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Two-Wheel Driving Teaching Reform and Practice in the Context of Smart Exhibition: "VR Technology Application + Golden Course Construction"

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Abstract: The digital transformation of the smart exhibition industry has imposed new requirements on the cultivation of exhibition professionals in terms of digital-intelligent thinking and practical skills. Traditional teaching models face prominent contradictions between theory and practice disconnection and course content lagging behind industry demands. Grounded in the context of smart exhibition, this study proposes and implements a two-wheel driving teaching reform model of "VR technology application + golden course construction," aiming to resolve the dual dilemmas of superficial application of virtual simulation technology and the lack of technological support in course construction within exhibition major teaching. Guided by the Outcome-Based Education (OBE) philosophy, the reform is carried out along three dimensions. First, a "theory-practice-virtual-application, four-in-one" VR teaching system is constructed, incorporating virtual simulation experimental teaching projects into the scope of five major golden course categories, and developing VR teaching resources and virtual simulation experimental projects covering core links such as exhibition planning, booth construction, and on-site operations. Second, golden course construction is advanced according to the criteria of high-order, innovation, and challenge, embedding VR interactive training modules into course content and reconstructing a "modularized, progressive, and collaborative" curriculum system. Third, a bidirectional empowerment mechanism between VR technology application and golden course construction is established—VR technology provides immersive teaching scenarios and process data support for golden courses, while golden course construction provides a systematic curriculum framework and quality assurance standards for the pedagogical transformation of VR technology. Through two rounds of teaching practice, the study constructs an implementation pathway for the two-wheel driving teaching reform encompassing teaching objective reconstruction, teaching content reengineering, teaching model innovation, and evaluation system renewal. Practical results indicate that the model effectively enhances students' professional identity and practical operational capabilities, significantly increases course participation, and yields positive evaluations of the teaching effectiveness of VR virtual simulation experimental projects. This study provides a replicable and promotable reform pathway and practical reference for the digital transformation of exhibition majors and other applied liberal arts disciplines.

Keywords: smart exhibition; VR technology application; golden course construction; two-wheel driving; teaching reform; virtual simulation; exhibition education

1. INTRODUCTION

With the deep application of big data, the Internet of Things, artificial intelligence, virtual reality, and other technologies in the exhibition industry, smart exhibition has become an important direction of industrial transformation and upgrading. Exhibition activities are gradually evolving toward digitalization, immersion, and intelligence in links such as planning, booth construction, on-site operations, visitor services, and effect evaluation. Industrial transformation has imposed new requirements on exhibition talent, demanding not only planning, marketing, and operational capabilities but also digital-intelligent thinking and virtual simulation operational skills. However, teaching in university exhibition majors still faces problems such as lagging course content, practical teaching constrained by time, space, and cost, and fragmented VR technology application. The Ministry of Education has proposed eliminating "water courses" and building "golden courses," and has incorporated virtual simulation experimental teaching projects into the scope of first-class course construction. Against this background, how to synergistically advance VR technology application and golden course construction has become an important topic in exhibition major teaching reform.

This study aims to construct a two-wheel driving teaching reform model of "VR technology application + golden course construction," explore their coupling mechanism, implementation pathway, and evaluation methods, and test its effectiveness through teaching practice. The theoretical significance lies in enriching cross-disciplinary research on smart exhibition education, VR teaching application, and golden course construction, and forming an analytical framework of "technology empowering courses, courses pulling technology". The practical significance lies in providing a referable reform scheme for exhibition majors and other applied liberal arts disciplines, promoting the alignment of course content with industrial demands, the integration of teaching processes with technological scenarios, and the matching of evaluation methods with competency objectives.

Foreign research mainly focuses on immersive learning, simulation training, and situated cognition, holding that VR technology can enhance presence, participation, and operational experience, and is particularly suitable for training in high-cost, high-risk, or hard-to-access real scenarios. Domestic research revolves around smart exhibition, virtual simulation experimental teaching, and golden course construction, focusing on industrial transformation, technology development, instructional design, and course evaluation. However, existing research still has deficiencies: first, VR

technology application and course construction are separated from each other, and technology is not effectively embedded in the golden course system; second, there is a lack of a systematic teaching model of "two-wheel driving"; third, practical evaluation mostly concentrates on a single course or short-term experiments, with insufficient sustained verification.

This study mainly includes four aspects: analyzing the current situation and problems of exhibition major teaching in the context of smart exhibition; constructing the "VR technology application + golden course construction" two-wheel driving model; exploring the implementation pathway of VR resource development, golden course construction, and bidirectional empowerment mechanism; and evaluating the reform effect through teaching practice. Research methods include literature research, questionnaire survey, interview, action research, and case analysis. Literature research is used to sort out the theoretical foundation; questionnaires and interviews are used to obtain teacher and student feedback; action research is used for multi-round teaching revision; and case analysis is used to analyze typical courses and virtual simulation projects.

This study follows the logic of "theoretical analysis—model construction—practical exploration—effect evaluation." First, relevant concepts and theories are sorted out; second, teaching problems are diagnosed; third, the two-wheel driving model is constructed and the implementation pathway is designed; finally, the effectiveness is tested through teaching practice. The innovations are mainly threefold: first, the "VR technology application + golden course construction" two-wheel driving model is proposed, emphasizing the synergistic coupling of the technology wheel and the course wheel; second, a bidirectional empowerment mechanism is constructed, enabling VR technology to provide immersive scenarios and process data for golden courses and golden courses to provide curriculum frameworks and quality assurance for VR application; third, a "theory-practice-virtual-application, four-in-one" teaching system is formed, promoting teaching from knowledge transmission to competency orientation and scenario-based training.

2. CONCEPT DEFINITION AND THEORETICAL FOUNDATION

Smart exhibition is a form of exhibition supported by new-generation information technologies such as big data, the Internet of Things, artificial intelligence, and virtual reality, which digitally and intelligently reconstructs the entire process of exhibition planning, marketing, operations, services, and evaluation. Its core characteristics are data-driven, scenario interconnection, immersive experience, and intelligent decision-making. The development of smart exhibition has not only changed the operating mode of exhibition business but also imposed new requirements on the talent competency structure. In addition to traditional professional knowledge such as planning, marketing, and operations, exhibition practitioners should also possess digital-intelligent thinking, data analysis capabilities, virtual scenario operational capabilities, and cross-boundary collaboration capabilities. Therefore, university exhibition majors urgently need to adjust their curriculum systems, strengthen technology application and practical training, and respond to the industry's demand for composite talent.

Virtual reality technology is characterized by immersion, interactivity, and imagination, and can create highly realistic, interactive, and repeatable virtual scenarios. In education and teaching, VR technology can break through the constraints of time, space, cost, and safety, provide students with operational experiences close to reality, and support learning evaluation through process data recording. In exhibition major teaching, VR technology can be applied to booth design, on-site operations, visitor flow planning, emergency handling, and other links, enhancing students' scenario understanding and practical capabilities. However, technology application itself does not necessarily bring about teaching effectiveness; only when deeply integrated with course objectives, teaching content, teaching processes, and evaluation systems can technology empower teaching.

Golden courses refer to courses with high-order, innovation, and challenge. High-order emphasizes the organic integration of knowledge, ability, and quality; innovation emphasizes the frontier nature of course content and the innovativeness of teaching methods; challenge emphasizes reasonable course difficulty that can stimulate students' deep learning. Golden course construction covers elements such as course objectives, teaching content, teaching implementation, teaching evaluation, and teaching staff. Virtual simulation experimental teaching projects, as an important type of first-class course construction, provide a policy interface for integrating VR technology into the curriculum system and a new pathway for exhibition majors to solve practical teaching difficulties.

"Two-wheel driving" refers to the teaching reform logic in which VR technology application and golden course construction support each other and advance synergistically. The technology wheel provides immersive scenarios, interactive training, and process data support; the course wheel provides objective frameworks, content systems, and quality assurance standards. The coupling of the two forms a bidirectional mechanism of "technology empowering courses, courses pulling technology." If only VR technology application is emphasized, it easily remains at the demonstration level; if only golden course construction is emphasized, it is difficult to break through the bottleneck of practical teaching. Only through two-wheel synergy can the deep integration of technology application and course construction be achieved, driving teaching reform toward systematization and normalization.

The theoretical foundations of this study mainly include Outcome-Based Education, constructivism, and situated learning theory. Outcome-Based Education emphasizes starting from student learning outcomes and reversely designing course objectives, teaching content, and evaluation methods, providing a basis for the objective reconstruction and effect evaluation of the two-wheel driving model. Constructivism holds that learning is a process in which learners actively construct meaning, and VR interactive environments help promote knowledge internalization and competency generation. Situated learning theory emphasizes that learning should occur in real or simulated situations, and VR technology can provide situation support close to reality for exhibition teaching. Together, the three provide theoretical support for the "theory-practice-virtual-application, four-in-one" teaching system.

3. CURRENT SITUATION AND PROBLEMS OF EXHIBITION MAJOR TEACHING IN THE CONTEXT OF SMART EXHIBITION

The rapid iteration of the smart exhibition industry has imposed new requirements on the knowledge structure and

competency quality of talent. However, the curriculum systems of some university exhibition majors still focus on traditional exhibition theory, planning processes, and marketing knowledge, while content such as digital-intelligent operations, virtual simulation, data analysis, and intelligent scenario management has not yet been systematically integrated. The course update cycle is relatively long, and there is a time lag between teaching content and industry technological development, resulting in a mismatch between students' acquired knowledge and actual job requirements. In particular, core courses such as exhibition planning, booth design, and on-site operations still emphasize theoretical lecturing and lack practical training matching smart exhibition scenarios.

Although some institutions have introduced VR technology to assist teaching, the application mostly remains at the level of demonstration, observation, or individual experiments and has not yet been embedded in course objectives, teaching content, and evaluation systems. VR resources are scattered across different courses or projects, lacking systematic design and unified standards, and there are problems such as redundant construction, low utilization rates, and maintenance difficulties. Technology application and course construction are separated from each other, making it difficult to form immersive and interactive teaching support throughout the entire talent cultivation process, and the teaching value of VR technology has not been fully unleashed.

Golden course construction emphasizes high-order, innovation, and challenge, requiring courses to stimulate students' deep learning and enhance comprehensive abilities. However, existing exhibition courses are still insufficient in practical scenarios, interactive training, and process data support. Virtual simulation experimental projects are not deeply integrated with course content, and some course innovations remain at the level of formal adjustments, failing to achieve teaching content reconstruction and teaching model transformation through VR technology. Insufficient technological support limits golden course construction in terms of practicality and challenge.

The evaluation of practical teaching in exhibition majors mostly relies on internship reports, planning proposals, work exhibitions, or final examinations, while process-oriented, scenario-based, and competency-based evaluation is relatively weak. VR teaching can generate interaction records, operation paths, and task completion data, but these data have not yet been effectively incorporated into the evaluation system. The evaluation method is single and cannot comprehensively reflect students' comprehensive abilities in planning, operations, collaboration, and contingency response, nor is it conducive to forming a virtuous cycle of "promoting learning through evaluation and promoting reform through evaluation."

The causes of the above problems are mainly fourfold: first, there is a contradiction between the rapid iteration of industrial technology and the long course update cycle; second, there is a lack of effective communication between VR technology development and teaching demands, and technology supply is disconnected from teaching application; third, teachers' digital literacy and cross-disciplinary collaboration capabilities need improvement; fourth, institutions are still imperfect in resource investment, institutional incentives, and quality assurance. As a result, technology application and course construction remain "two separate skins," making it difficult to form a synergistic effect.

4. CONSTRUCTION OF THE "VR TECHNOLOGY APPLICATION + GOLDEN COURSE CONSTRUCTION" TWO-WHEEL DRIVING TEACHING REFORM MODEL

Guided by the Outcome-Based Education philosophy, this study constructs a "VR technology application + golden course construction" two-wheel driving teaching reform model. The model takes the VR technology wheel and the golden course construction wheel as two cores, forming a closed-loop structure of "objective reconstruction—content reengineering—teaching innovation—evaluation renewal." The technology wheel provides immersive scenarios, interactive training, and process data; the course wheel provides objective frameworks, content systems, and quality assurance standards. The two operate synergistically to jointly support the "theory-practice-virtual-application, four-in-one" teaching system, driving exhibition major teaching from knowledge transmission to competency orientation and scenario-based training.

Two-wheel driving emphasizes that VR technology application and golden course construction support each other and advance synergistically. Its coupling mechanism manifests as bidirectional empowerment: on the one hand, VR technology provides virtual simulation scenarios, interactive training modules, and learning process data for golden courses, enhancing the high-order, innovation, and challenge of courses; on the other hand, golden course construction provides course objectives, teaching frameworks, and quality evaluation standards for VR application, preventing technology application from becoming mere formality. Through bidirectional empowerment, technology application and course construction shift from "two separate skins" to deep integration, forming a sustainable driving force for teaching reform.

Teaching objectives shift from single knowledge transmission to equal emphasis on knowledge, ability, and quality. Specifically, these include: mastering core knowledge of the exhibition major; possessing digital-intelligent thinking and data analysis capabilities; being able to proficiently use VR tools to complete tasks such as booth design, on-site operations, and emergency handling; and possessing complex problem-solving capabilities and teamwork capabilities. Objective design follows the Outcome-Based Education logic, reversely deriving teaching requirements from expected learning outcomes, making objectives measurable, evaluable, and achievable.

A "modularized, progressive, and collaborative" curriculum system is constructed, divided into basic modules, core modules, expansion modules, and practice modules. VR interactive training is embedded in core courses, and virtual simulation experimental projects covering links such as exhibition planning, booth construction, on-site operations, and visitor services are developed. Teaching content is aligned with smart exhibition job demands, promptly incorporating frontier content such as intelligent scenario management and data visualization, achieving dynamic alignment between course content and industrial development.

A combination of project-driven, situational teaching, and blended teaching is adopted. Before class, VR resources are used for preview and cognition; during class, virtual simulation training, collaborative discussion, and teacher guidance are implemented; after class, reflection, summary, and extended application are conducted. Teachers transform from knowledge

lecturers to learning facilitators and project organizers. Through the "theory—practice—virtual—application" four-in-one design, an immersive, interactive, and inquiry-based classroom is formed, enhancing student participation and practical capabilities.

A process-oriented, diversified, and competency-oriented evaluation system is established. VR operation data, task completion, collaboration performance, and reflection reports are incorporated into the evaluation scope, and a multidimensional evaluation mechanism is formed by combining teacher evaluation, peer evaluation, and system evaluation. The evaluation focus shifts from results to processes and from knowledge memorization to competency performance, achieving "promoting learning through evaluation and promoting reform through evaluation," and providing a basis for continuous optimization of teaching reform.

5. IMPLEMENTATION PATHWAY OF TEACHING REFORM

Centering on the core competencies of the exhibition major, VR teaching resources covering links such as exhibition planning, booth construction, on-site operations, visitor services, and emergency handling are developed. Resource construction follows the principle of "using virtual when real is not possible, combining virtual and real," focusing on developing virtual simulation experimental projects that are high-cost, high-risk, and difficult to repeat. Project design takes task-driven as the main line, embedding interactive operations, instant feedback, and process recording functions, enabling students to complete training such as planning scheme verification, booth layout adjustment, crowd diversion, and emergency incident handling in virtual scenarios, enhancing scenario understanding and practical capabilities.

Golden course construction is advanced according to the criteria of high-order, innovation, and challenge, and VR interactive training modules are systematically embedded into course syllabi, instructional design, and assessment requirements. In core courses, a teaching chain of "VR preview—virtual training—classroom discussion—practical training—reflection and improvement" is set up, transforming VR technology from auxiliary demonstration into an organic component of course construction. Meanwhile, the functional positioning and credit-hour proportion of VR modules are determined according to course objectives, avoiding technology stacking and ensuring that technology application serves the achievement of course objectives.

A "theory—practice—virtual—application" four-in-one teaching system is constructed. The theory link consolidates professional knowledge; the practice link carries out on-campus training and base internships; the virtual link completes immersive training with VR technology; the application link tests learning outcomes through project competitions, enterprise topics, and innovation and entrepreneurship activities. The four links connect with each other and progress layer by layer, forming a complete pathway from knowledge understanding to competency transfer, promoting students' repeated training and continuous improvement in real and simulated situations.

A bidirectional empowerment mechanism between VR technology application and golden course construction is established. The technology team and the course team conduct collaborative teaching research; the technology team develops and optimizes VR resources according to teaching demands, and the course team reconstructs teaching content and evaluation methods according to VR functions. VR technology provides immersive scenarios and process data for golden courses, and golden courses provide objective frameworks and quality assurance standards for VR application. Through regular seminars, teaching observations, and effect feedback, a closed-loop operating mechanism of "demand—development—application—evaluation—optimization" is formed.

Teaching organization adopts a collaborative model of project groups and course groups, clarifying teacher division of labor and collaboration processes. At the institutional level, resource investment, equipment maintenance, technical support, and institutional incentives are improved, and VR teaching workload and golden course construction effectiveness are incorporated into teacher assessment. Meanwhile, teacher digital literacy training and cross-disciplinary team building are strengthened to enhance technology application and course design capabilities. Through institutional guarantee, resource guarantee, and faculty guarantee, the stable operation and continuous optimization of the two-wheel driving model are ensured.

6. TEACHING PRACTICE EFFECTS AND EVALUATION

This study selects sophomore to junior undergraduate students majoring in exhibition at a certain university as practice subjects, and carries out two rounds of teaching practice relying on core courses such as exhibition planning, booth design, and on-site operations. The first round is a pilot run, focusing on testing the adaptability between VR modules and course content; the second round is full implementation, optimizing teaching processes and evaluation methods. The practice period is one academic year, covering links such as pre-class VR preview, in-class virtual simulation training, post-class reflection and expansion, and final project assessment, ensuring that the two-wheel driving model runs through the entire teaching process.

Data sources include student questionnaires, teacher interviews, course grades, VR platform operation records, and teaching supervision feedback. Questionnaires are used to investigate learning experience, participation, and satisfaction; interviews are used to understand teachers' and students' perceptions of and suggestions for the model; platform data are used to analyze operation paths, task completion, and interaction frequency; grade comparisons are used to test competency improvement. Evaluation adopts a combination of quantitative and qualitative methods, taking into account both process performance and summative outcomes, improving the credibility and comprehensiveness of the results.

Practical results indicate that students have a relatively high acceptance of the teaching method of embedding VR into courses. Questionnaires show that more than 80% of students believe that virtual simulation training helps them understand exhibition processes and operational key points; most students report that classroom participation and learning initiative have improved. Grade analysis shows that the experimental group outperforms the control class in aspects such as planning proposal completeness, booth layout rationality, and emergency handling capability. VR platform records also indicate that students' operational proficiency gradually improves through repeated training, and the completion time of complex tasks is significantly shortened.

Relying on the two-wheel driving model, core courses have been systematically optimized in objectives, content, implementation, and evaluation. VR modules are embedded in course syllabi and assessment requirements, and the high-order, innovation, and challenge of courses have been enhanced. Some courses have been rated as university-level or provincial-level first-class courses, and the utilization and sharing of virtual simulation experimental projects have increased. Teaching supervision feedback indicates that the practicality and sense of scenario in courses have significantly improved, the quality of student works and project outcomes has improved, and course construction has initially formed a pattern of equal emphasis on technological support and quality assurance.

Teachers' digital literacy and instructional design capabilities have been exercised in the process of participating in VR resource development, course reconstruction, and collaborative teaching research. The technology team and the course team conduct joint lesson preparation and mutual feedback, promoting teachers' transformation from single lecturers to learning facilitators and project organizers. Teacher interviews show that most teachers believe the model helps update teaching concepts, expand teaching methods, and promote cross-disciplinary collaboration. Some teachers have transformed reform experience into teaching research papers, teaching reform projects, and teaching competition achievements, forming a virtuous cycle.

Problems exposed in the practice process include: the update speed of VR resources needs to be accelerated, and some modules are not closely connected with the industrial frontier; teacher time investment and technical support are still insufficient; and process evaluation standards still need refinement. In the future, a dynamic resource update mechanism should be established, and school-enterprise collaborative development should be strengthened; the teacher incentive and training system should be improved to reduce technical burden; and evaluation indicators should be optimized to strengthen data-driven teaching improvement. Through continuous iteration, the stability and promotion value of the two-wheel driving model will be further enhanced.

7. CONCLUSION AND OUTLOOK

Grounded in the background of the smart exhibition industry, this study constructs and practices the "VR technology application + golden course construction" two-wheel driving teaching reform model. Research shows that VR technology application and golden course construction are not a simple superposition but form a synergistic effect through bidirectional empowerment: VR technology provides immersive scenarios, interactive training, and process data for golden courses, and golden courses provide objective frameworks, content systems, and quality assurance standards for VR application. Teaching practice shows that the model helps enhance students' learning participation, scenario understanding, and practical capabilities, promotes the improvement of course high-order, innovation, and challenge, and drives the development of teachers' digital literacy and teaching capabilities. Therefore, the two-wheel driving model can effectively respond to the practical problems faced by exhibition major teaching in the context of smart exhibition.

The innovations of this study are mainly reflected in three aspects. First, the "VR technology application + golden course construction" two-wheel driving model is proposed, breaking through the limitation of separation between technology application and course construction, and emphasizing the synergistic coupling of the technology wheel and the course wheel. Second, a bidirectional empowerment mechanism is constructed, forming a closed-loop pathway of "demand—development—application—evaluation—optimization," enabling technology application and course construction to support each other. Third, a "theory-practice-virtual-application, four-in-one" teaching system is formed, organically connecting theory, practice, virtual, and application, and driving teaching from knowledge transmission to competency orientation and scenario-based training.

This study still has certain deficiencies. First, the practice subjects are mainly concentrated in the exhibition major of one university, the sample scope is limited, and the universality of the research conclusions needs further testing. Second, the practice period is one academic year, and the long-term effects and sustainability still need follow-up observation. Third, the integration depth of VR platform data and course evaluation is still insufficient, and process evaluation indicators need refinement. Fourth, the speed of technological updating is fast, and the dynamic connection between VR resources and the industrial frontier still needs strengthening. Future research should expand the sample scope, extend the practice period, improve data-driven evaluation, and deepen school-enterprise collaborative development.

Future research can be expanded from four aspects. First, expand cross-institutional and cross-disciplinary practice to verify the promotion value of the two-wheel driving model in applied liberal arts disciplines. Second, deepen the integrated application of artificial intelligence, digital twins, and VR technology to enhance the intelligence and adaptability of virtual scenarios. Third, strengthen school-enterprise collaboration, promote the connection between VR resources and real exhibition projects, and enhance the industrial frontier nature of teaching content. Fourth, improve the teacher development mechanism and institutional guarantee, and promote the normalization and systematization of teaching reform. Through continuous exploration, the two-wheel driving model is expected to provide more solid theoretical and practical support for smart exhibition talent cultivation and the digital transformation of university teaching.

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