an objective framework, an implementation pathway, and a guarantee mechanism for nurturing students' craftsmanship spirit. Ultimately, this approach embeds the cultivation of craftsmanship spirit throughout the entire process of skilled talent development and shapes a comprehensive collaborative system for fostering craftsmanship spirit through joint efforts between schools and enterprises.

Keywords: Collaborative systems theory; School–enterprise cooperation; Craftsmanship spirit

1 INTRODUCTION

Chester I. Barnard, the founder of Collaborative Systems Theory, asserted that “every organization is a cooperative system”[1]. An organization is typically composed of multiple individuals who are closely interconnected. Through their interactions, they form a networked system of collaboration characterized by extensive linkages—a pattern that likewise applies to relationships between organizations. In the context of human social activity, any entity, whether an individual or an organization, may be viewed as a collaborative system, existing and developing through systemic cooperation. Within organized social operations, a collaborative system encompasses at least three fundamental elements: shared goals, collaborative intention, and information linkage. The first is the shared goal, representing the fundamental purpose for which any organization is constituted. The second is collaborative intention, referring to the self-restraint and mutual adjustment among individuals within an organization to facilitate the transition from individuality to collectivity. This process typically requires both material and spiritual forms of motivation to foster a sense of cooperation and collective identity. The third is information linkage, which denotes the mechanisms, channels, and methods of communication that connect members within the organization. Such linkages must be accessible and utilized by all members, who should be both competent and aligned in their objectives, while managers must possess sufficient authority and executive capacity to ensure the system's efficiency[2]. Craftsmanship spirit is a form of ethos cultivated through productive practice. It also constitutes a key element of the superstructure in social organizational activities and serves as an essential visionary component within collaborative systems involving multiple actors—whether individuals or organizations. The development of craftsmanship spirit necessarily relies on cross-sectoral collaboration among individuals, schools, enterprises, and other stakeholders, encompassing shared intentions, goal alignment, and connected information channels.

In speech at the National Commendation Conference for Model Workers and Advanced Workers in 2020, General Secretary Xi Jinping provided a precise and incisive summary of the scientific connotation of craftsmanship spirit—dedicated focus, pursuit of excellence, meticulousness, and striving for perfection. These qualities constitute the core professional literacy required of every worker in the new era[3]. From the perspective of contemporary societal development, craftsmanship spirit represents a vivid embodiment of the ethos of the times. The nation is in urgent need of a cohort of high-caliber technical personnel who possess this spirit to contribute to socialist economic development, and vocational institutions bear the responsibility of cultivating greater numbers of such high-quality technical talents, skilled craftsmen, and master artisans at the national level. However, at present, most applied universities in China lack effective cultivation of craftsmanship spirit among students. Even when relevant courses exist, they tend to be superficial and fail to establish a systematic mechanism for nurturing such qualities. Since the 18th National Congress of the Communist Party of China, especially following the launch of the "Made in China 2025" initiative, there has been a pressing need for a large number of highly skilled craftsmen and national-level artisans to support implementation. This imperative dictate that the cultivation of skilled personnel must prioritize the development of craftsmanship spirit. In the course of supply-side structural reform in talent development, efforts at the macro level should begin with cultivating master artisans, while at the micro level they should focus on fostering craftsmanship spirit among students. Unfortunately, the entity responsible for craftsmanship education among skilled personnel in China has yet to be clearly

identified, pathways remain obstructed, models are underdeveloped, and institutional mechanisms are still immature. In recent years, multiple ministries—including the Ministry of Education and the Ministry of Human Resources and Social Security—have issued key policy documents advancing reform of skilled talent cultivation. These directives emphasize that enterprises should play a principal role in the implementation of vocational education. They call for the establishment of a collaborative education mechanism driven by industry-education integration and school-enterprise cooperation, with work-study combination and the unity of knowledge and practice as core approaches, thereby cultivating a large workforce characterized by three attributes: knowledge-based, skilled, and innovative[4]. Moreover, the policy principle that ‘school-enterprise cooperation should operate under a model in which enterprises take the lead, the government provides support, industries offer guidance, and schools and enterprises act as dual subjects in implementation’ provides top-level institutional design for fostering craftsmanship spirit across different categories of talent in the new era[5]. On this basis, applied universities and vocational colleges should proactively collaborate with enterprises, actively promote institutional and mechanism reform and innovation in talent cultivation, and cultivate students’ craftsmanship spirit through school-enterprise cooperation platforms. In doing so, they should integrate the systematic development of craftsmanship spirit throughout the entire process of training high-quality technical and skilled personnel.

2 THE THEORY OF COLLABORATIVE SYSTEM OBJECTIVES FOR CULTIVATING STUDENTS’ CRAFTSMANSHIP SPIRIT THROUGH SCHOOL-ENTERPRISE COOPERATION

The cultivation of students’ craftsmanship spirit through school-enterprise cooperation is a systematic project. It is both a response to macro-level issues in the new era and a planning of objectives concerning micro-level details in the reform of talent training models in the new era, fully reflecting the meaning of the collaborative system objective theory.

2.1 Cultivating Students’ Craftsmanship Spirit through School-Enterprise Cooperation is a Systematic Response to the New Contradictions of the New Era

Since the 18th National Congress of the Communist Party of China, General Secretary Xi Jinping has made multiple important instructions regarding skilled talents. At a symposium with intellectuals, model workers, and youth representatives in 2016, he emphasized: “No matter what work one engages in, one must commit to it, love it, and delve into it. In factories and workshops, we must promote the ‘craftsmanship spirit,’ carefully refine every component, and produce high-quality products[6].” Cultivating craftsmanship spirit requires emphasizing the deepening of reform of the vocational education system and mechanisms, adhering to industry-education integration and school-enterprise cooperation, adhering to the combination of work and study and the unity of knowledge and action, and striving to build an education system for technical and skilled talents with Chinese characteristics. After the 19th National Congress of the Communist Party of China, Xi Jinping’s educational thought was widely studied in the education sector. It embodied the new position of the CPC Central Committee in the new period regarding the functions of education, new judgments of the situation, and new deployments of work. It emphasized that education should help “Made in China” move toward “quality manufacturing” and “premium manufacturing,” should accurately grasp the starting point and foothold of “what kind of people to cultivate and how to cultivate them,” and should promote the development of vocational education through reform. It once again clearly stressed the adherence to school-enterprise collaboration, cultivating students’ professional spirit, vocational skills, and employability and entrepreneurship through integrated training of theory and practice. In April 2021, General Secretary Xi Jinping made important instructions on vocational education work, emphasizing that “on the new journey of comprehensively building a modern socialist country, vocational education has broad prospects and great potential.” He stated the need to “optimize the position of vocational education types, deepen industry-education integration and school-enterprise cooperation, and deeply push reforms in educational approach, school-running models, management systems, and safeguard mechanisms,” and to “accelerate the construction of a modern vocational education system and cultivate more high-quality technical and skilled talents, skilled craftsmen, and great country artisans[7].” In the “Several Opinions on Deepening Industry-Education Integration” and the “Opinions on Deepening Reform of the Education System and Mechanisms” issued by the General Office of the State Council, both emphasize promoting reform of talent cultivation through industry-education integration, integrating the cultivation of craftsmanship spirit into collaborative education between industry and education and between schools and enterprises, which has virtually become the key to vocational education talent cultivation reform in the new era. To further push reform of the education system and mechanisms for cultivating technical talents, vocational colleges are required to accurately grasp the principal contradiction faced in the current education reform, promote the resolution of the fundamental contradictions of imbalance and inadequacy in education reform and development, and explicit that education mechanisms for students’ craftsmanship spirit based on school-enterprise collaboration are the key to further addressing the new contradictions that people urgently need to resolve in the new era.

2.2 School-Enterprise Cooperation In Cultivating Students’ Craftsmanship Spirit Is a Systematic Planning For The Reform Of The Education System And Mechanism In The New Era

School-enterprise cooperation in cultivating high-quality technical and skilled talents has a distinct craftsmanship spirit temperament, and it is a new requirement and new expectation that the new era assigns to application-oriented institutions and vocational colleges. Exploring a cooperative system for cultivating students’ craftsmanship spirit

through school-enterprise cooperation, with the cultivation of craftsmanship spirit as the core, is a key link and value embodiment of the reform of the education system and mechanism. First, innovate the educational culture and talent cultivation model, and explore new mechanisms for cultivating high-quality technical and skilled talents. In order to adhere to the fundamental task of fostering virtue through education, take the cultivation of craftsmanship spirit temperament as the orientation of talent cultivation, create a labor ethos that esteems labor and regards labor as glorious, and a behavioral style that seeks excellence and pursues perfection, further innovate the talent cultivation work in the new era, and provide a practical model of school-enterprise cooperation in cultivating students' craftsmanship spirit for other institutions[8]. Second, enhance the quality of cultivating high-quality technical and skilled talents, and improve the professional literacy of high-quality technical and skilled talents with "both moral integrity and technical skills." In particular, focus on cultivating the temperament of "craftsmanship spirit," and cultivate more and more craftsmen of the times to meet the new era's urgent demand for high-quality human resources. Finally, strengthen the new orientation and the entire process of talent cultivation in skills education, and form a collaborative path for school-enterprise cooperation in cultivating students' craftsmanship spirit. Integrate craftsmanship spirit into all aspects of talent cultivation, embed craftsmanship spirit into the entire process of cultivating high-quality technical and skilled talents, let craftsmanship spirit take root deep in the soul, strengthen the role of school-enterprise collaborative education, and form a new collaborative path for school-enterprise cultivation of students' craftsmanship spirit in an all-round and whole-process manner[9].

2.3 School-Enterprise Cooperation in Cultivating Students' Craftsmanship Spirit is the Systematic Goal Setting for the Cultivation of High-Quality Technical and Skilled Talents

The construction goal of the cooperative system for cultivating students' craftsmanship spirit through school-enterprise cooperation aims to further implement the spirit of national documents on the reform of the education system and mechanism, take school-enterprise collaboration as the starting point, innovate the mechanism for cultivating skilled talents, and integrate the cultivation of craftsmanship spirit into the entire process of systematic cultivation of high-quality technical and skilled talents. Specific Goal One: Build a collaborative mechanism for school-enterprise cooperation in cultivating students' craftsmanship spirit, including two major systems—the 'working mechanism for school-enterprise cooperation in cultivating students' craftsmanship spirit' and the 'guarantee mechanism for school-enterprise cooperation in cultivating students' craftsmanship spirit.' Specific Goal Two: Integrate the cultivation of craftsmanship spirit into the entire process of cultivating high-quality technical and skilled talents, and through constructing six subsystems—the working system for education, the teaching system, the student affairs system, the evaluation system, the team system, and the carrier system of school-enterprise cooperation in cultivating students' craftsmanship spirit—form an educational system for school-enterprise cooperation in cultivating students' craftsmanship spirit that is vibrant, efficient, more open, and conducive to scientific development. Specific Goal Three: Promote the integration of craftsmanship spirit cultivation into campuses and classrooms, and ensure its smooth implementation. Construct a collaborative education activity system for cultivating students' craftsmanship spirit through school-enterprise cooperation, so as to realize the entry of craftsmanship spirit cultivation into campuses; construct a collaborative teaching system for cultivating students' craftsmanship spirit through school-enterprise cooperation, so as to realize the entry of craftsmanship spirit cultivation into classrooms; construct a collaborative evaluation system, team guarantee system, and carrier guarantee system for cultivating students' craftsmanship spirit through school-enterprise cooperation, and form a practical and operable implementation plan that fits the learning conditions of students.

3 THE SYSTEM THEORY OF THE COLLABORATIVE SYSTEM FOR CULTIVATING STUDENTS' CRAFTSMANSHIP SPIRIT THROUGH SCHOOL-ENTERPRISE COOPERATION

The construction of pathways for cultivating students' craftsmanship spirit through school-enterprise cooperation requires overall coordination and joint establishment across multiple departments and multiple links. On the basis of collaborative system theory, with the cultivation of craftsman-type talents as the common goal, the construction vision of collaboration first lies in building six sub-units of the collaborative system for cultivating students' craftsmanship spirit through school-enterprise cooperation—namely, the "institutional system," the "teaching system," the "student affairs system," the "evaluation system," the "faculty system," and the "carrier system" (see Figure 1 below). The aim is to realize information linkage among each unit, achieve a grand collaborative pattern of "all personnel, whole process, and all dimensions" for all-round education, and cultivate master craftsmen of a great socialist country in the new era with Chinese characteristics.

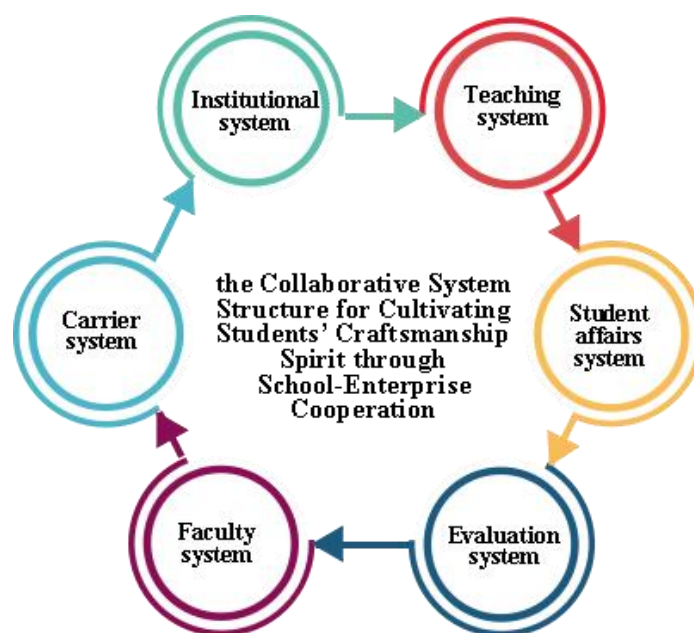


Figure 1 Schematic Diagram of the Collaborative System Structure for Cultivating Students' Craftsmanship Spirit through School-Enterprise Cooperation

3.1 The Collaborative Institutional System for Cultivating Students' Craftsmanship Spirit through School-Enterprise Cooperation

First, the leadership mechanism. Institutions should treat the “construction of the collaborative institutional system for cultivating students’ craftsmanship spirit through school-enterprise cooperation” as a top-level design project for talent training reform and innovation. A project leadership team and relevant organizations should be established, taking the project as a “number-one responsibility initiative” jointly overseen by the Party secretary and the president of the institution. A collaborative working leadership group composed mainly of institutional leaders, heads of various departments, and representatives of school-enterprise cooperation units should be formed to carry out unified planning, decision-making, organization, coordination, supervision, and acceptance of the pilot project work, so as to ensure that the project construction is carried out efficiently and in a standardized manner. A special leadership organization should be set up for the construction of the collaborative system to ensure the smooth completion of the project.

Second, the working mechanism. A project management system should be established, upholding the principle of combining demonstration by industry associations and enterprise experts with institutional decision-making, implementing scientific and standardized construction and management, and forming an advancement pattern of “top leaders focusing on overall planning, responsible leaders on concrete implementation, and designated personnel on detailed work.” A sound promotion system for the project of “construction of the collaborative institutional system for cultivating students’ craftsmanship spirit through school-enterprise cooperation” in institutions should be established, forming a dual promotion mechanism of “college-department-class” plus “enterprise.” Institutions should set up a working promotion team composed of the institution’s Party committee secretary, president, departments, administrative offices, and school-enterprise cooperation units; each teaching unit should establish a working promotion team for collaborative education in cultivating students’ craftsmanship spirit through school-enterprise cooperation; each class should establish a collaborative education working team for cultivating students’ craftsmanship spirit through school-enterprise cooperation, led directly by the counselor (or homeroom teacher); a guidance group for collaborative education in cultivating students’ craftsmanship spirit through school-enterprise cooperation should be formed by representatives of school-enterprise cooperation units and experts from industry associations; a regular reporting system by information officers at all levels should be established to ensure high-quality and high-level implementation of the project.

Third, the working regulations. The “construction of the collaborative institutional system for cultivating students’ craftsmanship spirit through school-enterprise cooperation” should establish and improve relatively complete working regulations, and improve and refine relevant working systems such as development plans, implementation opinions, assessment methods, and specific implementation plans of institutions for the collaborative mechanism of cultivating students’ craftsmanship spirit through school-enterprise cooperation.

3.2 The Collaborative Teaching System for Cultivating Students' Craftsmanship Spirit through School-Enterprise Cooperation

Institutions define the cultivation of ‘craftsmanship spirit’ as an important teaching objective of talent training, integrate the education of craftsmanship spirit into the whole process and all dimensions of talent training, and construct a collaborative teaching system for cultivating students’ craftsmanship spirit through school-enterprise cooperation. First,

the construction of a mechanism that integrates craftsmanship spirit into the entire process of talent training. Compulsory or elective courses on craftsmanship spirit education should be offered, and school-based teaching materials on craftsmanship spirit education should be jointly compiled with experts from industries and enterprises, with dedicated credits set and included in talent training programs. The teaching of professional courses should integrate craftsmanship spirit education in a timely manner, closely combining the cultivation of “craftsmanship spirit” with professional skills training. Different training programs of different majors have different training projects and courses, and the education of craftsmanship spirit through school-enterprise cooperation should have professional characteristics. Craftsmanship spirit education should be integrated with professional courses and skill training courses, reflected in the setting of teaching objectives, teaching content, and assessment rules of professional courses.

rs of the World Skills Competition, industry experts, model workers, and researchers in skill education to jointly form a committee for cultivating craftsmanship spirit through school-enterprise cooperation. This not only strengthens friendly cooperation and exchange among various industries, but also innovates scientific research activities that support craftsmanship spirit, providing practical suggestions, professional consultation, and research support for the development of teaching and research output, such as developing school-based coursebook, popular science readers, and other teaching and research output. Development of a school-based coursebook system should form a system of school-based coursebook for craftsmanship spirit education, including monographs on the practice and reform of craftsmanship spirit education and school-based coursebook for craftsmanship spirit education in various majors. Development of popular science readers should include popular science readers on craftsmanship spirit, including readers on traditional craftsmanship culture (for morning reading), readers on modern role models of craftsmanship (for extracurricular reading), and readers on the cultivation of craftsmanship behavior (for practical training). Application of other teaching and research output should involve summarizing and refining teaching models of craftsmanship spirit, applying for relevant research projects, and turning them into output such as monographs and papers[10].

3.3 The Collaborative Student Affairs System for Cultivating Students’ Craftsmanship Spirit through School-Enterprise Cooperation

First, the development of an educational activity system for craftsmanship cultivation. The cultivation of students’ craftsmanship spirit through school-enterprise cooperation should take the enhancement of students’ craftsmanship literacy as its primary goal. As key participants in educational activities, and especially as the core subjects of spiritual education, students should be encouraged to play a principal role and to construct a student-centered self-education activity system for craftsmanship spirit. This includes the design of craftsmanship-spirit-themed activities in the second classroom, the establishment of craftsmanship education platforms within student self-organized activities, and the development of professional student associations centered on the promotion of craftsmanship spirit. In this way, students’ enthusiasm for learning craftsmanship spirit is stimulated from multiple dimensions, including campus soft culture and students’ self-culture[11]. For example, professional student associations such as craftsmanship spirit research clubs serve as innovative spaces for independently understanding craftsmanship spirit. While encouraging students to form professional associations, institutions should also proactively assign excellent in-house professional teachers and enterprise mentors, provide financial support for activities, and allocate activity venues. Another example is organizing skill training competitions in second-classroom activities. Through the combination of “training and competition,” students not only improve their industry-related skills but also temper and experience the essence of craftsmanship spirit.

Second, the development of an innovation and entrepreneurship activity system. In advocating student participation in innovation and entrepreneurship activities, institutions should, on the one hand, establish an integrated activity model of “innovation + entrepreneurship,” and on the other hand, construct a bidirectional interactive model in which schools and enterprises coordinate innovation and production, enabling mutual integration and transformation.

Third, the development of a competition activity system. Taking school-enterprise collaborative competitions as a platform, competitions are used to promote learning and to promote teaching. Skill competitions are an important means to improve students’ skill levels and also function to inherit and promote craftsmanship spirit. In the process of cultivating students’ craftsmanship spirit through school-enterprise cooperation, while adhering to the principle of promoting learning and teaching through competitions, institutions should also create conditions to support students’ participation in various types of skill competitions. Through competition, students can experience the connotations of craftsmanship spirit and temper the will associated with craftsmanship.

Fourth, the establishment of a publicity and lecture platform for craftsmanship spirit—“Craftsman Lecture Hall.” Institutions proactively invite outstanding craftsmen from enterprises to be guest speakers in the “Craftsman Lecture Hall” to share their lives, experiences, and reflections as craftsmen. According to the specific conditions of school-enterprise cooperation, each school or departmental unit invites several outstanding craftsmen from productive or service enterprises every year to tour the campus and give lectures on craftsmanship spirit.

3.4 The Collaborative Evaluation System for Cultivating Students’ Craftsmanship Spirit through School-Enterprise Cooperation

The effectiveness of cultivating students’ craftsmanship spirit through school-enterprise cooperation is measured primarily by the quality of evaluation. In the process of cultivating students’ craftsmanship spirit, institutions should

continue to deepen the reform of skill talent training models and, with the goal of cultivating skilled artisans, great national craftsmen, and world-renowned masters, establish and improve an evaluation system for assessing the outcomes of collaborative education. This evaluation system should include dimensions such as educational content, educational process, and educational outcomes. First, evaluating the degree to which craftsmanship spirit content is integrated. Evaluation indicators include whether each course reflects elements of craftsmanship spirit, whether craftsmanship teaching elements are designed around professional curricula, and whether the cultivation of craftsmanship spirit through school-enterprise cooperation is integrated throughout the entire process of professional skill training. Second, evaluating the educational process of craftsmanship spirit. Indicators include whether the process follows the objective laws of cultivating high-quality technical and skilled talent, whether it respects the developmental laws of professional ethics for high-quality technical and skilled talent, and whether it adheres to the educational 规律 of craftsmanship spirit cultivation. Specifically, within school-enterprise cooperation for cultivating craftsmanship spirit, it should be assessed whether the cultivation of craftsmanship spirit is integrated into the entire and all-round process of professional skill training models and ideological-political curriculum development. Third, evaluating the outcomes of craftsmanship spirit education. The effectiveness of cultivating craftsmanship spirit through school-enterprise cooperation can be observed at the consciousness level in students' abilities to appreciate, understand, and internalize craftsmanship spirit, and at the behavioral level through indicators assessing whether skilled talents possess craftsmanship behavioral literacy, practical craftsmanship literacy, and craftsmanship competence literacy. At the same time, the main approach to evaluating the above three dimensions can adopt a multi-party joint evaluation model involving "schools, enterprises, and third-party institutions."

3.5 The Collaborative Faculty System for Cultivating Students' Craftsmanship Spirit through School-Enterprise Cooperation

It is essential to strengthen the construction of both internal and external teaching teams for the collaborative cultivation of students' craftsmanship spirit through school-enterprise cooperation. The development of the internal teaching team should focus on ideological and political course teachers, professional course teachers, student affairs workers, and outstanding student craftsmen. The external teaching team should primarily consist of World-Skills experts, enterprise master craftsmen, industry experts, and vocational education researchers.

3.6 The Collaborative Carrier System for Cultivating Students' Craftsmanship Spirit through School-Enterprise Cooperation

The construction of a collaborative system for cultivating students' craftsmanship spirit through school-enterprise cooperation cannot be separated from environmental immersion nor from the support of carrier platforms. First, the construction of the campus soft cultural environment. Institutions should take craftsmanship spirit as the soul of cultivating high-quality technical and skilled talent. The campus ethos should emphasize both moral integrity and professional excellence, and the academic atmosphere should stress the pursuit of excellence. Students should be guided to cultivate a spirit of meticulousness in scientific pursuits and a professional attitude of dedication and focus in their daily studies. Second, the construction of the physical environment, including campus vegetation and buildings. The campus hardware environment should be supplemented with soft decorations featuring craftsmanship elements. School buildings can be given names with craftsmanship characteristics, statues of renowned craftsmen can be erected, and outdoor video screens promoting craftsmanship spirit can be installed. In this way, an atmosphere that respects skills and promotes craftsmanship spirit is created, enabling the cultivation of craftsmanship spirit to influence students subtly in their daily lives. Third, the construction of a social service system. A multifunctional social service system integrating inheritance, promotion, research, innovation, education, and dissemination should be established. Taking the promotion of craftsmanship qualities, master demeanor, exemplary models, and scientific spirit as goals, the exemplary roles of figures such as "skilled artisans," "great national craftsmen," and "skill masters" should be used to lead craftsmanship-spirit-based education.

4 SAFEGUARD MECHANISMS OF THE COLLABORATIVE SYSTEM FOR CULTIVATING STUDENTS' CRAFTSMANSHIP SPIRIT THROUGH SCHOOL-ENTERPRISE COOPERATION

Any system is a dynamic and open system, and the formation and development of a system are closely related to its environment[12]. In the operation of the entire collaborative system for cultivating craftsmanship spirit through school-enterprise cooperation, none of the units exists in isolation or operates independently; rather, it is a process of frequent interaction and information exchange among internal and external environmental factors and constraints. The entire system of craftsmanship education is affected by various factors such as responsibility, evaluation, and funding, as well as by external constraints, including environment, policies, and risks, which influence the school-enterprise cooperation system. Conversely, the school-enterprise cooperation system can also exert a counteracting effect on these external constraints. When both reach an optimal adaptive state, the healthy development of the entire system for cultivating craftsmanship spirit through school-enterprise cooperation can be ensured, involving responsibility, evaluation, funding, and risk prevention, among others.

First, the responsibility safeguard mechanism for cultivating students' craftsmanship spirit through school-enterprise cooperation. The construction of the collaborative system for cultivating students' craftsmanship spirit through

school-enterprise cooperation must first implement the system of assigning a primary responsible person, clarify the responsibilities of project leaders and management institutions at all levels, link responsibility and performance with rewards and penalties, strengthen the sense of responsibility of project leaders, and stimulate their work enthusiasm.

Second, the evaluation safeguard mechanism for cultivating students' craftsmanship spirit through school-enterprise cooperation. Institutions should establish a project performance evaluation mechanism, incorporate the construction of the collaborative system for cultivating students' craftsmanship spirit through school-enterprise cooperation into the institution's annual work assessment, and take the quality of craftsmanship education as an important indicator for measuring the level of school operation and assessing departmental leadership, thereby strengthening performance evaluation. The quality of cultivating students' craftsmanship spirit should be regarded as an important component of evaluating the talent training quality of vocational institutions. Objectives should be clarified, tasks decomposed, and strict assessment should be implemented. Dynamic monitoring should be conducted on the construction progress, funding input, and utilization of projects related to craftsmanship education, with a focus on evaluating the intended functions and effects of talent cultivation.

Third, the funding safeguard mechanism for cultivating students' craftsmanship spirit through school-enterprise cooperation. Vocational institutions should establish a special fund for cultivating students' craftsmanship spirit through school-enterprise cooperation. They should actively seek financial allocations from higher-level authorities and at the same time secure matching funds internally. Special funds should be used exclusively for designated purposes, with institutions assuming the main responsibility for management. Institutional leaders should disburse and use funds in accordance with financial management regulations and procedures and bear direct responsibility for the use of funds. Meanwhile, the special funds for craftsmanship education should be managed scientifically and rationally by preparing an overall budget and an annual budget for the construction projects, keeping separate accounts for bookkeeping, and implementing dedicated fund usage and exclusive account management.

Fourth, the risk prevention mechanism for cultivating students' craftsmanship spirit through school-enterprise cooperation. Institutions should incorporate craftsmanship education into the top-level design of college development planning, innovate educational carriers, and conduct comprehensive exploration of the cultivation of students' craftsmanship spirit through school-enterprise cooperation throughout the talent training process. First, institutions should regard craftsmanship education as the central guiding philosophy of talent cultivation and extend it from the top-level design of the institution to the entire process of education. All resource elements—such as institutions, personnel, funding, and venues—must be effectively guaranteed. To ensure the smooth implementation of craftsmanship education in practice, the following systematic risk prevention mechanisms must also be established: (1) Establish a reporting system for major matters. If the institution makes significant progress, achieves breakthrough results, or encounters potential risks that may affect educational outcomes during the cultivation process, it should promptly prepare a summary report and submit it to the leadership departments responsible for educational system reform. (2) Establish a performance evaluation system. During the cultivation process, the institution should ensure that all educational objectives, responsibilities, and measures are in place and achieve visible results. Evaluation should be used as an external driving force and incentive factor, integrated into daily process management activities, and serve as an effective means to identify problems, improve management, and enhance performance. (3) Establish and improve the information reporting system. During the cultivation process, the institution should set up a dedicated body and designate full-time personnel with strong policy awareness, good writing skills, and a strong sense of responsibility to serve as information officers. These personnel should be specifically responsible for the collection and organization of information related to craftsmanship education, and promptly compile summaries of outcomes, progress, analytical reports, supportive policies, exemplary experiences, and other key developments for wider dissemination and application.

5 CONCLUSION

From the perspective of collaborative systems theory, the construction of a collaborative mechanism for cultivating students' craftsmanship spirit through school-enterprise cooperation can achieve new breakthroughs in terms of the direction, quality, content, mechanisms, measures, and influence of cultivating high-quality technical and skilled talent. First, from the perspective of collaborative systems theory, cultivating students' craftsmanship spirit through school-enterprise cooperation can deliver more outstanding craftsman-type talents to society and provide excellent high-quality technical and skilled personnel for regional economic development. Within a certain scope, it can generate significant influence, and the mature experience of collaborative education mechanisms for cultivating students' craftsmanship spirit through school-enterprise cooperation can be disseminated to other institutions, forming a demonstrative effect. Second, from the perspective of collaborative systems theory, cultivating students' craftsmanship spirit through school-enterprise cooperation can realize bidirectional interaction between institutional talent training and enterprise-based craftsman cultivation, accelerate the construction of a "great power craftsman" human resource pool, and promote the transition of great national craftsmen to world-class craftsmen. Third, from the perspective of collaborative systems theory, cultivating students' craftsmanship spirit through school-enterprise cooperation aligns with the objective needs of industrial structural transformation and upgrading, provides innovative talent momentum for the reform and innovation of traditional industries, strives to solve the problem of unbalanced and inadequate development in skilled talent education, and meets the people's needs for a better life.

COMPETING INTERESTS

The authors have no relevant financial or non-financial interests to disclose.

FUNDINGS

This research was funded by the "Research Project on the Cultivation of New Business Talent with Craftsmanship Spirit through School-Enterprise Cooperation" under the "14th Five-Year Plan for National Business Education Research" in 2024 (SKJYKT-2405133), and the "Key Research Project on the Basic Categories and Realization Paths of Modern Civilization Education of the Chinese Nation" under the Jiangsu Province Education Science Planning (B/2023/01/191).

AUTHOR CONTRIBUTIONS

Conceptualization, methodology and writing, Y.P.; review and editing, H.J.

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