# Construction and Practice of an International Talent Training Model for Civil Engineering Majors in Vocational Colleges under the 'VITAL' Concept

Jun Zeng, Lijuan Jiang*

Chongqing Vocational Institute of Engineering, Chongqing, 402260, China

*Corresponding author email: jianglj@cqvie.edu.cn

**Abstract.** Under China's "Double High-Level Plan," cultivating high-quality, technically skilled international talents has become a core goal of vocational education reform. Despite progress in the internationalization of civil engineering education, challenges persist, including narrow knowledge structures, poor alignment with local industry needs, and limited integration of international exchange with vocational training. Guided by the "VITAL" concept—Value shaping, International vision, Technical skills, Adaptability, and Lifelong learning—this study builds a civil engineering talent training model. The model promotes school-enterprise collaboration, industry-education integration platforms, international exchange, and project-based, practice-oriented teaching reforms. Results show it significantly enhances students' technical skills, global vision, and adaptability, offering a viable path for the high-quality development of vocational education.

**Keywords:** International talent cultivation, Civil engineering education, Vocational colleges, VITAL concept

## 1 Introduction

With the rapid evolution of global industrial structures and technological innovation, civil engineering is moving toward digitalization, intelligence, and sustainability. This shift has highlighted a growing shortage of technically skilled personnel with international competencies. Vocational education, as a key driver of regional economic growth and national strategic development, plays a vital role in cultivating high-quality, employable, and globally mobile talents.

Since the release of national and regional policies—such as the Action Plan for Improving the Quality of Vocational Education (2020-2023)[1] and the 14th Five-Year Plan for the Development of Education in Chongqing (2021-2025)[2]—efforts to build an internationalized vocational education system have accelerated. These initiatives emphasize diversified talent pathways and the enhancement of graduates' global competitiveness. In 2023, the Ministry of Education released the Opinions on Promoting the High-Quality Development of Modern Vocational Education[3], fur-

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ther advocating for expanded international cooperation and the creation of globally influential programs and partnerships.

As a strategic hub in Western China, Chongqing has prioritized the internationalization of vocational education, supported by national strategies such as the Chengdu-Chongqing Twin-City Economic Circle and the New Western Land-Sea Corridor. The city has advanced Sino-foreign cooperative education, overseas training platforms, and mechanisms for exporting high-level technical talent[4]. Local higher vocational colleges have led efforts to integrate school-enterprise collaboration, industry-education integration, and international connectivity into civil engineering programs. These efforts focus on emerging areas such as green construction, smart sites, and BIM, and have incorporated international curricula, bilingual teaching, overseas exchanges, and faculty mobility.

However, challenges remain, including limited internationalized curriculum resources, weak foreign language instruction, and insufficient international practice opportunities[5]. In response, vocational colleges in Chongqing have explored a "VITAL"-guided talent model, emphasizing Value orientation, International vision, Technology & skills, Adaptability, and Leadership. This approach has led to optimized training systems, expanded exchange platforms, and deeper school-enterprise collaboration. A regionally distinctive, internationally aligned civil engineering talent training system has thus begun to take shape—rooted in Chongqing, serving Western China, and aligned with global standards.

## 2 Major Challenges in the Internationalized Talent Cultivation of Civil Engineering Majors in Higher Vocational Colleges

As a core city in the Chengdu-Chongqing Economic Circle and a strategic fulcrum for Western China's development, Chongqing holds a vital position at the intersection of the "Belt and Road" Initiative and the Yangtze River Economic Belt. It is also a nationally designated transportation hub and a manufacturing base. With the advancement of major initiatives such as the China-Singapore (Chongqing) Demonstration Initiative on Strategic Connectivity, the city's pace of opening-up has accelerated. Urban development and international engineering projects have significantly increased the demand for civil engineering professionals with global vision and cross-cultural communication skills.

Chongqing Vocational Institute of Engineering, a key institution serving the civil and construction sectors in the region, has continuously promoted the integration of vocational education with regional industry needs. Focusing on areas such as construction engineering, project management, and intelligent construction, the institute has explored international talent cultivation pathways in line with China's outward development strategy under the "Belt and Road" Initiative since 2013. In 2017, it partnered with a Tanzanian state-owned company to develop a Luban Workshop, which officially launched in 2019. This workshop became one of China's earliest platforms for exporting vocational education to Africa. The institute has also trained foreign students under Chongqing's "Silk Road Project," joined the Ministry of Edu-

cation's "Future Africa - China-Africa TVET Cooperation Plan" in 2021, and was designated a national-level Luban Workshop construction unit in 2023.

Moreover, the institute has undertaken over ten provincial and ministerial-level research projects, including Practice Research on Civil Engineering Talent Cultivation Based on International Standards and Practice Research on China-Africa CEC Cooperation Model, earning second prize in the National Teaching Achievement Award and a special prize in the Chongqing Teaching Achievement Award. These efforts have laid a strong foundation for a regionally distinctive, internationally oriented civil engineering talent training system rooted in China-Africa cooperation and industry-education integration.

However, critical challenges persist that require urgent reform:

(1) Outdated Curriculum and Limited International Standards Integration: The curriculum still focuses heavily on local projects, lacking alignment with international standards in civil engineering, sustainability, and project management. Technical English, global collaboration skills, and overseas work adaptability are insufficiently covered, limiting students' capacity to apply international terminology and practices.

(2) Limited Teaching Resources and Faculty Development: Despite partnerships with countries like Tanzania, the overall scale of international cooperation remains narrow. High-quality foreign faculty recruitment is weak, and domestic instructors have few opportunities for international exchange or project experience. This restricts the global perspective needed for curriculum updates. Collaboration with international industry bodies and enterprises is limited, and more diverse overseas training bases and internships are needed.

(3) Weak Links Between Training and Local Employment: There is a lack of systematic planning in curriculum, assessment, and certification, making it difficult for students to translate international experience into domestic job competitiveness. Coordination with enterprises in Belt and Road countries is limited, and domestic employers lack mechanisms to integrate internationally trained professionals, weakening the sustainability of internationalization outcomes.

In conclusion, while Chongqing Vocational Institute of Engineering has made meaningful progress in internationalizing civil engineering education, further improvements in curriculum, faculty development, and employment linkage mechanisms are essential. These reforms are crucial to cultivating globally competent technical talent that supports the Belt and Road Initiative and meets evolving demands in international infrastructure development.

## 3 Construction and Practical Pathways of the "VITAL" Model for International Talent Cultivation in Civil Engineering Majors

Under the framework of China's "Double High Plan" for vocational education, the internationalization of talent cultivation has become a key approach for higher vocational colleges to enhance training quality and support national strategies such as the "Belt and Road" Initiative and international industrial cooperation. In alignment with

China's education opening-up strategy, Chongqing Vocational Institute of Engineering has actively explored international collaboration mechanisms within its civil engineering programs. The institute has developed an international talent cultivation model centered around the "VITAL" concept, which emphasizes Value shaping (V), International vision (I), Technical skills (T), Adaptability (A), and Learning (L)(see Figure 1). This model forms a dual-track, bidirectional mechanism of "going global" and "bringing in," systematically promoting the international development of civil engineering students.

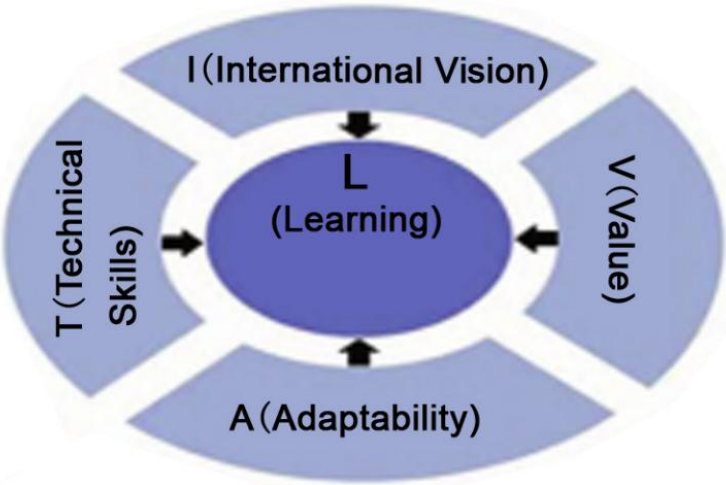


**Fig. 1.** "VITAL" International Talent Cultivation Model for Architecture-related Majors in Higher Vocational Education

(1) V - Value Shaping

The institute emphasizes professional value cultivation by leveraging platforms such as the Luban Workshop and the China-ASEAN Alliance for Civil Engineering Education. It expands international development channels through joint degree programs, overseas study pathways, and employment with Chinese enterprises abroad. Overseas teaching bases and technical training centers in Tanzania, Indonesia, and Thailand provide solid support for developing globally competent civil engineering professionals.

(2) I - International Vision

By establishing platforms like the "Municipal-Level High-Level Innovative Team in Civil Engineering Vocational Education" and the "Digital Construction Industry-Education Integration Innovation Center," the institute enhances international perspectives for students and faculty. Guided by "standards-led, dual integration, and three-level cooperation," it addresses gaps in international standards and practice environments through Sino-foreign joint research and participation in global standard formulation.

(3) T - Technical Skills

The institute prioritizes technical competency by building a faculty team that blends full-time and part-time instructors and integrates international and local teaching resources. Based on a "standards-led, locally oriented, globally distinctive" philosophy, it has developed over 30 bilingual courses—including Foundation Engineering Construction and BIM Applications—to blend internationalization with localized skill development.

(4) A – Adaptability

To foster cross-cultural adaptability, the institute launched the "International Civil Engineering Cultural Exchange Center," organizing forums like the China-Africa Civil Engineering Education Forum and China-Thailand TVET Cooperation Symposium. It also collaborated with Tanzania's NACTE to incorporate national civil engineering vocational standards (NTA7 and NTA5), boosting students' global adaptability and employability.

(5) L – Learning

The institute has created a progressive, modular learning pathway, helping students gradually enhance core competencies and meet global civil engineering standards.

"2+1" Customized Pathway for Chinese Civil Engineering Students: In the first two years, students receive language and professional training domestically; in the third year, they undertake practical courses at overseas Luban Workshops. Upon graduation, they are employed by Chinese enterprises operating abroad. A total of 122 students have completed this pathway, with 22 promoted to core technical positions (see Figure 2).

"1+2+1" Bachelor's Pathway for Tanzanian Civil Engineering Students: Students undergo foundational training in Chinese language and professional skills during their first year in Tanzania, study in China during the second and third years, and complete practical training at the Luban Workshop in the fourth year. This pathway has produced a number of high-level local civil engineers (see Figure 3).

**Fig. 2.** Training Conducted by Our Faculty at the Luban Workshop in Tanzania

"2+1" Non-Degree High-End Local Training Program: This includes two months of Chinese language and management training abroad followed by one month of on-

site project training in China. Over 700 trainees have been cultivated, addressing the shortage of middle- and high-level management personnel in partner countries.

**Fig. 3.** Tanzanian International Students Visiting Our Institution

Through the systematic implementation of the "VITAL" model, Chongqing Vocational Institute of Engineering has formed a replicable and scalable international talent cultivation mechanism for civil engineering majors, contributing both to the localization of international standards and to the global recognition of China's vocational education capabilities.

## 4 Practical Achievements in the Cultivation of International Skilled Talents

Guided by the "VITAL" international talent cultivation model and following the pathway of "Standard-led, Dual-linkage & Integration, and Triple-cooperation & Implementation," our college has made significant strides in cultivating globally competent technical talents in the civil engineering field. The model has resulted in steady improvement in student quality, teaching capacity, international platform development, and the establishment of a recognized vocational education brand.

(1) Significant Improvement in Student Quality and Outcomes in International Talent Cultivation

The "VITAL" model is built on five dimensions: Vocational skills, International vision, Talent development, Adaptability, and Leadership. It has guided the education of over 5,000 civil engineering students. Approximately 20% have joined major state-owned enterprises such as CSCEC, CREC, and Chongqing Construction Group. Over 100 graduates now work for overseas branches like CSCEC Sixth Bureau and Tanzania Joint Construction Co., Ltd., serving as technical backbones and team leaders in large international projects.

International student training has also achieved notable success. Over the past six years, we have provided civil engineering training for more than 700 Tanzanian mid- and senior-level professionals, including officials, university faculty, and engineers. Over 98% held bachelor's degrees or higher, with more than three years of experience. Among the first 21 trainees were government officials and doctoral-level faculty. After training, many contributed to key national infrastructure projects, such as the Bangulo Water Supply Project and Magufuli Bridge, supporting Tanzania's development.

In South Africa, 22 trainees participated in a one-year overseas exchange program. Upon returning, several were promoted to leadership roles in Chinese-funded construction enterprises, demonstrating the model's success in international talent development.

(2) Continuous Development of Teaching Teams and International Education Capacity

The construction of international teaching teams is a core pillar of the "VITAL" model. Currently, seven civil engineering faculty have obtained the Cambridge TKT certificate, twenty hold bilingual BIM teaching certificates from the UK's Dudley College, eight have Germany's IHK Trainer Certification, and another eight are certified under the German AHK Elite Training system. This ensures a strong team of dual-qualified instructors with both technical and international teaching capabilities.

Our college also engages international faculty through global partnerships. Each year, around 15 instructors deliver civil engineering courses in English, while over 10 overseas experts are invited to participate in co-teaching and guidance. To support hands-on training, we have built a 300-square-meter teaching facility at Ardi University in Tanzania and a 1,000-square-meter practical training base in the Sino-Tanzania National Industrial Park, providing professional environments for international skill development.

(3) Notable Achievements in International Platforms and Global Cooperation

The "VITAL" model has driven the development of key international education platforms. A major accomplishment is the establishment of a Luban Workshop overseas, which has become a flagship for Chinese vocational education. We also launched five "Chinese + Vocational Skills" programs to enhance international students' competencies.

To strengthen global cooperation, our college has built 11 platforms, including the China-Germany Rhine Industry Innovation Center and German 5G International Academy, which offer bilingual instruction, overseas internships, and skill certification. These platforms expand students' international horizons and ensure high-quality delivery of globally aligned vocational education.

Recognized as a national and Chongqing-level demonstration base for international education, we actively participate in the Ministry of Education's "Jingshi Program" and the China-ASEAN Double Hundred Vocational Schools Program. Our college has received honors such as "Chongqing Advanced Collective for Foreign Affairs" and "Advanced Unit for International Student Education," affirming our leadership in international vocational training.

(4) Expanding Global Influence and Establishing a Recognized Vocational Education Brand

Through the continued implementation of the "VITAL" model, our global influence—especially in Africa—has grown significantly. We conduct the Chongqing Mayor's Scholarship Program to support excellent international students annually. In June 2019, a delegation of over 20 Chinese vocational college presidents visited our Luban Workshop in Tanzania, deepening exchange and cooperation. Later that year, ambassadors from several African countries visited our college, highlighting the workshop's contributions under the Belt and Road Initiative.

The Tanzanian government has formally integrated our training programs into its national education framework. Our work has received recognition from the President of Tanzania and been featured by major media including Xinhua News Agency, China Education Daily, and Tanzania Daily News. These achievements have boosted the international reputation of our civil engineering program and firmly positioned our college as a leader in vocational education under the "VITAL" framework.

## 5 Conclusion

By establishing an international talent cultivation model centered on the core concept of "VITAL," Chongqing Institute of Engineering has built a long-term and stable international cooperation mechanism with higher education institutions across multiple countries. Over the past five years, the Institute has successfully launched Luban Workshops and developed high-level joint training programs with overseas universities, including several full-English instruction programs tailored for civil engineering majors. Under the guidance of the "VITAL" model, the Institute has continuously optimized curriculum design and teaching resources, enhanced the professional capacity of its faculty, and broadened students' international outlook, engineering innovation ability, and academic literacy, thereby equipping them to effectively address the challenges posed by globalization and the transformation of the civil engineering industry.

With the ongoing development of the global economy and the structural upgrading of the civil engineering sector, the cultivation of internationally competent skilled talents in civil engineering is facing broader prospects and new development opportunities. Moving forward, the Institute will further deepen international exchanges and cooperation, strengthen the development of teaching teams and resource systems, and refine its quality assurance and evaluation mechanisms for talent cultivation. Emphasis will be placed on enhancing students' practical competence and capacity for innovation to meet the increasingly diverse and complex demands of the civil engineering profession.

Looking ahead, the Institute is committed to cultivating more high-level professionals with global perspectives, strong local grounding, innovative thinking, and critical analytical skills. These efforts are expected to promote the internationalization of civil engineering vocational education and contribute to the training of a new generation of internationally competitive, application-oriented civil engineering talents.

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