

# Research on the “Intelligent + Training” Model for Key Teachers in Vocational Colleges under the Context of Digital Transformation

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**Abstract:** In the context of the comprehensive promotion of digital transformation in vocational education and the official implementation of the “Teacher Digital Literacy” educational industry standard, the training work for key teachers in vocational colleges is facing practical problems such as content disconnected from the industry, monotonous and rigid forms, difficult implementation of effects, and incomplete support systems. To effectively overcome the limitations of traditional training models and better serve the high-quality development of vocational education, this paper, based on the TPACK framework, precise teaching theory, and teacher learning community theory, constructs an “intelligent + training” model for key teachers in vocational colleges.

**Keywords:** Digital transformation; Vocational colleges; Key teachers; Intelligent + training; Digital literacy

**Online publication:** December 20, 2025

## 1. Background and problem statement

### 1.1. Policy-driven

Vocational education is currently at a critical stage of digital transformation. The digital capacity building of the teaching staff has become a key focus of policy attention. High-level school construction all regards the digital teaching ability, technological integration ability, and industry adaptation ability of teachers as core evaluation indicators<sup>[1]</sup>.

Under the overall layout of promoting the digital strategy action for vocational education at the national level, teachers are seen as the key variable driving the digital transformation of vocational education. Enhancing the digital literacy and intelligent teaching ability of key teachers has become an important task that vocational colleges must fulfil. Under the multiple policy-driven circumstances, the traditional training model has been unable to meet the needs of teacher development in the new era. Reconstructing the training system for key teachers is imperative.

### 1.2. Current challenges

At present, the training of key teachers in vocational colleges is still mainly based on traditional models. Under the background of digital transformation, several problems have emerged as follows:

- (1) The training content is disconnected from the cutting-edge of the industry. Most training remains at the basic level of information technology operation, and is not closely integrated with new technologies and new business models such as intelligent manufacturing, big data, artificial intelligence, and virtual simulation, making it difficult to support teachers in developing digital courses and conducting intelligent classroom teaching;
- (2) The training methods are relatively monotonous. It still mainly adopts offline centralized training and unified teaching as the main form. The learning time is fixed, and the learning space is limited, making it difficult to balance the actual rhythm of teachers' daily teaching, research, and enterprise practice, and lacking flexible, fragmented, and continuous learning support;
- (3) The training effect is prone to be virtualized. The assessment and evaluation mainly rely on graduation examinations and submission of summary reports, lacking tracking of actual achievements such as classroom improvement, training project optimization, and student ability enhancement;
- (4) Precise support is insufficient. The training plans are mostly based on experience judgment, lacking data-based capability diagnosis, personalized learning guidance, and dynamic feedback mechanisms, thereby being unable to meet the differentiated development needs of key teachers from various specialties and levels <sup>[2]</sup>.

### 1.3. Core issues

Under the background of the comprehensive digital transformation of vocational education, the traditional training model shows obvious inadaptability in terms of supply methods, implementation paths, evaluation mechanisms, and support systems. The utilization of new-generation information technologies such as artificial intelligence, big data, and virtual simulation to change the previous training methods and shift to a precise and personalized empowerment model, building a new training system that conforms to the characteristics of vocational education, aligns with the growth laws of key teachers, and meets the needs of industrial development, has become the core issue faced by vocational colleges in teacher development. Conducting research on this issue and exploring a feasible, scalable, and sustainable “intelligent + training” model is of significant theoretical value and practical significance for improving training quality, strengthening teachers' digital competence, and promoting the digital transformation of vocational education <sup>[3]</sup>.

## 2. Theoretical foundation and model construction

### 2.1. Core concepts

“Intelligent + Training” is a new type of teacher professional development approach emerging in the context of digital transformation. It is supported by technologies such as artificial intelligence, big data, learning analytics, and virtual simulation, and covers the entire process of teacher training needs analysis, content provision, process management, effect evaluation, and iterative optimization. Compared with traditional training, “Intelligent + Training” no longer focuses on a unified curriculum and centralized teaching, but emphasizes centering on individual teacher needs, using data to create ability profiles, using technology to achieve precise delivery, using mixed scenarios to enhance practical experience, and using data evaluation to ensure implementation effectiveness. Its ultimate goal is to promote the simultaneous improvement of teachers' digital literacy and teaching ability, and to transform training work from being driven by experience to data-driven, from uniform supply to personalized empowerment, and from phased training to continuous development <sup>[4]</sup>.

### 2.2. Theoretical basis

This article constructs the “Intelligent + Training” model mainly relying on three theoretical foundations as outlined:

- (1) TPACK framework, which emphasizes the deep integration of subject content knowledge, teaching method knowledge, and technology knowledge, suggesting that the training of key teachers should not only focus on technical

- operations but also guide teachers to integrate intelligent technologies into teaching design, classroom implementation, practical training, evaluation feedback, etc., forming a new teaching paradigm under the empowerment of technology;
- (2) The precise teaching theory, which emphasizes conducting differentiated diagnosis and targeted intervention based on data, providing methodological support for the precise identification of training needs, the customization of individualized learning paths, and the precise evaluation of training effects, enabling training to truly “tailor to individuals and train according to needs”;
  - (3) The theory of teacher learning communities, which emphasizes collaborative study among teachers, resource sharing, experience creation, and peer assistance, providing a theoretical basis for online and offline mixed training, virtual teaching, and school-enterprise collaborative training, helping to build an open, interactive, and sustainable teacher professional development ecosystem <sup>[5]</sup>.

### 2.3. Structure of the “Smart + Training” model

Based on the above theoretical support, this article constructs a “Intelligent + Training” model for vocational school key teachers with the core goal of improving digital competence.

The overall model consists of four core components and an integrated technical support system, forming a complete closed-loop operation system. The four components are precise diagnosis, personalized push, mixed training, and data evaluation. Precise diagnosis is the starting point of the training, used to identify the teacher’s ability weaknesses and development needs; personalized push is based on the diagnosis results to match resources and paths, achieving differentiated supply; mixed training is an implementation carrier combining online and offline, theory and practice; data evaluation is a comprehensive tracking of the training process and results, providing a basis for optimization and adjustment. The technical system supporting the effective operation of this model includes learning analytics technology, intelligent recommendation algorithms, virtual simulation platforms, and big data management systems, providing guarantees for the full-process intelligence <sup>[6]</sup>.

### 2.4. Core characteristics of the model

Compared with traditional training models, “Intelligent + Training” presents significant characteristic differences. In terms of demand analysis, traditional training relies on experience judgment and unified surveys, while “Smart + Training” relies on multi-dimensional data to create a teacher ability profile, achieving precise identification.

In terms of content supply, traditional training adopts a unified curriculum and batch distribution, while “Intelligent + Training” uses knowledge mapping and capability gaps for personalized matching, providing modular and selectable resources. In terms of training methods, traditional training is mainly based on centralized face-to-face teaching and one-way indoctrination, while “Intelligent + Training” adopts a deep integration of online self-study and offline concentrated training, emphasizing interaction and practice. In terms of effect evaluation, traditional training focuses on result assessment and subjective evaluation, while “Intelligent + Training” emphasizes the tracking of the entire process data, using real evidence to reflect training effectiveness. In terms of mode optimization, traditional training relies on experience for local adjustments, while “intelligent + training” is based on data-driven evidence-driven iteration to achieve continuous optimization. These features make “Intelligent + training” more suitable for the actual needs of teachers’ professional development in the digital era.

## 3. Mode operation and implementation path

### 3.1. Precise diagnosis: Training demand identification

Precise diagnosis is the prerequisite for the effective implementation of the “Intelligent + training” mode. Its core lies in comprehensively, objectively, and accurately grasping the current digital literacy status and training needs of teachers.

During the implementation process, institutions can, based on the “Teacher Digital Literacy” standard, develop a

digital literacy assessment scale for key teachers, conducting a systematic assessment from dimensions such as digital awareness, digital knowledge, digital skills, digital ethics, and teaching integration. At the same time, integrating multi-source data such as teachers' classroom teaching behaviors, platform learning records, professional development archives, enterprise practice evaluations, and teaching activity participation, through learning analysis technology, to form a complete personal ability profile. Finally, generating a capability gap report for each key teacher, clearly identifying their strengths, weaknesses, and development directions, providing a reliable basis for the formulation of subsequent personalized training plans, and avoiding "one-size-fits-all" and "one-size-fits-all" training methods from the source<sup>[7]</sup>.

### **3.2. Personalized push: Learning path customization**

Based on a precise diagnosis, enter the personalized learning content and path push stage. Institutions should rely on the vocational education teacher position ability standards to build a digital literacy knowledge map and professional teaching resource library, clearly defining the ability structure that different professionals and different-level key teachers should possess. Relying on intelligent recommendation algorithms, modularized content such as micro-courses, teaching cases, virtual simulation training projects, industry technical reports, and excellent lesson resources are automatically matched with the teachers' capability gaps, generating an exclusive learning path for each teacher. The learning path can be divided into basic layer, intermediate layer, and innovative layer, corresponding to different goals such as digital skill popularization, technology teaching integration, and intelligent teaching innovation. Teachers can choose to study based on their own time and needs, and the platform automatically records the learning progress and provides periodic reminders, making the training more flexible, efficient, and tailored to individual actual situations.

### **3.3. Hybrid training: Training method innovation**

Hybrid training is the core of the "Intelligent + training" implementation, adopting a diversified approach combining online and offline, theory and practice, and school and enterprise collaboration. Online training is carried out through the intelligent training platform, allowing teachers to conduct self-study, intelligent Q&A, virtual teaching, peer evaluation, resource upload and sharing, breaking the limitations of time and space, and achieving fragmented learning and regular improvement.

Offline training is oriented towards problem-solving and ability improvement, conducting teaching workshops, topic discussions, demonstration class observations, teaching improvement practices, and collective lesson planning, focusing on practical training for real problems in teaching. At the same time, VR/AR virtual simulation technology is introduced to provide immersive training teaching experiences for teachers, helping them master teaching methods in scenarios such as intelligent manufacturing and digital twins. School-enterprise collaboration is also an important component of hybrid training, organizing teachers to participate in technological research and development, project practice, and on-site training in enterprises, promoting the synchronous improvement of teaching ability and industrial ability<sup>[8]</sup>.

## **4. Real challenges and promotion suggestions**

### **4.1. Main challenges**

In the process of promoting the implementation of the "Intelligent + training" mode, vocational schools generally face four levels of challenges as follows:

- (1) Technological level: The existing training platforms, teaching platforms, and management platforms have fragmented functions, inconsistent data interfaces, and non-standardized standards, making it difficult to achieve data interconnection and resource sharing, affecting the intelligent operation of the entire process;
- (2) Teacher level: Key teachers have different age structures, disciplinary backgrounds, and technical foundations. Some teachers have low digital literacy and have a fear of intelligent technology, have insufficient acceptance and application willingness, which affects the overall progress of the training;

- (3) Institutional level: The recognition of training credits, the conversion of outcomes, and the incentive mechanism are not fully developed. The connection between training effectiveness and performance assessment, professional title evaluation, and merit awards and commendations is not tight enough. The internal driving force for teachers to participate in training is insufficient;
- (4) Ethical level: The scope of data collection and usage rights is not clear, the protection of teachers' privacy and data security systems are not sound, there is a risk of information leakage and abuse, and data ethical norms need to be strengthened.

## **4.2. Implementation recommendations**

To address these challenges, efforts should be coordinated from five aspects: platform, resources, teams, systems, and ethics. This will provide support for the implementation of the “Intelligent + training” model. In terms of platform construction, integrate the existing systems within the school, break down data barriers, build an integrated intelligent training platform, unify data standards, and achieve full integration of demand diagnosis, resource push, training management, and evaluation analysis.

In terms of resource development, deepen cooperation with enterprises, jointly develop digital training resources that are close to the industry frontiers and combine virtual and real elements, and build a modular, scenario-based, and highly practical resource library. In terms of team building, implement a layered and classified digital literacy improvement program, design differentiated training content for teachers of different ages, different majors, and different backgrounds, strengthen practical training and case teaching, and enhance teachers' technical acceptance and application capabilities. In terms of system guarantee, establish a training credit bank and micro-certificate certification system, achieve mutual recognition, accumulation, and conversion of credits, incorporate training effectiveness into the teacher assessment and evaluation system, and strengthen positive incentives. In terms of ethical norms, clarify the boundaries of data collection and usage, establish data approval, supervision, and security protection mechanisms, strengthen teacher data ethics education, and ensure the security of teachers' information and legitimate rights and interests.

## **5. Conclusion**

Digital transformation brings development opportunities to vocational education and also poses higher requirements for teacher team construction. Key teachers, as the backbone of teaching reform and innovation in vocational schools, their digital literacy and intelligent teaching abilities directly affect the effectiveness of vocational education's digital transformation. The “intelligent + training” model is supported by intelligent technology, driven by data, and centered on the individualized development of teachers. It effectively solves problems such as lagging traditional training content, single forms, weak effects, and insufficient precision. It is a feasible direction for the reform of the training model for key teachers in vocational schools. During the implementation process, vocational schools should strike a balance between technological empowerment and the subjectivity of teachers, avoid technological supremacy and excessive toolization, and always take the improvement of teachers' teaching ability and professional growth as the fundamental goal. At the same time, insist on the deep integration of training and teaching practice, enterprise practice, and promote the training results to truly be transformed into classroom innovation, training quality improvement, and talent cultivation quality enhancement. Through a collaborative mechanism of government coordination, school leadership, enterprise participation, and platform support, continuously improve platform functions, optimize training resources, strengthen system guarantee, and standardize ethical and security, and continuously promote the “intelligent + training” model to deepen and implement. Ultimately, build a high-level “dual-qualified” key teacher team with high digital literacy, capable of proficiently using intelligent technology for teaching, and closely connecting with industrial demands, providing solid talent support for the high-quality development of vocational education and the construction of the “Double First-Class” plan.

## Funding

Education and Teaching Reform of Hainan Vocational University of Science and Technology in 2024 (Project No.: HKJG2024-49)

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