

Research on the Reform of Diversified Evaluation System for the Course of Interaction Design and Development Based on Artificial Intelligence

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Abstract: This study aims to construct an artificial intelligence-driven curriculum teaching and evaluation system and promote high-quality connotative transformation of the course. A four-dimensional competency model covering technology, aesthetics, innovation and collaboration is established. Multi-source data are collected to capture students' operation data in the Unity3D environment; meanwhile, predictive analytical algorithms are introduced, and curriculum contents are reconstructed into a three-stage modular system of "Basic Foundation — Core Advancement — Practical Integration". The results show that this system realizes full-life-cycle panoramic tracking of learning trajectories and can automatically generate visualized dynamic learning portraits for early intervention of academic bottlenecks. Meanwhile, the integrated AI transformation has achieved in-depth integration of AI technology and the core workflow of interactive development. In conclusion, this study effectively overcomes the drawbacks of traditional evaluation and constructs a digital intelligent closed-loop of "Perception — Prediction — Intervention — Improvement" for precise teaching.

Keywords: Teaching evaluation system; Curriculum reform; Artificial intelligence empowerment

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1. Research background and significance

In April 2026, five ministries, including the Ministry of Education, issued the Action Plan for "Artificial Intelligence + Education", proposing to scientifically design "AI +" specialty and curriculum systems to improve the adaptability of specialty settings to industrial development. It clearly put forward deepening the integrated innovation of "AI + Education" and actively exploring intelligent teaching and evaluation models that fit the characteristics of vocational education as a type. As a national strategic emerging industry, virtual reality (VR) technology has brought dual challenges to the talent training quality and scale of higher vocational colleges due to the structural upgrading of talent demand.

Against this backdrop, as a core course for the major of Virtual Reality Technology Application in

higher vocational colleges, Interaction Design and Development undertakes the important task of cultivating students' core literacy of engine editing ability. This course guides students to proficiently master and further apply Unity3D software to build 3D scenes, write interactive logic and design and integrate virtual reality projects, laying a solid theoretical foundation and engineering practice ability for advanced follow-up courses such as Comprehensive Engine Project Design. It further promotes the transformation of teaching modes from traditional one-way output to an intelligent form featuring interactive collaboration between teachers and students, injecting new momentum into curriculum teaching in line with educational development trends.

Nevertheless, the traditional course of Interaction Design and Development has multiple endogenous bottlenecks in its evaluation links. First, the homogenization of textbooks and cases is prominent, with most majors adopting the same set of teaching materials and cases. Since Unity3D project development is a multi-dimensional composite activity integrating logic coding, scene visual design and user experience (UX) optimization, traditional summative evaluation or single subjective teacher evaluation are restricted by methodological and technical limitations such as delayed feedback cycles, single evaluation dimensions and difficulty in quantifying dynamic interactive behaviors, which fail to accurately and timely reflect the evolution of students' higher-order thinking and periodic cognitive deviations in complex project development^[1]. On this basis, artificial intelligence (AI) technology is introduced to reshape the whole teaching and evaluation process of this course, enabling students to master design skills and strengthen design thinking through immersive experience. By constructing an AI-driven teaching and evaluation system for Interaction Design and Development, this study responds to urgent practical demands and bears far-reaching academic and practical demonstration significance.

2. Research status

At present, research on the reform of diversified evaluation systems for higher vocational courses empowered by artificial intelligence has become the core direction of the digital transformation of vocational education. Relevant academic explorations mainly focus on three fields: process evaluation based on multimodal data, reconstruction of evaluation indicators matching industry-education demands, and platform-based intelligent diagnosis and academic risk prediction^[2,3]. Scholars have achieved fruitful results in specific practices and methodological explorations, yet each research study has its own limitations.

Hao Xuan et al. constructed an intelligent evaluation system for computer experiments featuring dual orientation and layered experiments. The system achieves a 100% success rate in academic risk early warning based on operation logs and code submission records, with an accuracy rate exceeding 90%. However, this model highly relies on digital operating systems in computer labs, and the universality for non-computer lab courses as well as the cost investment of multimodal perception hardware remain major challenges^[4]. Taking an objective stance, Chen Fei positioned artificial intelligence as an assistant, pointing out that education contains values and emotions hard to quantify. She thoroughly sorted out the logic of acquiring indicators including vocational skills, interactive participation, emotional states and curriculum ideology and politics via AI, and built a collaboration mechanism of "AI preliminary perception and expert final judgment". Nevertheless, her research leans more toward teaching supervision, lacking quantitative comparison and examination of individual students' skill progress^[5]. Wang Xiuting discussed the intelligent diversified evaluation theory covering process, results and competencies, and proposed utilizing AI code detection to strengthen quality control. However, her research mostly consists of macro strategy discussions without

quantitative data support from school-based practices^[6]. Lv Wei adopted an automatic scoring system in the major of Numerical Control Technology to improve the efficiency and impartiality of training report and code scoring, making over 91% of graduates meet post requirements and satisfy employers. Still, his evaluation methods mainly depend on statistical mining of conventional learning systems without in-depth multimodal behavior perception^[7].

Han Lei et al. reconstructed evaluation concepts and took Prompt design quality and human-machine collaboration efficiency as core assessment observation points, focusing on evaluating students' cognitive thinking processes. However, the formal modeling capacity required by the internal circulation of this system poses adaptability challenges for higher vocational students with weak learning foundations^[8]. Zhao Yutong et al. applied AIGC technology to formulate personalized learning paths for the Warehouse Management course, and utilized large model algorithms to objectively evaluate project schemes from the dimensions of innovation and feasibility. Non-parametric tests show that the new model can significantly improve students' comprehensive abilities, yet the experimental samples were limited to two classes of a single major, and technical bottlenecks such as large model hallucinations were not deeply discussed^[9]. Xia Zhenchang et al. adopted NLP technology and knowledge graphs to quantitatively analyze the correlation of ideological and political keywords in students' discussions, generating holographic ideological portraits and establishing a multi-party collaborative evaluation network. However, the introduction of large model collaborative review and high-end technical tools imposes extremely high requirements on the operation and maintenance costs and digital competence of teachers in ordinary higher vocational colleges^[10].

3. Analysis of research content

3.1. Innovative construction of AI-empowered teaching evaluation system

This study aims to develop and construct a core dynamic evaluation system running through the whole teaching cycle to break methodological dilemmas such as data barriers and strong subjectivity in practical teaching evaluation.

Centered on four core competencies including technical implementation, design aesthetics, innovative thinking, and collaborative work, a multi-dimensional evaluation indicator matrix is constructed and decomposed into quantifiable, explicit behavioral indicators through operationalization. A multi-source accompanying data collection engine is adopted to synchronously capture students' operational behaviors and cognitive states in the Unity3D environment, forming high-dimensional multimodal datasets. Based on time sequences of "Projects — Stages — Practical Training", interactive visualized learning portraits and reports are automatically generated, realizing the leap from flat evaluation to panoramic evaluation. Predictive learning analysis algorithms are integrated to dig historical behaviors and association rules for early identification of cognitive bottlenecks and skill gaps, triggering adaptive diversion mechanisms to push differentiated micro-lessons and compensation strategies accurately, and ultimately forming a digital intelligent teaching closed loop of "Perception — Prediction — Intervention — Advancement".

3.2. Ecological reconstruction of AI-driven curriculum content system

In response to the demands of the digital and intelligent upgrading of the virtual reality industry for composite talents' knowledge structure, this study abandons the traditional deconstructive teaching content centered on software menu commands, fully introduces artificial intelligence tools as new productive forces, and

reconstructs a three-stage progressive modular content system of “Basic Foundation — Core Advancement — Practical Integration”.

3.3. Key research objectives and core problems to be solved

Construct a dynamic evaluation model to collect full-cycle data of students’ project development in real time, breaking inherent drawbacks of traditional design evaluation systems such as delayed feedback and single dimensions that are hard to quantify. Optimize teaching schemes with various AI tools to realize precise alignment between curriculum contents and new industrial technologies and demands.

4. Framework design of the evaluation system

In terms of the AI-empowered teaching evaluation system, the curriculum team innovatively built a Four-Dimensional Competency Model for the Course of Interaction Design and Development. Breaking blind spots of traditional evaluation, the model defines technical implementation, design aesthetics, innovative thinking and collaborative work as four core evaluation dimensions. By developing multi-source data collection functions, the system can conduct panoramic tracking of students’ learning trajectories throughout the whole life cycle of single projects, stage summaries and comprehensive training, and automatically generate visualized evaluation reports. This measure effectively resolves long-standing pain points of traditional teaching evaluation, including fragmented data, delayed feedback, and single dimensions.

In addition, this system introduces a predictive evaluation module and linked teaching intervention functions. The functions deeply mine students’ historical learning behaviors and multi-dimensional performance data to predict frequent cognitive difficulties and skill bottlenecks in advance. On this basis, the system can automatically push personalized learning resources and supplementary micro-lessons accurately, constructing a closed-loop precise teaching mode of “Evaluation — Prediction — Intervention — Improvement”.

In terms of curriculum content reconstruction, the curriculum team completed the AI-integrated transformation of the three-stage modules of “Basic Foundation — Core Advancement” in response to the digital intelligent transformation trend of industries.

- (1) Basic Module: Pre-set basic theoretical knowledge and practical training units of AI tools to cultivate students’ digital intelligence literacy;
- (2) Core Module: Closely follow cutting-edge industrial standards and integrate three digital intelligent sub-modules including AIGC full-scene preview generation, AI-assisted scripting and AI interactive test optimization, realizing in-depth integration of AI technology and interactive development. The specific mapping and correspondence of reconstructed contents are shown in **Table 1**.

Table 1. Correspondence table of curriculum content reconstruction

No.	Module (Project)	Knowledge Requirements	Skill Requirements	Newly Added Contents
1	Engine Development Knowledge Sorting (Basic Module)	1. Master the setup and structure of script editors and usage of engine tools. 2. Master script writing, be familiar with common APIs, grasp prompt word usage of AI tools, and understand concepts of vectors, enumerations and singleton patterns as well as script lifecycles.	1. Skilledly operate basic tools of Unity and AI software to develop simple interactive programs. 2. Master standardized C# coding habits.	Practical operation of AI interactive design tools

2	Interactive Scene Construction (Core Module)	1. Master terrain system operations. 2. Master lighting systems and lighting baking principles. 3. Master audio components and stereo production.	1. Build virtual scenes with terrain, lighting and audio systems and create vivid atmospheres via detailed design. 2. Generate preview images with AI tools and optimize lighting and materials according to project conditions.	AI scene preview image generation
3	Physical System Setup & Development (Core Module)	1. Master rigid bodies, colliders and physical collision triggers. 2. Master ray casting mechanics. 3. Be familiar with physical materials and joints.	1. Complete collision simulation via physical systems. 2. Adjust physical materials to realize realistic collision effects based on models. 3. Test and optimize scripts with AI tools.	AI-assisted coding, AI interactive test optimization
4	Engine UI Development & Design (Core Module)	1. Master major UI controls, UI hierarchy and masking mechanisms. 2. Master mainstream UI layout templates and cultivate aesthetic taste.	1. Create simple interfaces with various UI controls. 2. Improve aesthetic judgment via copying reference works. 3. Design and configure UI materials with AI prompt words.	AI preview image generation
5	3D Scene Interactive Function Development (Practical Module)	Master the architectural design and full development of interactive functions in 3D scenes and comprehensive engine development frameworks.	Possess the ability to develop complete projects with integrated engine knowledge independently.	AI interactive test optimization

5. Conclusion and prospect

In summary, this paper achieves the following goals through the reform of a diversified evaluation system for Interaction Design and Development.

- (1) AI Reconstructs the Evaluation System: The single summative evaluation mode is abandoned and a dynamic evaluation model is constructed. The system collects full-cycle data of students' project development in real time and conducts in-depth cluster analysis from three benchmarks including code quality, rationality of interactive logic and user experience feedback. Four characterization dimensions including knowledge mastery, skill proficiency, innovation adaptability and teamwork capacity are defined, and dynamic visualized competency maps are generated to establish quantitative standards for process evaluation, effectively solving problems of delayed feedback, single dimensions and difficulty in quantification in traditional design evaluation systems.
- (2) AI Empowers Teaching Preparation: An intelligent teaching resource generation system is developed to create training cases and personalized test papers automatically. Combined with learning prediction models, the system adaptively optimizes traditional teaching plans and greatly improves the precision and pertinence of teaching implementation.
- (3) Application of Visualized Student Competency Maps: Based on the dynamic evaluation model, a Four-Dimensional Competency Map for Interaction Design and Development is extracted, focusing on technical ability, design capability, innovative capacity and collaborative competence. The system tracks real-time data and growth rates of each dimension to generate dynamic learning portraits, accurately locating students' cognitive weaknesses and intelligently pushing personalized advanced learning paths.

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Disclosure statement

The authors declare no conflict of interest.

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