Occupation and Professional Education Vol. 2 No. 7, 2025

Research on the Construction of AI Dynamic Evaluation System for the Integration of Competition and Teaching in Higher Vocational English under the Background of Digital Transformation of Vocational Education

Pei Li*
International Education Department, Jiangsu Maritime Institute, China
**Corresponding Author*

Abstract: This study aims to address the limitations of traditional static evaluation methods in higher vocational English teaching, such as weak real-time performance, insufficient personalization, and poor alignment with the goals of integrating competition and teaching under the digital transformation of vocational education. It adopts a mixed research method combining literature review, theoretical framework construction, and system design verification. First, the study combs through the theoretical foundations of vocational education digital transformation, competition-teaching integration, and AI evaluation, and conducts a critical review of domestic and international research status. Second, based on the competency requirements of higher vocational English and the characteristics of skill competitions, it constructs a three-dimensional evaluation index system covering language application, professional skills, and competition literacy. Then, it designs an AI dynamic evaluation system architecture integrating data acquisition modules, intelligent analysis engines, and real-time feedback terminals, and verifies the system's feasibility and effectiveness through expert consultation and simulation operation. The results show that the constructed AI dynamic evaluation system can realize real-time tracking and personalized evaluation of students' learning processes, effectively connect teaching and competition scenarios, and provide data support for optimizing higher vocational English teaching strategies. It enriches the theoretical exploration of competition-teaching integration evaluation and provides practical reference for the digital reform of vocational education evaluation.

Keywords: Vocational Education Digital Transformation; Higher Vocational English; Competition-Teaching Integration; AI Dynamic Evaluation; Evaluation System Construction

1. Introduction

1.1 Research Background and Significance

Digital transformation has become a core driver reshaping global vocational education ecosystems, with artificial intelligence, big data, and other technologies penetrating teaching management, skill training, and quality evaluation. Higher vocational English, as a foundational course for cultivating cross-border professional capabilities, faces dual requirements of improving language application proficiency and aligning with professional skill development. The integration of competition and teaching has emerged as a key path to bridge theoretical teaching and practical application in higher vocational English education, yet traditional evaluation methods remain constrained by static paradigms—relying heavily on final examinations and competition results, failing to capture real-time changes in students' learning processes or establish effective connections between classroom teaching and competition scenarios. Such limitations hinder teaching strategy optimization and accurate measurement of students' comprehensive competencies. Constructing an AI-based dynamic evaluation system tailored to competition-teaching integration responds to vocational education digital transformation demands, resolves mismatches between traditional evaluation and modern teaching needs, and provides technical support for enhancing higher vocational English education quality.

1.2 Review of Domestic and International Research Status

International research on vocational education digital evaluation has achieved preliminary progress. Scholars have explored machine learning applications in language proficiency assessment, developing automated writing evaluation systems based on natural language processing. Research on competition-teaching integration focuses more on curriculum design alignment, lacking in-depth exploration of dynamic evaluation mechanisms linking teaching processes and competition performance. Domestic studies have closely followed national vocational education digital transformation policies, with numerous discussions on competition-teaching integration connotations and implementation paths in higher vocational English. Existing research either emphasizes technological application without combining competition scenarios or focuses on integration while ignoring evaluation dynamics. Few studies have systematically constructed AI-driven dynamic evaluation systems integrating multi-source teaching and competition data, resulting in theoretical and practical gaps in connecting digital technology, competition-teaching integration, and English education evaluation.

1.3 Research Content and Methods

This study focuses on constructing an AI dynamic evaluation system for higher vocational English competition-teaching integration. Specific content includes defining core concepts and theoretical foundations, establishing evaluation principles and a three-dimensional index system, developing core AI evaluation system modules, and verifying system feasibility and effectiveness. Research methods combine qualitative and quantitative approaches: literature review sorts theoretical frameworks of vocational education digital transformation, competition-teaching integration, and AI evaluation; mixed research integrates qualitative index design and quantitative system verification; expert consultation invites vocational education management, higher vocational English teaching, and AI technology professionals to validate index; simulation operation tests system performance and evaluation accuracy via simulated teaching and competition data.

1.4 Research Innovations

This study exhibits three key innovations. It proposes a three-dimensional higher vocational English evaluation index system integrating language application, professional skills, and competition literacy, breaking traditional single-dimensional language assessment. It constructs an AI evaluation architecture integrating multi-source teaching and competition data, realizing organic data flow connections between classroom learning and competition training. It develops a real-time feedback mechanism embedded in the evaluation system, enabling dynamic teaching strategy and competition guidance adjustments based on results—differing from static systems providing only post-event outcomes.

2. Core Concept Definition and Theoretical Foundation

2.1 Core Connotation of Vocational Education Digital Transformation

Vocational education digital transformation is not simple digital technology-education superposition but systemic reconstruction of educational elements, processes, and models driven by digital technology. Its core connotation includes three dimensions: technological integration, process optimization, and value reconstruction. Technological integration refers to deep AI, big data, and Internet of Things application in teaching, evaluation, and management to realize educational resource digitalization and service process intelligentization. Process optimization focuses on reconstructing teaching and evaluation workflows, replacing linear closed processes with dynamic open ones adapting to individual learning needs. Value reconstruction shifts educational goals from knowledge imparting to competency development, with digital technology supporting personalized training and accurate evaluation. This transformation emphasizes technology-education integration and alignment of evaluation methods with competency-oriented goals.

2.2 Essence and Characteristics of Competition-Teaching Integration in Higher Vocational English

Competition-teaching integration in higher vocational English essence lies in organic unification of teaching and competition goals, content and standards, and evaluation and

assessment. It takes skill competitions as carriers to stimulate learning motivation and classroom teaching as foundations to improve competition performance, ultimately realizing synergistic development of students' language proficiency and professional skills. This integration exhibits three distinct characteristics: practicality emphasizing English application in professional scenarios and competition tasks over pure linguistic knowledge; skill orientation taking competition-related capabilities (on-site speech, professional document translation, cross-cultural communication) as key training content; scenario linkage connecting classroom teaching and competition practice to ensure skill training and assessment standard consistency.

2.3 Technical Principles and Application Logic of AI Dynamic Evaluation

AI dynamic evaluation relies on three core technical pillars: machine learning, natural language processing (NLP), and data mining. Machine learning enables automatic evaluation model optimization via data training to improve competency assessment accuracy. NLP realizes intelligent analysis of vocabulary, grammar, and discourse in English outputs (writing, speech). Data mining extracts valuable information from multi-source heterogeneous data (classroom interaction, competition performance, homework records) for comprehensive evaluation. Application logic follows a closed-loop mechanism: real-time multi-source data collection from teaching and competition scenarios; intelligent algorithm model data processing and analysis to generate results; system feedback to students and teachers for learning and teaching adjustments; adjusted behaviors generating new data re-entering the system to realize full-process dynamic iteration.

3. Construction Basis and Framework of AI Dynamic Evaluation System for Higher Vocational English Competition-Teaching Integration

3.1 Basic Principles for the Construction of the Evaluation System

The AI dynamic evaluation system construction adheres to four core principles. Orientation principle requires taking competition-teaching integration as the core direction, ensuring evaluation indicators and functions align with improving teaching quality and competition performance. Scientific principle emphasizes indicators based on higher vocational English competency standards and competition assessment criteria, with clear connotations and measurable methods, and algorithm models having theoretical support and technical feasibility. Dynamic principle demands real-time data collection and result updates, reflecting competency changes throughout learning and competition processes. Feasibility principle ensures system implementation with existing technical conditions and educational resources, avoiding overly complex functions hard to apply in practical teaching.

3.2 Design of Three-Dimensional Evaluation Indicators Oriented by Competition-Teaching Integration

Table 1. Three-Dimensional Evaluation Index System for Higher Vocational English Competition-Teaching Integration

Primary Indicators	Secondary Indicators	Weight	Evaluation Methods
Language Application	Vocabulary accuracy	0.12	NLP-based text analysis
	Grammatical correctness	0.10	NLP-based syntax checking
	Discourse coherence	0.13	Semantic similarity algorithm
Professional Skills	Professional terminology usage	0.15	Domain corpus matching
	Scenario-based communication	0.18	Multi-modal data (speech + text) analysis
Competition Literacy	On-site response speed	0.12	Response time data mining
	Team collaboration effectiveness	0.08	Behavioral data analysis
	Pressure adaptation	0.12	Emotional feature recognition

Based on basic principles and combined with higher vocational English competency requirements and competition characteristics, this study designs a three-dimensional evaluation index system covering language application, professional skills, and competition literacy. Each dimension includes specific secondary indicators, with weights determined via expert consultation to ensure scientificity. Index system details are shown in Table 1.

3.3 Construction of the Overall Architecture of the AI Dynamic Evaluation System

The AI dynamic evaluation system adopts a three-layer architecture—data layer, algorithm layer, application layer—with clear division of labor and organic connections. The data layer undertakes multi-source data collection and storage, including structured data (test scores, competition results) and unstructured data (writing samples, speech recordings, classroom logs). It uses distributed databases for efficient storage and access. The algorithm layer serves as the core, integrating NLP models, machine learning algorithms, and data mining tools to process data and generate results based on the three-dimensional index system. The application layer provides human-computer interaction interfaces for students, teachers, and administrators, realizing real-time result display, historical data query, and personalized feedback push. This layered architecture ensures system scalability and maintainability, facilitating subsequent upgrades and iterations.

4. Core Module Development of AI Dynamic Evaluation System for Higher Vocational English Competition-Teaching Integration

4.1 Multi-Source Data Collection and Preprocessing Module

The multi-source data collection module captures comprehensive teaching and competition scenario data, covering classroom teaching, competition practice, and autonomous learning. Classroom data include question response times, group discussion participation, and in-class assignment quality. Competition data involve on-site speech content, question response accuracy, and team collaboration behaviors. Autonomous learning data include platform login frequency, video learning duration, and after-class exercise quality. The preprocessing module adopts three steps: data cleaning to remove duplicates and anomalies (invalid responses), data integration to unify heterogeneous formats (speech-to-text via recognition), and data standardization to normalize dimensions (time duration to 0-1 scale) ensuring input data validity and comparability.

4.2 Construction Module of Intelligent Evaluation Algorithm Model

The intelligent evaluation algorithm model integrates three sub-models corresponding to the three-dimensional indicators. For language application, a BERT-based pre-trained model with strong semantic understanding is adopted, accurately assessing vocabulary, grammar, and coherence via domain corpus fine-tuning. For professional skills, a random forest algorithm integrates decision trees to analyze terminology usage and scenario communication, with features including domain vocabulary frequency, scenario matching, and logicality. For competition literacy, a fuzzy comprehensive evaluation model combines objective data (response time) and subjective features (speech emotional state) to assess response speed, collaboration, and pressure adaptation. The three sub-models operate in parallel, with results weighted and integrated per index weights for comprehensive evaluation.

4.3 Real-Time Feedback and Result Application Module

The real-time feedback module provides targeted information for stakeholders. For students, it pushes personalized reports via learning platforms, including strengths/weaknesses in language, skills, and literacy, plus improvement suggestions (vocabulary courses for weak terminology). For teachers, it generates class-level summaries showing competency distribution and key improvement areas to support content/method adjustments (scenario communication training for poor performance). The result application module connects evaluations with teaching/competition management: managers optimize curricula using results, while coaches formulate training plans based on competition literacy scores. This module transforms evaluation from "assessment tools" to "improvement drivers".

5. Feasibility Verification of AI Dynamic Evaluation System for Higher Vocational English Competition-Teaching Integration

5.1 Verification of Index Scientificity via Expert Consultation

Expert consultation verified the three-dimensional index system. Fifteen experts were invited: 5 vocational education management experts (senior titles, ≥10 years evaluation experience), 5 higher vocational English experts (curriculum developers, competition coaches), and 5 AI education technology experts (intelligent evaluation development). Two-round

Delphi consultation was adopted: first-round indicator/weight rationality comments led to 3 revisions (merging "professional translation" into "scenario communication"); second-round revised system ratings achieved Kendall's W=0.78 (exceeding 0.7 threshold), indicating high expert consensus. Weight adjustments based on opinions are shown in Table 1.

5.2 Testing of System Effectiveness via Simulation Operation

Simulation operation tested system effectiveness using data from 200 international trade majors: 100 hours classroom data, 50 competition simulation sets, 300 autonomous learning pieces. Tests focused on system performance and evaluation accuracy. Performance was measured by response time (data input to output); accuracy by comparing system results with expert manual evaluations. Results are shown in Table 2.

Table 2 Results of Simulation Operation Test

Test Indicators	Measurement Value	Evaluation Standard	Test Result
System Response Time	1.2 seconds	≤ 2 seconds	Qualified
Evaluation Accuracy (Language Application)	89.2%	≥ 85%	Qualified
Evaluation Accuracy (Professional Skills)	91.5%	≥ 85%	Qualified
Evaluation Accuracy (Competition Literacy)	87.8%	≥ 85%	Qualified

Results confirm good system performance and high accuracy, meeting practical application requirements in higher vocational English teaching and competition scenarios.

6. Conclusion

This study systematically constructs an AI dynamic evaluation system for higher vocational English competition-teaching integration under vocational education digital transformation. Via literature review, theoretical analysis, system design, and feasibility verification, it clarifies core connotations of vocational education digital transformation and competition-teaching integration, establishes a three-dimensional index system covering language application, professional skills, and competition literacy, and develops an AI evaluation system with data collection, algorithm analysis, and real-time feedback functions. Expert consultation and simulation operation verify scientific indicators and effective performance, enabling real-time student learning/competition tracking and accurate evaluation. The study enriches higher vocational English competition-teaching integration evaluation theory and provides practical technical solutions for vocational education evaluation digital reform. Limitations include simulated test data potentially differing from real teaching scenarios; future research can test/optimize the system via actual teaching data and expand application to more professional fields.

Acknowledgements

Research and development fund project of Research on the Digital Transformation Path of Higher Vocational English Competition-Teaching Integration Led by Ideological and Political Education (Project No. 25SWC-87)

References

[1] Zhang, L. (2020). Exploration and practice of the "competition-integrated teaching" model in higher vocational public English. Journal of Vocational Education, 36(5), 89-94.

[2] Wang, Y. (2024). Teaching reform of "practical English" in higher vocational education from the perspective of competition-teaching integration: Taking equipment manufacturing majors as an example. Chinese Vocational and Technical Education, 40(12), 112-118.

[3] Li, S. (2025). Construction and application of evaluation index system for higher vocational public English courses based on CIPP model. Modern Education Technology, 35(3), 78-85.

[4] Fan, T., & Guo, X. (2021). Exploration and practice of "promoting learning and teaching through competitions" in higher vocational public English. Vocational and Technical Education Forum, 37(7), 102-107.

[5] Sun, J. (2021). Preliminary construction of evaluation index system for higher vocational talent training based on "competition-teaching integration" model. Vocational Education Research, 28(4), 65-71.

[6] Zhao, H. (2024). AI-driven dynamic evaluation system for vocational education teaching quality. China Educational Technology, 40(9), 123-129.

[7] Chen, W. (2025). Digital transformation of vocational education: Exploration of AI application scenarios. Journal of Distance Education in China, 38(2), 98-105.

[8] Liu, Y. (2023). Construction of "post-certificate-competition" integrated

evaluation system for higher vocational English. Vocational and Technical Education, 44(15), 56-61.
[9] Yang, X. (2024). Research on AI dynamic evaluation model for vocational education skills training. Modern Vocational Education, 32(18), 87-93.
[10] Wu, Q. (2025). Integration of competition and teaching in higher vocational English: A case study of equipment manufacturing majors. Journal of Higher Vocational Education, 34(6), 101-107.