Exploring the Pathway for "Morality and Skills Integration" Teaching Reform in Higher Vocational English Based on Dynamic Data Profiling

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Abstract: The digital transformation of vocational education urgently requires solutions to critical issues such as fragmented teaching quality monitoring, lagging student assessment, and the misalignment with industry needs. This study, situated in a vocational college in Xinjiang, China, and guided by the Vocational English Test System (VETS) framework, explores a "lightweight and highly feasible" pathway for teaching reform. It aims to construct a comprehensive evaluation index system that deeply integrates VETS professional skills with essential qualities such as "sense of responsibility" and "spirit of collaboration." By systematically leveraging existing teaching tools like the Learning Through platform, the VETS training system, Questionnaire Star, and FineBI, this research facilitates the collection, mapping, and governance of multi-source teaching data to build dynamic student competency profiles. Furthermore, it establishes a closed-loop teaching optimization mechanism encompassing "monitoring, diagnostic attribution, targeted intervention, and effect evaluation," designed to shift pedagogical decision-making from experience-based to evidence-driven, enabling precise instruction and personalized learning support. This paper elaborates on the conceptual framework, proposed implementation process, potential challenges, and future directions of this system. The goal is to provide a validated, replicable, and low-cost solution for peer institutions facing similar challenges, thereby contributing a practical paradigm for the digital transformation of vocational education.

Keywords: Vocational education; Data-driven teaching; Student competency profile; VETS (Vocational English Test System); Integration of morality and skills

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1. Introduction

Vocational education in China is undergoing a profound transformation focused on quality enhancement and digitalization. A series of national policies underscores the imperative to empower vocational education through digital means and to innovate educational models and evaluation systems. Within this context, the "English Curriculum Standards for Higher Vocational Colleges" emphasizes the need to "align with professions and highlight application," providing a core literacy framework for constructing student competency profiles. The implementation of the "1+X Certificate" system, particularly the Vocational English Test System (VETS), offers standardized, observable benchmarks for assessing vocational skills.

Despite clear policy guidance, a significant gap persists between policy and classroom practice, especially in vocational colleges. The monitoring of teaching quality and student assessment often relies on summative, static data, failing to track the learning process, practical operations, and professional literacy comprehensively. This leads to "data silos" and "evaluation lag," creating a "competency gap" between the talent supply and the demands of regional industrial upgrading.

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Concurrently, the maturation of big data, artificial intelligence, and learning analytics technologies provides a viable technical foundation for addressing these challenges. Current research trends indicate a shift from singular assessments towards data-driven governance and from academic labels towards holistic professional competency modeling. However, critical gaps remain: existing student profiles often lack effective quantification of core vocational qualities; data from teaching, training, and certification remain fragmented; and many models are not tailored to the specific contexts of vocational colleges. This study addresses these challenges by proposing a dynamic monitoring and competency profiling system that is contextually grounded, industry-serving, and integrates moral and professional development.

2. Literature Review and Theoretical Framework

(1) The evolution of teaching quality monitoring: from singular assessment to data-driven governance

Globally, the utilization of learning analytics to optimize instruction has become a significant research focus. Domestically, research has evolved from preliminary analyses of online platform logs to attempts at integrating multi-system data—including academic administration, classroom attendance, and online learning—for teaching early warnings and academic analysis (Liu, 2022). However, significant shortcomings persist in the monitoring systems within the specific context of vocational education. Studies indicate that while big data is propelling a systematic evolution in vocational education quality monitoring, it is imperative to break down existing data barriers (Tan & Li, 2023). The core of this evolution lies in achieving the integration of multi-source data and enabling intelligent diagnostics (Gu & Zhao, 2023). Currently, the quality assurance of teaching in higher education institutions is commonly plagued by issues such as "prevalent data silos and a lack of governance systems" (Li & Zhou, 2023). This underscores that constructing a quality monitoring system capable of bridging the entire chain of "teaching-practice-internship-certification," while also aligning with the practical characteristics of vocational education, remains an underdeveloped area of research.

(2) Student competency profiling: from academic labels to holistic professional literacy modeling

The "learner profile," as a core component of learning analytics, has been extensively studied both internationally and domestically. However, existing profiles predominantly focus on general dimensions such as students' academic performance, online behavior, and interest preferences (Zimmerman, 1994; Pintrich, 2000). In the field of vocational education, although the "1+X Certificate" system has catalyzed an urgent demand for comprehensive vocational ability assessment, the quantitative modeling of implicit competencies such as "craftsman spirit," "work ethic," and "job adaptability" remains a formidable challenge. For instance, within the domain of integrating VETS with English language teaching, a substantial body of research (Yang & Liu, 2022; Liao et al., 2022) concentrates on curriculum standard comparison and integration pathways. These studies have largely failed to translate the "vocational skill standards" represented by certificate assessments into collectible, analyzable process data and embed them into dynamic profiles.

(3) Theoretical framework and research gap integration

The current research trend is advancing towards multi-modal data fusion, dynamic process tracking, and service personalization. Synthesizing the existing literature reveals the following core gaps, which form the direct point of entry for this study:

Disconnection from Vocational Education Characteristics: Existing profiles critically lack effective quantification of core vocational competencies, failing to embody the educational goal of "cultivating both morality and skills." This results in a misalignment with the competency dimensions outlined in the national curriculum standards and "1+X" certificates like VETS.

Failure to Form a Data Closed-Loop: Data from teaching, practical training, internships, and enterprise evaluations remain segregated. The inability to achieve seamless integration and closed-loop analysis of full-chain data leads to

one-dimensional and simplistic profiles.

Lack of Regional Adaptability in Models: Predominantly trained on data from developed regions, existing models fail to adequately account for the specificities of vocational colleges in unique contexts, such as their geographic location, multi-ethnic student composition, pillar industrial structures, and distinct educational directives. This lack of adaptation renders the models less effective in these settings.

This study is designed to confront these challenges directly. It is theoretically grounded in Constructivism, which emphasizes the learner's active role in constructing knowledge, a process supported by the feedback from the dynamic profile. Furthermore, the methodology is underpinned by Educational Data Mining, which provides the technical framework for collecting and analyzing multi-source data to generate actionable insights. By aiming to build a teaching quality monitoring and competency profiling system that is deeply rooted in its specific context, serves local industry, spans the entire educational process, and equally emphasizes morality and skills, this research effectively addresses identified gaps in the literature. It represents a critical exploration in advancing the digital transformation and connotative development of vocational education in its specific context.

3. Proposed Model: A "Morality and Skills Integration" Framework

The core of this research is the design of a systematic, data-driven teaching reform framework. This framework is conceived as a closed-loop optimization system, structured around three interconnected, iterative layers: the Data Foundation Layer, the Diagnostic Analytics Layer, and the Intervention & Decision-Making Layer. Its primary goal is to translate abstract educational standards into actionable teaching practices and measurable student development.

The operational logic and research process of the proposed framework are visually summarized in the following research roadmap, which illustrates the three-phase, closed-loop structure of the model:

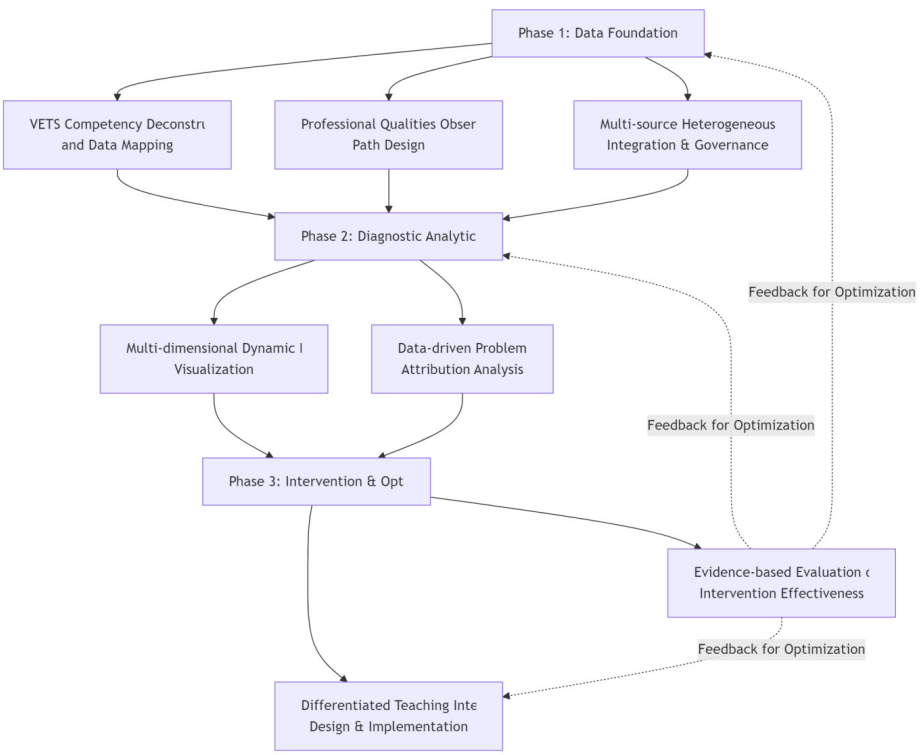

Figure 1: Data-Driven VETS Integration

As illustrated in Figure 1, the framework operates through three interconnected phases - Data Foundation, Diagnostic Analytics, and Intervention & Optimization - forming a continuous feedback loop that enables iterative teaching improvement.

(1) Data foundation layer: indicator deconstruction and multi-source data mapping

This layer serves as the cornerstone of the entire model, focusing on the operationalization of abstract standards into observable and collectible data points.

VETS Competency Operationalization: The specific competency descriptors across the three proficiency levels and five key work domains (e.g., "issuing activity notices" in "Administrative Arrangements," "handling customer feedback" in "Customer Service") within the VETS standard are deconstructed into measurable behavioral indicators. This process involves mapping these indicators to quantifiable data logs from existing platforms. For instance, performance on assignments and video completion rates from learning platforms like Learning Through, as well as task completion time and accuracy rates from the VETS simulation training software, are utilized to quantify specific skill points.

Professional Qualities Observation: To address the challenge of assessing moral and professional development, qualities such as "sense of responsibility," "spirit of collaboration," and "integrity" are translated into recordable behavioral evidence. This is achieved by regularly administering self-assessment and peer-assessment surveys via tools like Questionnaire Star. Furthermore, key events (e.g., individual contributions in group projects, instances of academic misconduct) are documented using collaborative tools like Tencent Docs. A set of coding rules is designed to convert these qualitative observations into semi-structured, analyzable data.

Data Integration and Governance: A standardized data governance protocol is established to integrate these multi-source, heterogeneous data streams. Using tools like Excel or FineBI, data from different platforms are cleaned, transformed, and integrated. A student ID serves as the unique identifier to link all related data, forming a unified and standardized analysis dataset that provides a comprehensive foundation for profile building.

(2) Diagnostic analytics layer: visualization and diagnostic modeling

This layer is dedicated to transforming raw data into meaningful pedagogical insights that can inform teaching decisions.

Visualization of Multi-dimensional Profiles: Utilizing business intelligence tools like FineBI, dynamic and intuitive visualizations are generated. These include individual competency radars, which display a student's strengths and weaknesses across various VETS modules and professional qualities, and class-wide learning heatmaps, which identify common areas of difficulty for the entire cohort (e.g., a generally low score in the "Business Writing" module).

Diagnostic Modeling for Root Cause Analysis: Moving beyond mere data presentation, this component involves constructing an analytical framework to guide teachers in interpreting data within its specific instructional context. For example, when data concurrently shows low performance in "written communication ability" and a low "assignment on-time submission rate," the model facilitates a structured investigation into the root cause. Teachers are guided to discern whether the issue stems from "unengaging teaching materials," "excessively high task difficulty," or "deficiencies in students' time management skills," thereby converting data signals into accurate diagnostic conclusions.

(3) Intervention & decision-making layer: targeted teaching and evaluation

This layer represents the practical application of the model, aiming to form a closed feedback loop for continuous teaching improvement.

Design and Implementation of Differentiated Interventions: Based on the diagnostic insights from the profiles, targeted teaching optimization strategies are designed and implemented. For instance, if a class shows collective weakness in "oral communication," a teaching plan incorporating additional simulated situational dialogue exercises is deployed. For individual students exhibiting a lack of "collaboration spirit," the design and evaluation rules for group

tasks are optimized to clarify individual responsibilities and methods for assessing group contribution.

Evidence-Based Evaluation and Model Refinement: The effectiveness of these interventions is rigorously evaluated using an action research approach. A combination of quantitative and qualitative methods—comparing changes in profile data before and after intervention, tracking VETS certification pass rates, and analyzing student interview feedback—is employed to assess the impact. Based on the evaluation results, intervention strategies are continuously reflected upon and refined. The ultimate aim is to distill this iterative process into a generalizable and replicable teaching optimization model: "Data Monitoring → Diagnostic Attribution → Targeted Intervention → Effect Evaluation."

4. Research Methodology, Implementation Plan, and Feasibility

(1) Research methodology and implementation plan

This study will adopt a mixed-methods research paradigm, centered on Action Research and supported by Educational Data Mining, Case Study, and Literature Review. This approach ensures a deep integration of the research process with actual teaching practices, facilitating both practical problem-solving and theoretical contribution.

The implementation of the research will strictly follow the logic of the proposed model (Figure 1) and is scheduled over a 12-month period, comprising four distinct yet interconnected phases:

Phase 1 (Months 1-3): Data Foundation Construction. This initial phase is dedicated to establishing the data infrastructure. It involves the deconstruction of VETS competencies and professional qualities into observable indicators, the design of corresponding data collection protocols using existing platforms (e.g., Learning Through, Questionnaire Star), and the development of standardized procedures for cleaning and integrating multi-source heterogeneous data into a unified dataset using tools like FineBI.

Phase 2 (Months 4-6): Diagnostic Model Development and Initial Intervention. The focus shifts to analytics and initial action. In this phase, multi-dimensional dynamic student profiles will be generated and visualized. Concurrently, the data-driven diagnostic model for root cause analysis of teaching and learning problems will be constructed and refined. Based on the initial diagnostic insights, the first cycle of differentiated teaching intervention strategies will be designed and implemented in the classroom.

Phase 3 (Months 7-9): Evaluation and Model Refinement. This phase emphasizes evidence-based evaluation and iterative improvement. The effectiveness of the implemented interventions will be rigorously assessed by comparing pre- and post-intervention profile data, VETS pass rates, and qualitative feedback from student interviews. The findings from this evaluation will be used to reflect upon and refine both the intervention strategies and the overarching "Data Monitoring-Diagnostic Attribution-Targeted Intervention-Effect Evaluation" teaching optimization model.

Phase 4 (Months 10-12): Dissemination and Conclusion. The final phase focuses on synthesis and knowledge transfer. The refined teaching optimization model, along with the operational guidelines and case studies, will be prepared for dissemination to peer institutions. The project will culminate in the preparation of the final research report and conclusion materials.

(2) Expected outcomes

This research is designed to yield outcomes with theoretical, practical, and scalable value, aligned directly with its objectives.

A Practical "Morality and Skills Integration" Teaching Data Monitoring System. The primary outcome will be a fully operationalized framework that translates VETS standards and professional ethics into specific, measurable indicators. This system will enable the process-oriented and comprehensive assessment of teaching effectiveness using accessible tools.

An Evidence-Based Mechanism for Precision Teaching Intervention. The study will produce and validate a structured mechanism for designing and implementing differentiated teaching and ideological integration strategies. This mechanism will be grounded in the insights derived from the dynamic student profiles, directly addressing individual and collective student learning gaps.

A Scalable and Low-Threshold "Data-Driven Teaching Optimization" Model. A key outcome will be the distillation of practical experience into a replicable model and a set of operational guidelines (a "practice toolkit"). This model will demonstrate a low-technical-barrier approach to teaching reform, providing a valuable reference for public English courses and other disciplines in similar vocational colleges.

(3) Feasibility and project support

The successful execution of this research is underpinned by three strong foundational pillars:

Expertise and Preliminary Research: The research team possesses substantial theoretical knowledge and practical experience in vocational education data analysis and student competency assessment. Members have previously led or participated in several provincial-level teaching and research projects, publishing a series of relevant papers that provide direct foundational support for this project.

Mature Technical Infrastructure: The project adopts a "lightweight" approach, avoiding costly new platform development. It leverages the college's existing, widely-used teaching platforms (e.g., Learning Through) and the team's proficiency with data analysis tools like FineBI. Preliminary datadocking and profile prototype testing have already been successfully conducted, confirming the technical feasibility and low risk of the proposed path.

Comprehensive Theoretical and Resource Preparation: The team has systematically reviewed domestic and international academic literature and policy documents on educational big data, multimodal assessment, and the VETS standards, establishing a specialized resource library. A thorough interpretation of the VETS standards has been completed, mapping competency indicators to teaching behaviors, thus laying a solid theoretical foundation for constructing the "morality and skills integration" evaluation model.

5. Conclusion

This study has conceptualized and systematically designed an innovative pathway for reforming Higher Vocational English teaching, directly addressing the critical challenges of fragmented student assessment and the disconnect between educational outcomes and industry demands. At the heart of this reform lies the proposed framework for a "Morality and Skills Integration" model, which leverages dynamic data profiling to bridge a long-standing divide in vocational education. By operationalizing the national VETS standard and integrating observable indicators of professional qualities, the model moves beyond theoretical discourse to offer a practical mechanism for holistic student development.

The principal contribution of this research is threefold. First, it presents a novel theoretical and practical framework that seamlessly merges the often-separated domains of skills training and character cultivation into a unified, data-informed evaluation system. Second, it champions a "lightweight" implementation strategy, demonstrating that meaningful digital transformation in resource-conscious environments is not only possible but also practical, relying on the intelligent integration of existing platforms rather than costly new infrastructure. Third, it establishes a robust, data-driven closed loop of "monitoring-diagnosis-intervention-evaluation," which empowers educators to transition from intuitive teaching to evidence-based pedagogical decision-making, thereby fostering a more agile, responsive, and effective vocational education ecosystem.

Looking forward, the trajectory of this work is clearly defined. Immediate future efforts will be dedicated to the practical piloting of the proposed model within our institution, focusing on empirical validation, iterative refinement

of the diagnostic algorithms, and the development of comprehensive teacher support resources. The mid-term perspective will explore the model's scalability and adaptability, investigating its potential for application in other vocational disciplines and institutional contexts. Finally, long-term research avenues will examine the sustained impact of this data-driven approach on graduate employability, career progression, and the broader alignment of vocational training with the evolving needs of the regional economy. Through this continued exploration, the study aspires to contribute a sustainable and replicable blueprint for the future of vocational education, both within the specific regional context and for the global community.

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