

On safety culture literacy education in vocational colleges from the perspective of the Free Trade Port

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Abstract. Guided by General Secretary Xi Jinping's important expositions on safety culture and safety education, and grounded in the practical context of the Hainan Free Trade Port as well as the teaching practices of Hainan Vocational University of Science and Technology, this paper analyzes the core connotations and contemporary value of safety culture literacy education in vocational colleges from the perspective of the free trade port. It systematically reviews the university's achievements in curriculum system development, the establishment of practice bases, and innovations in talent cultivation models. On this basis, a four-dimensional optimization path—"policy anchoring, system construction, base empowerment, and collaborative cultivation"—is proposed to consolidate the human resource foundation for the safe development of the Hainan Free Trade Port.

Keywords: Hainan Free Trade Port, vocational colleges, safety culture literacy education

1. Introduction

On April 10, 2016, on the occasion of the first National Security Education Day, General Secretary Xi Jinping issued an important instruction: "Taking the establishment of National Security Education Day as an opportunity, we must be guided by a holistic approach to national security, fully implement the National Security Law, vigorously carry out national security publicity and education, and effectively enhance public awareness of national security" [1]. This important statement provides clear guidance for vocational colleges in conducting safety culture literacy education. The newly revised *Regulations on Work Safety in the Hainan Special Economic Zone* further stipulate that "in line with the needs of free trade port development, safety production education should be strengthened, and safety risks in emerging industries should be prevented" [2], offering an institutional framework for safety-oriented talent cultivation in the free trade port. The development of the Hainan Free Trade Port encompasses a range of industries, including high-end manufacturing, cross-border trade, and tropical tourism. In particular, emerging high-risk sectors—such as deep-sea diving and low-altitude aviation—as well as distinctive industries like biomedicine and cross-border logistics, impose compound requirements on the safety literacy of practitioners. As key institutions for cultivating frontline technical and skilled personnel, vocational colleges play a pivotal role: the level of safety culture literacy among their graduates is directly linked to the safety baseline and long-term sustainability of industrial development in the free trade port.

2. Core connotations and contemporary value of safety culture literacy education in vocational colleges from the perspective of the Free Trade Port

2.1. Core connotations

Safety culture literacy education in vocational colleges, viewed from the perspective of the free trade port, is guided by a holistic approach to national security and grounded in the distinctive context of the free trade port characterized by "all-round opening-up and coordinated multi-industry development." It aims to cultivate in students the core principle of "life first, safety foremost," and constitutes a comprehensive educational system encompassing multiple dimensions, including national security, industrial safety, public safety, and cybersecurity. Its core connotations can be summarized as "three dimensions of literacy".

2.1.1. Safety cognition literacy

This refers to students' systematic understanding of safety policies and regulations in the free trade port, operational standards for industrial safety, basic knowledge of public safety, and risks in emerging sectors. It includes familiarity with local regulations such as the *Regulations on Work Safety in the Hainan Special Economic Zone*, as well as mastery of professional norms in fields such as cross-border trade security and biopharmaceutical production safety.

2.1.2. Safety awareness literacy

This denotes students' capacity for risk anticipation and their sense of safety responsibility in both professional and everyday contexts. It is reflected in their keen perception of potential hazards within the unique environment of the free trade port and their conscious commitment to fulfilling safety responsibilities in their respective occupational roles.

2.1.3. Safety practice literacy

This refers to students' practical skills in responding to emergencies and their ability to coordinate effectively in handling safety incidents. It includes competencies in emergency rescue, safe operation of equipment, and risk prevention and control, as well as the capacity for cross-position and cross-departmental collaboration.

Within the free trade port context, safety culture literacy education places particular emphasis on "three forms of alignment": first, alignment with the industrial demands of the free trade port, highlighting areas such as cross-border security and safety in emerging industries; second, alignment with occupational scenarios, strengthening practical training and job relevance; and third, alignment with international safety standards, incorporating the safety requirements associated with the free trade port's opening-up, thereby demonstrating strong practicality, specificity, and forward-looking orientation.

2.2. Contemporary value

2.2.1. Consolidating the talent foundation for the safe development of the Free Trade Port

In the construction of the free trade port, safety risk prevention and control in emerging sectors—such as low-altitude aviation, deep-sea tourism, and cross-border logistics—depend on the safety literacy of highly skilled technical personnel. Through systematic safety culture literacy education, vocational colleges can supply these sectors with compound talents who are both technically proficient and safety-compliant, thereby preventing safety incidents at their source.

2.2.2. An important measure for implementing national security education policies

The theme of the eighth National Security Education Day in 2023 explicitly emphasized the need to "enhance public awareness and literacy in national security" [3]. The Ministry of Education's *Guidelines on*

Strengthening National Security Education in Primary, Secondary, and Higher Education further stipulate that national security education should be incorporated into the national education system, covering all stages from primary school to university, integrated into all aspects of teaching and learning, and embedded throughout the entire process of talent cultivation [4]. In this regard, safety culture literacy education in vocational colleges represents a concrete effort to implement national security education policies and to put into practice the holistic approach to national security, thereby promoting the effective expansion and deepening of national security education within the field of vocational education.

2.2.3. A pathway to enhancing the quality of talent cultivation in vocational colleges

Safety culture literacy has become an essential component of modern vocational competence. Traditional vocational education has tended to prioritize technical skill development while often neglecting the cultivation of safety literacy, leading in some cases to safety incidents caused by insufficient awareness or non-standard operations among graduates. By integrating safety culture literacy education into the entire process of talent cultivation, vocational colleges can achieve a dual integration of "skill enhancement" and "safety empowerment," thereby significantly improving the overall quality of graduates and their alignment with industry needs.

2.2.4. Supporting the modernization of social governance in the Free Trade Port

Drawing on their professional safety knowledge and skills, students in vocational colleges can actively engage with communities to enhance public safety awareness through outreach and educational activities, thereby contributing to the modernization of social governance in the free trade port. For example, the university has repeatedly organized the "Benevolent Footprints" initiative, conducting emergency first-aid training in communities such as Nanguo Venice City International Community, Mission Hills Community, and Shili Chunfeng Community. It has also carried out thematic outreach activities in communities including Haikou Bay Community and Hefeng Jiayuan Bihai Residence, focusing on electricity safety, financial fraud prevention, emergency response, and rehabilitation techniques.

3. Practical exploration of safety culture literacy education at Hainan Vocational University of Science and Technology

Hainan Vocational University of Science and Technology (hereinafter referred to as "HVUST"), responding to the needs of free trade port development, has established an educational model characterized by "systematized curricula, diversified bases, and normalized practice," with the goal of "cultivating safety literacy and serving safe development." This model has developed distinctive institutional features.

3.1. Establishing a "three-tier linkage" safety culture literacy education system

In strict accordance with the policy requirements of the Ministry of Education, the university has incorporated safety culture literacy education into its talent cultivation framework and constructed a three-tier curriculum system consisting of "general foundation + professional specialization + practical extension."

3.1.1. The first lesson for freshmen: military training / orientation education

During military training and orientation, all freshmen receive specialized instruction in national security education. Core topics—including the holistic approach to national security, free trade port safety policies, and public emergency response—are systematically introduced. A "theoretical instruction + case analysis" approach is adopted, incorporating typical safety incidents from the Hainan Free Trade Port to enhance the relevance and effectiveness of teaching.

3.1.2. *Specialized courses within professional education*

Targeted safety courses are developed in alignment with the occupational contexts of different disciplines. For example, the School of Maritime Studies offers courses such as *Ship Firefighting and Life-Saving and Marine Pollution Prevention Technology*, the School of International Nursing provides *Nursing Safety Standards and Emergency Skills Training*, the School of Urban Construction delivers *Construction Safety and Intelligent Fire Protection Technology*, and tourism-related programs include *Safety Protection for High-Risk Tourism Projects*. These initiatives ensure deep integration between safety education and professional training.

3.1.3. *Practical "general skills" courses in experiential education*

Through activities such as safety knowledge competitions, emergency drills, legal education lectures, and volunteer services, the university strengthens practice-oriented learning. Annual "fire drill" exercises are organized across departments, and experts from public security, firefighting, and customs authorities are invited to deliver specialized lectures, thereby enhancing students' safety awareness and emergency response capabilities.

3.2. Building a "four-in-one" network of safety culture literacy practice bases

Leveraging its strengths in industry-education integration, the university has established a multi-sector network of safety practice bases in collaboration with government agencies and enterprises. This network integrates "police-school cooperation, school-enterprise cooperation, school-local cooperation, and international collaboration."

3.2.1. *Police-school co-constructed legal and safety education bases*

In partnership with institutions such as Xincheng Prison of Hainan Province and the Meilan Brigade of the Haikou Public Security Bureau Traffic Police Detachment, the university has established legal and safety education bases. Activities such as "Prison Open Day" and "Traffic Police Entering Campus" are organized to deliver themed education on drug prevention, anti-telecom fraud, and traffic safety.

3.2.2. *School-enterprise co-constructed industrial safety bases*

The university collaborates with Shanghai Huayang Maritime Technology Development Co., Ltd. to establish a maritime safety training base, utilizing the research vessel *Marine Geology No. 26* for offshore safety training. It has also partnered with Hainan Zhongnanlong Safety Technology Co., Ltd. to build an intelligent fire protection training base for hands-on training in fire facility inspection and safety assessment. In cooperation with the Haikou 120 Emergency Medical Center, the university has established an "Emergency Safety Room" to provide training in CPR simulation and trauma first aid. The university has been officially designated as an "Emergency Safety Room" institution by the Haikou 120 Emergency Medical Center and recognized by the Ministry of Education as one of the first pilot institutions for school-based emergency education nationwide.

3.2.3. *School-local co-constructed public safety bases*

In collaboration with the Haikou Customs Animal and Plant Quarantine Center, the university has established a provincial-level "Grand Ideological and Political Course" practice base—the Hainan Biosecurity Science Education Base at the national gateway—offering practical teaching on biosecurity and the prevention of invasive alien species. It has also co-built a construction safety training base with the Jinpaigang Industrial Park in Lingao County to support infrastructure development in the free trade port.

3.2.4. *International cooperation safety bases*

The university has jointly established the China-Kazakhstan International Joint Laboratory for Medical and Elderly Care with Al-Farabi Kazakh National University, focusing on research and talent cultivation in

healthcare safety technologies. It has also collaborated with Rajamangala University of Technology in Thailand to establish the Li Brocade Workshop, incorporating elements of cultural security education.

3.3. Innovating a "three-all education" model for safety culture literacy cultivation

Adhering to the principle of "education involving all staff, throughout the entire process, and in all dimensions," the university integrates safety culture literacy education into teaching, student management, and campus culture.

3.3.1. *Participation of all personnel*

A diversified teaching team has been formed, consisting of academic faculty, industry experts, public security officers, and enterprise technical specialists. A student safety management mechanism—featuring "counselor + academic advisor + safety officer"—has been established to ensure comprehensive coverage in safety education.

3.3.2. *Full-process integration*

Safety culture literacy education is embedded across all stages, including orientation, coursework, practical training and internships, graduation projects, and career guidance. Safety training modules are included in orientation programs; job-specific safety instruction is provided prior to internships; and professional safety standards are emphasized during career guidance, forming a continuous and coherent educational chain.

3.3.3. *All-dimensional coverage*

Safety knowledge and policy interpretation are disseminated through campus broadcasting, bulletin boards, and official social media platforms. Safety culture signage is incorporated into the campus environment, and electronic displays broadcast safety education content and typical case studies around the clock, fostering a campus culture in which "everyone values safety, everything centers on safety, and safety is considered at all times."

3.4. Achieved outcomes

The university has achieved notable results in safety culture literacy education. For instance, in 2025, over 90% of graduates from the School of International Nursing obtained CPR + AED certification issued by the Hainan Red Cross Society. In October 2024, the university won second and third prizes in the Hainan regional competition of the National Undergraduate Tax Risk Management Case Competition. In 2025, it was awarded second prize in the Hainan Provincial College Students' Patriotic and National Defense Knowledge Competition. The student pass rate for safety cognition increased from 82% in 2020 to 96.5% in 2024, while the pass rate for emergency skills assessment reached 98%. Graduates trained by the university, distinguished by their strong safety literacy, have been widely recognized by enterprises in the free trade port, with employment satisfaction rates consistently exceeding 92% over the past three years.

4. Existing challenges in safety culture literacy education in vocational colleges from the perspective of the Free Trade Port

4.1. Insufficient precision in aligning educational content with Free Trade Port Needs

4.1.1. *Inadequate coverage of specialized content*

At present, safety education in vocational colleges remains largely focused on conventional public safety knowledge, with insufficient attention paid to the distinctive safety demands of the free trade port.

4.1.2. Lag in content updating

With the rapid development of free trade port industries, safety policies and standards are continuously evolving. However, the updating cycle of teaching materials and instructional content remains relatively long, resulting in a mismatch between some educational content and the current realities of safety development in the free trade port.

4.2. Limited innovation in educational models and technological application

4.2.1. Monotonous teaching models

Most vocational colleges still rely predominantly on classroom-based instruction, with a disproportionately high emphasis on theoretical teaching and relatively weak practical training components.

4.2.2. Low level of digitalization

Modern information technologies—such as Virtual Reality (VR), Augmented Reality (AR), and big data—have not yet been fully leveraged to construct immersive safety education scenarios.

4.3. Need for strengthening the development and outreach effects of practice bases

4.3.1. Vague functional positioning of practice bases

Some safety practice bases exhibit a tendency toward "prioritizing formal designation over substantive development." Training equipment is not updated in a timely manner, and teaching staff are insufficiently resourced, making it difficult to meet diversified training demands.

4.3.2. Limited outreach effects

Practice base resources primarily serve on-campus students, with insufficient linkage to enterprises and communities within the free trade port. As a result, their potential role in disseminating safety culture and providing social services has not been fully realized.

4.4. Incomplete collaborative education mechanisms

4.4.1. Ineffective school-enterprise collaboration

Enterprises demonstrate limited motivation to participate in safety education, and a fully developed model of "joint construction, co-education, and resource sharing" between schools and enterprises has yet to take shape.

4.4.2. Insufficient school-local collaboration

Collaborative education mechanisms involving government agencies and social organizations remain underdeveloped, with a lack of clear provisions regarding policy support, resource sharing, and responsibility allocation.

4.4.3. Weak internal coordination within institutions

Within institutions, coordination among administrative units—such as academic affairs offices, student affairs offices, and individual schools or departments—is inadequate. The integration of safety education with professional teaching and student management remains superficial, leading to fragmented implementation and a tendency toward siloed operations.

5. Optimizing pathways for safety culture literacy education in vocational colleges from the perspective of the Free Trade Port

5.1. Policy anchoring: aligning educational content with Free Trade Port Needs

5.1.1. *Developing Free Trade Port-Specific Safety Course Modules*

Guided by the newly revised *Hainan Special Economic Zone Work Safety Regulations* and aligned with the industrial development plan of the free trade port, vocational colleges should introduce a "Free Trade Port-Exclusive Safety Knowledge Module." This module would cover cross-border safety, biosafety, data security, and safety in high-risk industries. Industry experts and government personnel should be invited to participate in course design to ensure precise alignment between educational content and industrial needs.

5.1.2. *Establishing a Dynamic Content Updating Mechanism*

Leveraging free trade port industry associations and key enterprises, a platform for dynamically updating safety knowledge should be established to promptly incorporate the latest policies, industry standards, and safety technologies into teaching materials. Hainan College of Science and Technology could take the lead in forming a "Vocational Safety Education and Teaching Advisory Committee for the Free Trade Port" to periodically revise course standards and textbooks.

5.1.3. *Strengthening the integration of national security education with Free Trade Port Practice*

Teaching should interpret the application of the overall national security concept in the context of the free trade port, integrating topics such as border biosafety, marine security, and ecological safety. This approach enhances students' sense of civic responsibility and safety awareness.

5.2. System construction: innovating diverse educational models

5.2.1. *Advancing the "theory + practice + digital" three-dimensional teaching model*

Drawing on Taishan Vocational College of Nursing's "1331 Working Method [5]," theoretical instruction can employ case studies, seminars, and scenario simulations. Practical training should follow a full-cycle approach of "pre-class preparation—hands-on practice—in-class review." Digital teaching should include VR safety laboratories and online safety course repositories. Big data analytics can be applied to identify gaps in students' safety literacy, enabling precision teaching.

5.2.2. *Improving the safety literacy evaluation system*

A three-dimensional evaluation system should be established, including knowledge assessment, skills testing, and literacy evaluation. Knowledge is tested through written exams, skills via hands-on assessments, and literacy through comprehensive appraisal of daily performance, practical achievements, and volunteer service. Incorporating enterprise and social evaluations further enhances the objectivity and comprehensiveness of assessment.

5.3. Empowering practice bases: strengthening base development and outreach

5.3.1. *Optimizing the functional layout of practice bases*

Based on existing facilities at Hainan College of Science and Technology, a three-tier base network should be established: on-campus core bases, school-enterprise cooperative bases, and community practice bases. Core on-campus bases focus on faculty development and training equipment, school-enterprise bases implement "order-based" safety training aligned with key free trade port enterprises, and community bases provide safety education and skill training for the public.

5.3.2. Enhancing digitalization of bases

Practice bases should be equipped with VR simulation devices, intelligent assessment systems, and virtual training programs, combining online virtual training with offline hands-on exercises. For example, maritime safety bases could develop virtual sea rescue training systems, and construction safety bases could create high-altitude work simulation modules.

5.3.3. Strengthening base outreach effects

Bases should be opened to society, offering safety training to enterprise employees and community residents. Collaboration with key free trade port industrial parks could deliver customized safety training, while partnerships with primary and secondary schools could promote safety-focused experiential learning, creating a recognizable brand for free trade port safety culture dissemination.

5.4. Collaborative co-education: building a multi-party talent development framework

5.4.1. Establishing robust school-enterprise collaboration mechanisms

Through policy guidance and tax incentives, enterprises should be encouraged to engage deeply in safety education. A "fourfold co-construction" mechanism—co-building courses, faculty, bases, and student evaluation—should be implemented, integrating enterprise safety standards into teaching content and involving enterprise technical personnel in instructional assessment.

5.4.2. Deepening school-local collaboration

Regularized cooperation with government agencies, including public security, firefighting, customs, and emergency management, should be established. Their staff can serve as part-time mentors, contributing to course instruction, practical guidance, and emergency drill organization. Government resources should be leveraged to co-develop safety training bases and public science platforms.

5.4.3. Strengthening internal collaborative education

A cross-departmental coordination mechanism should be established, with a leadership group comprising the Academic Affairs Office, Student Affairs Office, Marxism College, and various secondary colleges. This group would oversee the integration of safety education with professional instruction, student management, and campus culture construction.

6. Conclusion

The safety development needs of the Hainan Free Trade Port present both new opportunities and challenges for vocational colleges in cultivating safety culture literacy. Implementing safety culture literacy education is an essential strategy for vocational colleges to uphold the overall national security concept and support the development of the free trade port. Hainan College of Science and Technology's practical experience in curriculum system construction, practice base development, and innovative talent cultivation models provides a valuable reference for similar institutions. Nevertheless, continued efforts are needed to optimize educational content, innovate teaching models, empower practice bases, and enhance collaborative talent development. Going forward, vocational colleges should base their strategies on the realities of free trade port development, using policy as guidance, systems as support, practice bases as platforms, and collaborative mechanisms as safeguards, continually improving the quality of safety culture literacy education.

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