Research and Practice on the Training Model of High-Skilled Talents for Intelligent Buildings in the Context of China's Modernization

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Abstract. Guided by the spirit of the 20th National Congress, and oriented towards the digital transformation of education and the development of regional industries, this study revolves around the three major strategic tasks of "provincial modern vocational education system, municipal industry-education community, and industry-education integration community." Addressing the shortcomings of existing educational models, which often lack the flexibility and industry alignment required for modern economic demands, this paper leverages digital technology, interdisciplinary integration, and the construction of an alumni economy to deepen the integration of "four chains" and optimize the mechanism and implementation path for the innovative talent training model of high-skilled personnel in smart construction. The research results indicate that this approach not only enhances alumni engagement but also innovates the model of high-skilled talent cultivation. Moreover, by integrating industry needs directly into the educational process, it improves the quality of skill talent cultivation.

1 Introduction

Under the vigorous promotion of national policies and the rapid advancement of cutting-edge technologies like 5G, the Internet of Things, artificial intelligence, cloud computing, and big data, the smart building sector is undergoing a significant transformation. As the industry evolves and the market expands, shifts in labor market demands and supplies have become evident. Technological progress has raised the skill level expectations for workers, and the need for highly skilled professionals in the smart building domain is growing. However, the current pace and quality of talent development have not yet met market demands, leading to a shortage of skilled personnel in the smart building industry and a dual challenge of "job-finding difficulties" and "hiring difficulties" [1,2].

Scholars from both domestic and international backgrounds have delved into the development and essence of Chinese-style modernization, proposing various theories and perspectives, and analyzing the unique path of China's modernization. International scholars focus on China's reform and opening-up experiences and economic development models to explore the characteristics and significance of China's modernization [3,4].

In the realm of education, researchers have extensively discussed how education can support Chinese-style modernization, with a focus on educational reform, quality enhancement, and talent cultivation. Domestic research primarily concentrates on the practical and policy analysis of educational system reform, curriculum reform, and teacher development. Additionally, international educational cooperation and the establishment of educational demonstration zones have become focal points of research [5,6].

Since the State Council issued the "National Vocational Education Reform Implementation Plan" in 2019, China's focus on vocational education has intensified. The National Vocational Education Conference in 2021 further clarified the direction of vocational education development. The "Strategy of Invigorating the Country through Science and Education" proposed in the report of the 20th National Congress of the Communist Party of China in 2022 once again emphasized the central role of education in national development [7].

This paper will delve into new models for the cultivation of highly skilled talents in smart buildings under the backdrop of China's modernization, focusing on five aspects: digital reform, alumni economy, interdisciplinary integration, "four-chain" integration, and the practice of innovative models for the cultivation of highly skilled talents in smart buildings. These studies will not only help address the talent shortage in the smart building industry but also provide solid talent support for the construction of Chinese-style modernization. By exploring these new models, this paper offers significant theoretical foundations and practical references for the

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field of educational development, promoting the deep integration of vocational education with industry needs.

2 Digital Transformation of Skilled Talent Cultivation

As digital transformation becomes a key driver of global economic development, the cultivation of skilled talents is also embracing new opportunities brought about by digital reform. This reform is not only about updating educational content but also involves innovation in teaching methods and management models.

Firstly, digital reform emphasizes the use of virtual simulation training platforms and industry-education integration bases, which provide trainees with a learning environment that closely resembles real work settings. Through these advanced technological means, trainees can practice in a safe and controllable environment, thereby more rapidly acquiring necessary skills. Concurrently, the "AI (Artificial Intelligence)+" personalized curriculum system designed based on digital technology can offer customized learning paths according to each trainee's progress and capabilities, achieving true personalized teaching.

Secondly, the reconfigurability of the new curriculum system implies that it can be quickly adjusted and updated according to the needs of industrial development and technological advancements. This flexibility ensures that educational content remains synchronized with market demands while also meeting trainees' needs for enhancing digital literacy, individual development, and lifelong learning. The concept of "one person, one curriculum" and "one term, one model" reflects the personalization and precision of education, which helps cultivate high-skilled talents that better meet societal needs.

Furthermore, enhancing the self-diagnosis and improvement capabilities of talent cultivation models through digital technology is another important aspect of digital reform. By establishing and perfecting vocational education teaching management mechanisms, real-time monitoring and assessment of the teaching process and outcomes can be achieved. A collaborative management mechanism involving multiple stakeholders can integrate resources from schools, enterprises, and industry organizations, forming a joint force to promote the improvement of talent cultivation quality.

Additionally, the establishment of a dynamic talent cultivation evaluation and early warning mechanism helps to identify and address issues in the educational process in a timely manner, ensuring the quality and efficiency of talent cultivation. This mechanism can dynamically adjust teaching strategies and content based on trainees' learning performance and feedback to meet the needs of different trainees.

3 Innovative talent training model based on alumni economy

In the current job market, structural employment contradictions have become a prominent issue, characterized by a mismatch between job seekers and employers' needs, known as the coexistence of "difficulty in finding jobs" and "difficulty in recruiting." Particularly in the emerging interdisciplinary field of smart buildings, due to rapid technological updates and high professional requirements, this contradiction is particularly evident, posing a significant challenge to the healthy development and industrial upgrading of the entire industry. Faced with this challenge, universities, as important bases for talent cultivation, have the responsibility to adopt innovative strategies to respond. Among them, the utilization of alumni resources is a direction worth exploring in depth. Alumni associations, as a bridge connecting the school with alumni and alumni with alumni, can not only provide valuable industry information and career guidance for current students but also provide a platform for alumni to continue learning and communicating, promoting the healthy development of the alumni economy.

By standardizing and strengthening the construction of alumni associations, their role in talent cultivation and employment services can be better played. On the one hand, schools can rely on the resources of alumni associations to conduct industry research, understand the latest development trends and talent needs in industries such as smart buildings, thus providing a basis for the reform of teaching content and methods. On the other hand, alumni associations can provide students with internship and employment opportunities, helping them better understand and integrate into the industry, achieving high-quality employment.

In addition, the implementation path of high-matching recruitment and employment based on alumni associations can effectively solve the problems of "difficulty in finding jobs" and "difficulty in recruiting." Through the recommendations and connections of alumni associations, employers can more accurately find talents who meet the job requirements, while job seekers can find suitable job opportunities more quickly, achieving efficient matching between both parties.

4 Integration of Disciplines to Reform Talent Cultivation Models

In the current educational context, the integration of disciplines has become an important trend in promoting the reform of talent cultivation models. As a demonstration unit for the construction of high-level professional clusters in provincial vocational colleges, our school is actively embracing this change, using interdisciplinary integration as a 'catalyst' for reform. By integrating resources and advantages from different disciplines, our school has built a diversified structure of interdisciplinary integration. This structure not only provides students with a richer and more three-dimensional learning experience but also improves teaching efficiency through the use of digital technology, making learning materials more intuitive and vivid. This innovative teaching model enables students to acquire

new knowledge and skills at the intersection of multiple disciplines, thereby better adapting to the complexity and variability of future society.

In terms of academic organizational models, our school has adopted an open and inclusive attitude, breaking down traditional disciplinary barriers and encouraging communication and collaboration between different disciplines. This interdisciplinary cooperation is reflected not only in project research and curriculum design but also in the innovation of teaching methods and learning activities. In this way, our school has successfully stimulated students' innovative thinking and practical abilities, enabling them to use knowledge and skills from multiple disciplines when solving practical problems. In addition, our school has also strengthened cooperation with enterprises, integrating the actual needs and latest technologies of enterprises into teaching. This industry-education integration model allows students to better understand industry trends and improve their employability.

In order to cultivate compound talents who have a solid professional foundation, innovative spirit, and sense of social responsibility, our school also focuses on the comprehensive quality cultivation of students. By offering general education courses, our school has broadened students' knowledge horizons, enabling them to better understand and appreciate the value of different cultures and disciplines. At the same time, by holding various academic lectures and practical activities, our school has improved students' cross-cultural communication abilities and team collaboration skills. These activities not only enrich students' campus life but also lay a solid foundation for their future success in multicultural work environments. Through these comprehensive measures, our school is committed to cultivating talents who can adapt to the rapidly changing world. They will be able to play a leadership role in their future careers and make a positive contribution to the development of society.

5 Research on "four-chain" integrated talent training mode

The 'Four Chains' integration talent cultivation model is a systematic and open new paradigm for talent cultivation. It is supported by digital technology, characterized by interdisciplinary integration, platformed by the alumni economy, and secured by the collaboration of multiple stakeholders. The aim is to build a new path for talent cultivation that fosters a virtuous cycle of development in 'education + talent + technology + industry,' as shown in Fig. 1.

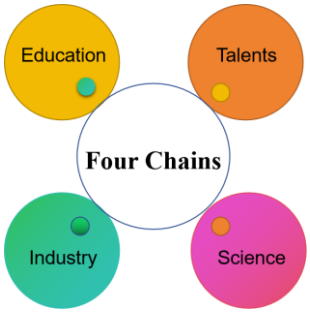

Fig. 1. Block diagram of four-chain integrated talent training mode

The empowerment of digital technology is becoming a key factor in promoting the modernization of education, providing technical assurance for the all-round innovation of educational content, teaching methods, learning modes, and evaluation systems. Under the background of the 'Four Chains' integration, that is, the organic combination of the education chain, talent chain, innovation chain, and industry chain, the application of digital technology is particularly important.

The integration of interdisciplinary subjects injects new vitality into talent cultivation. In the era of knowledge explosion, the knowledge of a single discipline can no longer meet the diverse needs of society for talents. Through interdisciplinary curriculum settings and project research, students can establish connections between different disciplines, cultivate interdisciplinary thinking and problem-solving abilities, which will greatly enhance their innovation and adaptability.

Finally, the collaborative construction of multiple stakeholders is key to achieving the integration of the 'Four Chains.' Governments, schools, enterprises, social organizations, and other parties should participate in the talent cultivation process together, forming a community of industry-education integration. Through policy guidance, resource sharing, project cooperation, and other means, all parties can complement each other's advantages and jointly promote the innovation and development of talent cultivation models.

6 Innovative mode of training intelligent building high-skilled talents

Firstly, practice and refine the "AI+" personalized curriculum system. This system should fully integrate artificial intelligence technology to provide students with a customized learning experience, enabling them to develop personalized learning paths according to their interests and abilities. By intelligently analyzing students' learning behaviors and outcomes, educators can more accurately assess students' learning status and provide corresponding teaching support.

Secondly, deepen the "Four Chains" integration talent training model, which closely integrates the education chain, innovation chain, industry chain, and talent chain, forming a virtuous interactive educational ecosystem. This model emphasizes the deep integration of education and industry, providing students with

practical opportunities through school-enterprise cooperation and the integration of education, research, and industry, allowing them to learn and grow in real work environments.

Lastly, improve the talent training model to provide new momentum for local industrial development. Through the above practices, schools can cultivate highly skilled talents in smart construction who not only have professional skills but also possess an innovative spirit and a sense of social responsibility. These talents will become an important force in promoting local industrial upgrading and economic development. The characteristics of the smart construction highly skilled talent training model are "position-focused, certificate-integrated, and education-training integrated," as shown in Fig. 2.

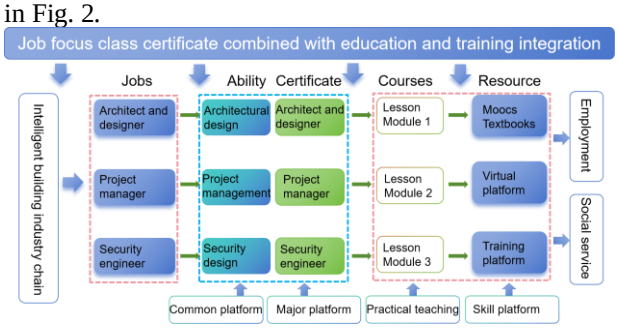

Fig. 2. Intelligent building high-skill talent training model

This plan combines traditional education with modern teaching methods, forming a diversified and three-dimensional training system. By integrating MOOC (Massive Open Online Course) resources and textbook resources, the plan provides students with a rich theoretical knowledge learning path. At the same time, with the help of virtual platforms and online resources, students can practice in a simulated environment.

The innovation of the plan lies in its certificate-integrated training model, which emphasizes the practicality and targeting of education. By closely cooperating with the industry, the curriculum content directly corresponds to job requirements, and students can acquire skills closely related to future work during the learning process.

Furthermore, the plan also reflects the educational concept of education-training integration, aiming to cultivate students' comprehensive quality and innovation ability by providing professional training in different fields such as project managers and security engineers. While completing their studies, students can also achieve the transformation from students to professionals through practical training resources and professional certificate certification.

7 Conclusion

This study aimed to investigate innovative models for cultivating highly skilled talents in the field of smart construction within the context of China's modernization. By implementing an "AI+" personalized curriculum system, a "four-chain" integration model, alumni economic development, and in-depth industry-education integration strategies, we have successfully established a novel framework for talent cultivation. The findings indicate that this model has significantly enhanced the personalization and practicality of education, effectively improving students' professional skills and employability, thus providing the smart construction industry with a substantial number of high-quality professionals.

While positive outcomes have been achieved, the study acknowledges its limitations, such as a limited sample size and a short implementation period, which may affect the generalizability and long-term effectiveness of the results. Future research should expand the sample size and conduct long-term follow-ups to verify the sustainability of the model. Moreover, it is essential to further explore the adaptability and scalability of this model in different regions and cultural contexts to facilitate the comprehensive development and optimization of talent cultivation models for the smart construction sector.

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