Academic Education Publishing House
Higher Education and Practice Vol. 3 No. 1, 2026

Research on the Construction and Teaching Application of Foreign Language Virtual Simulation Laboratory

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Abstract: With the development of virtual simulation technology, the construction of virtual simulation laboratories has become an urgent requirement for foreign language teaching reform in universities. Although virtual simulation teaching has made progress in teaching applications, it still faces challenges such as insufficient technological depth, weak interdisciplinary collaboration, and low resource utilization. To address these issues, this paper proposes a five-in-one teaching reform paradigm of "Scenario-Technology-Data-Discipline-Industry" and the construction framework of a virtual simulation laboratory. Taking the course "Business Interpretation" as an example, a virtual simulation teaching project is designed to promote the construction and teaching application research of foreign language virtual simulation laboratories.

Keywords: Virtual Simulation Laboratory; Foreign Language Teaching; Teaching Reform Paradigm; Virtual Simulation Teaching Project

1. Introduction

In recent years, the application of virtual simulation technology in the field of education has become an important means of teaching reform. As of 2025, 59 foreign language and literature virtual simulation experiment courses have been released on the national virtual simulation experiment teaching course sharing platform, supporting the digital transformation of foreign language practice teaching. However, the current virtual simulation laboratory for foreign language majors faces challenges such as insufficient depth of technology application (most rely on basic VR technology, lack of deep integration of cutting-edge technology) and imperfect interdisciplinary collaboration mechanism (immature collaboration mode leads to disconnection between training scenarios and industry needs). Therefore, it is an urgent need for foreign language teaching reform in colleges and universities to explore the construction path of virtual simulation laboratory with deep integration of technology and teaching based on the requirements of new liberal arts construction.[1-4]

2. Research on the Current Situation of Foreign Language Virtual Simulation Laboratory

2.1 Domestic Research Status

2.1.1 Enabling foreign language teaching

Through technological innovation and scene-based teaching, the virtual simulation laboratory promotes the deep integration of foreign language majors in the dimensions of teaching mode, cross-cultural ability, interdisciplinary and practical application. In the face of the impact of changes in the global economic structure and trade model on the training mode of foreign language talents, the virtual simulation training platform can make up for the shortcomings of traditional teaching to a certain extent, and strengthen the cultivation of students ' comprehensive ability and practical ability[5]. Especially in the context of the " Belt and Road " initiative to promote the surge in the demand for compound foreign language talents, virtual simulation meets the interdisciplinary talent demand for foreign languages by improving students ' business practice ability and cross-cultural communication ability[6]. The construction of virtual simulation laboratory is a positive response to the development trend of the new liberal arts to promote the reform of teaching methods.

2.1.2 Challenges and countermeasures

In recent years, the number of virtual simulation teaching innovation laboratory projects has been increasing. By 2024, among the first batch of virtual simulation teaching innovation laboratory projects announced by the Ministry of Education,

325 teaching teams from 173 universities across the country have been selected, of which liberal arts account for about 25 %, while foreign languages only account for 3 % of liberal arts. Among them, the virtual simulation laboratory of foreign language is mainly constructed in the form of liberal arts integration, interdisciplinary and integration of production and education. In addition to the small number of virtual simulation laboratories based on foreign language and the single form of construction, there are also problems such as weak interdisciplinary, imperfect management mechanism, low resource utilization, virtual simulation teacher team construction and insufficient software and hardware resources[7-8].

In the face of many challenges in the application of virtual simulation laboratory in foreign language teaching, the academic circles have put forward targeted solutions through the innovation of theory and practice. Tang and Zhang (2016) proposed that the resource integration of virtual simulation laboratory needs to promote teaching informatization and improve the experimental teaching mode and content[9]. Zheng (2019) implemented the teaching mode of ' virtual simulation experiment + real experiment ', which significantly stimulated the enthusiasm of students ' autonomous learning[10]. Yin et al. (2020) put forward the idea of modular virtual simulation laboratory construction, interdisciplinary integration to optimize the teaching effect[11]. Liu (2022) analyzed the difficulties encountered in the construction of the virtual simulation experiment teaching sharing platform, and proposed solutions to promote the innovation of the sharing platform[12]. Wen (2024) discussed the importance of top-level design and teacher training[13]. Zhao and Sun (2024) proposed the idea of creating a "seven-dimensional" development path in the context of the new liberal arts to improve the teaching quality of experimental courses[14]. It promotes the development of foreign language virtual simulation teaching.

2.2 Foreign Research Status

The development of virtual simulation foreign language teaching began in the Second Life virtual world launched by Linden Lab in 2003, which opened the prelude to virtual simulation foreign language teaching. Subsequently, the emergence of the EU VILL @ GE project, Russia 's three-dimensional multi-user Russian virtual world, Romania 's Mondly VR and other platforms has made more and more research on virtual simulation foreign language teaching, and the application of virtual simulation technology in foreign language teaching is more and more extensive. When gamification learning has become an innovative way of virtual simulation foreign language experiment teaching, more and more scholars have carried out gamification teaching based on Second Life virtual simulation platform. For example, in German teaching, by constructing scenes such as the Berlin Virtual Museum and the Berlin Wall, learners are guided to conduct immersive roaming and interact with the current German social and cultural topics. After the event, learners submit their learning experiences and participate in relevant questionnaires.Thisgame-based learning model integrates educational goals, interest stimulation and means innovation, awakens learners ' interest in learning foreign languages with a lighter learning method and a shorter learning time, and can continue to learn. Similar to this game-based learning model has been extended to Russian, English, Chinese and other multilingual teaching. Foreign platforms mostly adopt open community design to support learners ' cross-regional interaction and collaboration, which further strengthens the practical effect[15].

2.3 Comparison and Trend of Domestic and Foreign Research

The domestic virtual simulation foreign language experiment teaching has outstanding performance in policy support and localized application, but the technological frontier and interdisciplinary collaboration still need to be improved ; foreign countries are good at technological depth and theoretical innovation, but face the challenge of cost and cultural adaptation, as shown in Table 1.

The construction of virtual simulation laboratories for foreign language majors in Chinese universities presents the characteristics of" multi-dimensional advancement and systematic challenges." On the one hand, through the deep integration of technological innovation and scene-based teaching, the laboratory has achieved results in the fields of teaching mode innovation and cross-cultural ability training. On the other hand, it still faces bottlenecks in management mechanism, resource

sharing and teachers. In this regard, the academic community has put forward countermeasures to strengthen top-level design, resource integration, teacher training and sharing platform, which has promoted the development of foreign language virtual simulation laboratory to a certain extent.

Table 1. Difference of Virtual Reality at Home and Abroad

Dimensions	Domestic	Abroad
Technology application	Based on basic VR, AI voice technology is gradually introduced	Deep integration of XR, AI, meta-universe and other cutting-edge technologies
Research focus	Scene localization, policy-driven, mixed teaching	Dynamic interaction, multi-modal technology, interdisciplinary theory integration
Platform type	Task-oriented (preset experimental steps)	Open community type (free interaction and collaboration)
Core challenges	Insufficient interdisciplinary collaboration and lagging technology updates	High equipment cost and insufficient cultural diversity adaptation

Future research needs to focus on the depth of technology integration, resource sharing efficiency and interdisciplinary coordination mechanism, accelerate the deep integration of XR, meta-universe, deep learning and foreign language teaching, and explore lower-cost immersive devices. Combining the advantages of domestic technical means and foreign open platforms, a virtual training scene with cultural characteristics and international vision is constructed. Promote the development of virtual simulation laboratory to the direction of intelligence and internationalization.

3. Construct Virtual Simulation Laboratory to Construct Teaching Reform Paradigm

Based on practice, this paper puts forward some suggestions and schemes on building virtual simulation laboratory platform, virtual simulation laboratory project, diversified teaching mode, interdisciplinary cooperation and integration of industry and education. Based on the five-in-one foreign language teaching reform paradigm of " scene-technology-data-discipline-industry, " this paper constructs a foreign language virtual simulation experiment teaching platform, and explores the application of VR in foreign language virtual simulation teaching by taking the virtual simulation project of " business interpretation " course design as an example.

The paradigm takes scenario-driven as the practice carrier, technology empowerment as the innovation engine, data-driven as the decision support, interdisciplinary as the knowledge base, and integration of industry and education as the goal orientation to build a multi-dimensional linkage foreign language teaching ecosystem. Its core logic lies in the symbiosis of scene and technology, the mutual embedding of data and disciplines, and the closed loop of industry and education. The symbiosis of scene and technology is to use VR and AI technology to construct a language practice scene with virtual and real integration, breaking through the traditional classroom boundary. The inter-embedding of data and disciplines is to drive the optimization of teaching strategies through multi-source data (learning behavior, industry needs, interdisciplinary knowledge), and realize the knowledge reconstruction of the intersection of arts and sciences ; the closed loop of industry and education is to define the scene design based on industrial demand, to cultivate the ability of interdisciplinary support, and to serve the regional economy and industry upgrading,as shown in Figure 1.

The five elements form a double closed loop :

Internal circulation : scene → technology → data → discipline → industry → scene (ability training closed loop).

External circulation : industry → discipline → data → technology → scene → industry (closed loop of value creation).

This double closed loop makes the education system both adaptive (through data feedback optimization) and external expansion (through industrial docking and upgrading), and promotes the development of foreign language education.

3.1 Scene-driven, Virtual Scene Construction to Achieve Full-scene Real-time Interaction and Teaching Synergy Advantages

Scene is not only the carrier of teaching activities, but also the core hub to realize the connection between curriculum objectives and industrial needs. The virtual simulation scene (virtual) and the real industry demand (real) are interdependent, and the language practice

environment is constructed by VR / AR technology to solve the problem of high complexity scenes (such as international conferences, business negotiations) that cannot be reproduced in traditional classrooms. Industrial demand-driven scenario design (such as the " Belt and Road " trade negotiations), interdisciplinary support ability training (such as the integration of legal terminology and translation skills), and ultimately nurturing industrial upgrading, forming a two-way value cycle of " education chain → industrial chain → education chain".

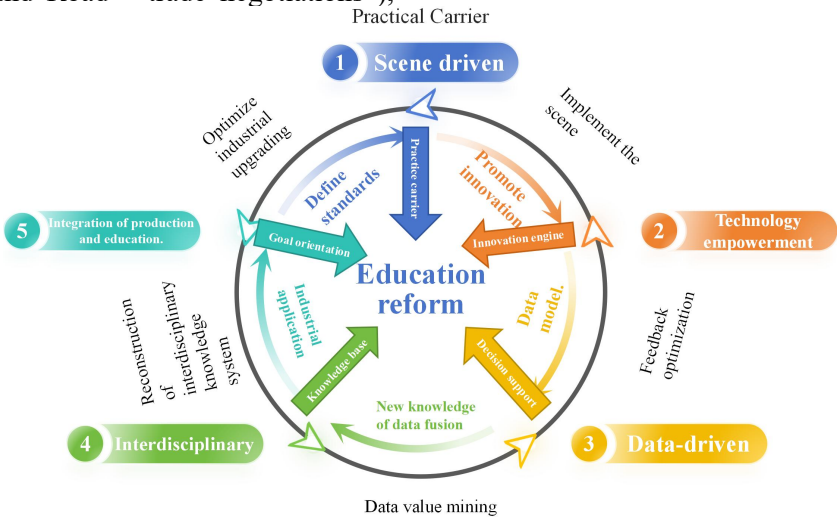

Figure 1. Scene-Technology-Data-Disciplinary-Industry Five-in-one Foreign Language Teaching Reform Paradigm Diagram

3.2 Technology Empowerment, Real-time and Multi-modal Adaptation of Deep Integration of AI and VR Technology

The teacher 's machine can display students ' VR images (first-person perspective) and their own demonstration images (global perspective) in real time, support one-click switching of different students ' perspectives, and break through the limitations of teachers ' inability to visually observe students ' immersive operations in traditional teaching. At the same time, AI (speech recognition, NLP natural language processing, machine translation) and VR (3D modeling, motion capture, environment rendering) technology are integrated to solve the problem between data processing and real-time interaction. For example, oral training needs to synchronize lip shape, expression (VR) and voice feedback (AI) of virtual characters, and the cross-modal data fusion algorithm has high complexity.

3.3 Data-driven, Precise Teaching and Quantitative Evaluation Advantages

The workstation collects students ' multi-dimensional data (speech recognition accuracy, line of sight stay time, interactive action standardization), constructs students ' ability radar map through AI algorithm, and quantitatively evaluates the five core abilities of ' listening, speaking, reading, writing and translation '. The cloud platform analyzes the class data, identifies the effectiveness of teaching strategies (such as a grammar point using the ' virtual role correction ' teaching method, the student error rate decreased by 35 %), and provides an empirical basis for teaching and research.

3.4 Interdisciplinary, Interdisciplinary Resource Sharing and Flexible Deployment Advantages

Multidisciplinary projects are implemented in parallel, and the virtual simulation suite supports fast switching of subject scene templates. The same laboratory can meet different professional needs. Compared with the traditional single-disciplinary laboratory, the resource reuse rate is increased by more than 70 %, which can support multi-disciplinary rotation. Modular cloud platform management, teachers customize the experimental module parameters through the VR cloud platform (such as the speech speed complexity in the foreign language scene, the cultural background of the virtual role), and distribute them to the student terminal at one click to realize the personalized teaching of ' thousands of people and thousands of faces '.

3.5 Integration of Industry and Education, Collaborative Innovation of Industry and Education, Closed-loop Ecological Construction of Industry, University and Research

According to the needs of enterprises, access to the real corpus of Huawei, Chuanshen and other enterprises (such as 5G technology English tender), students ' training data feedback enterprise talent screening, reduce the cost of recruitment trial and error. The teaching scene service enterprises (such as ' International Exhibition VR Oral Training System ') will be connected to the internship training, open up the education chain and the industrial chain, and make the teaching reform results directly serve the industrial upgrading.

4. Build a Virtual Simulation Laboratory

The five-in-one teaching reform paradigm is the theoretical guidance, and a virtual simulation sharing platform is built. Through the scene docking curriculum practice needs, technological breakthrough ability boundaries, data-driven precise decision-making, discipline reconstruction knowledge system, and industry verification reform value, a complete closed loop of foreign language education reform is constructed. The essence is to reconstruct the " teaching production relationship " through digital technology, so that the construction of new liberal arts evolves from the conceptual level to the operational paradigm. The following is the main virtual simulation equipment ,as shown in Table 2 , platform equipment topology diagram,as shown in Figure 2.

Table 2. List of Main Virtual Simulation Devices.

Equipment	Model
VR wireless helmet	PICO; Model: Neo 3
Virtual simulation suite	HP; Model: Reverb G2
Server	Task-oriented (preset experimental steps)
High performance workstation	ThingkStation K-C2
All-in-one machine	Seewo，98 inches

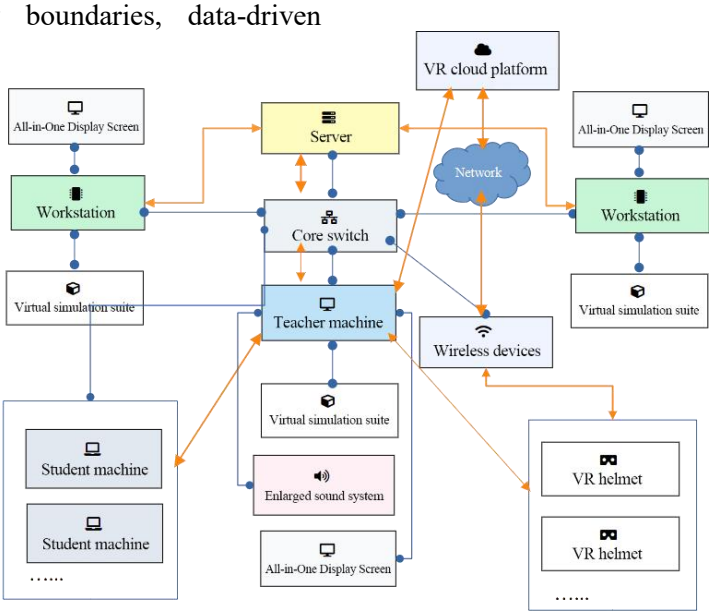

Figure 2. Virtual Simulation Platform Device Topology

Blue represents the physical connection, and orange represents the virtual connection (wireless network or data transmission).

The virtual simulation equipment is connected to a high-performance workstation (one of which is a teacher machine). The display screen of the all-in-one machine can display the interactive scene of students in the virtual simulation equipment in real time, and show the demonstration teaching of teachers in the virtual simulation equipment. The data of virtual simulation is transmitted to the server through the workstation.

The VR helmet synchronizes the interactive screen in the helmet with the teacher's machine through the wireless device. The teacher's machine can display and switch the VR images of different students in real time during the teaching process. At the same time, the teacher 's machine can analyze the module setting data of the VR terminal through the VR cloud platform to understand the students ' learning situation. Virtual simulation suite and VR helmet can deploy multidisciplinary virtual simulation

projects, and students of different majors can enter the laboratory at the same time for virtual simulation experience.

The virtual simulation laboratory realizes the integrated teaching innovation of immersive teaching demonstration, learning behavior data analysis and multi-scene collaborative training through multi-terminal real-time interaction, centralized teaching control and interdisciplinary equipment sharing.

5. Virtual Simulation Course Design Practice

The virtual simulation course is a complete course with the discipline system as the core and the systematic integration of multiple virtual simulation projects. The course design should meet the teaching objectives, covering theoretical explanation, simulation training, assessment and evaluation. Among them, the virtual simulation project is the core unit of the course, which is a practical task for the design of knowledge points or skills. It is usually problem-oriented and completes the learning objectives through interactive operations (such as business talk in business interpretation courses and international conference simultaneous interpretation of simultaneous interpretation courses). The virtual simulation course relies on laboratory resources to transform discrete projects into structured teaching content and integrate them into the teaching evaluation system. The curriculum can break through the boundaries of disciplines and enhance interdisciplinary practice.

5.1 Design Requirements

5.1.1 Accurately locate the course requirements and design goals hierarchically

Demand analysis, focusing on curriculum objectives, and constructing the core scene of curriculum objectives through virtual simulation technology. Secondly, aiming at the problems of high cost, high consumption, difficult implementation, difficult observation and difficult reproduction of traditional experiments, the experimental content suitable for virtualization is selected[16]. Combined with the professional characteristics, we give priority to the selection of experimental scenarios that reflect high-level, innovative and challenging, such as the simulation of international negotiations in foreign language teaching.

The hierarchical design of curriculum objectives is divided into three levels of objectives. Knowledge goal: to restore the experimental principle through virtual scene and strengthen theoretical cognition. Skill goal: design interactive operation process, improve language interaction and hands-on ability. Emotional goal: integrate the ideological and political elements of the curriculum (such as the awareness of cultural heritage protection) and enhance social responsibility.

5.1.2 Technology empowers teaching content and constructs virtual and real fusion scenarios

Unity 3D technology is used to construct 3D scenes, motion capture tactile feedback, spatial audio and other technologies are supported to construct high simulation environment, students are allowed to customize experimental variables (such as the adjustment of speech speed), and multi-path exploration is supported.

The module is split, and the complex learning target is decomposed into independent sub-tasks to support phased learning. Interdisciplinary integration, design of comprehensive projects (such as the integration of international commercial law knowledge map into the ' Belt and Road ' business negotiations '), and promotion of cross-application.

5.1.3 Teaching mode innovation and implementation strategy

Layered teaching mode: divided into junior high school and senior high school, through learning difficulty, cognitive degree and so on. The primary layer completes cognitive learning through virtual demonstration. The middle level, design open questions, guide independent inquiry. The advanced layer supports students to customize the experimental scheme and cultivate the ability to solve complex problems.

Data-driven precision teaching: behavior tracking, recording operation steps, response time, error rate and other data. Intelligent feedback, using AI algorithm to correct errors in real time (such as speech recognition to correct pronunciation errors), and setting up personalized training module.

5.1.4 Dynamic evaluation and continuous optimization mechanism

Diversified evaluation system, process evaluation and result assessment, evaluation of comprehensive ability. Iterative update mechanism, teacher-developer collaboration, optimize experimental parameters according to student feedback. The version or corpus is upgraded, and 10 % of the scene library is added each year to respond to industry changes.

5.2 'Business Interpreting' Course Virtual Simulation Project Design

5.2.1 Curriculum goal matching analysis

Professional norms (course objectives 1), scene simulation: provide 'business visit', 'press conference', 'international conference' and other scenes, students in the virtual environment to comply with professional etiquette (such as dress code, confidentiality requirements). For example, the locker room module allows students to choose professional attire (suits / gowns), and AI generates a virtual image and evaluates whether the attire is in line with international business etiquette. Corresponds to the outline requirements: covering the professional ethics and confidentiality requirements in the 'professional code' unit (outline unit 1).

Interpreting ability improvement (course goal 2), hierarchical training module: primary, providing ' simultaneous interpretation overview'and' pre-interpretation preparation' modules to help students master basic skills (such as interpreting note symbols). Intermediate and advanced, In the ' Belt and Road' business negotiation scenario, AI evaluates the accuracy of language conversion in real time and generates error reports (such as digital mistranslation red flags). Multi-mode training: support 'learning mode (with subtitles)', 'training mode (without subtitles)', 'task mode (teacher release task)', covering the whole process of listening comprehension, memory retelling and language conversion. Corresponding to the requirements of the outline: matching the linear translation skills and number interpretation skills of ' business meeting ', ' business negotiation ' and other units (the fourth and fifth units of the outline).

Cross-cultural communication ability (curriculum goal 3), cultural scene library: including 'World Heritage Conference', 'Chinese and Western cultural convergence' module, simulation of different countries business etiquette (such as the Middle East handshake taboo, Japanese bow etiquette). Dynamic cultural feedback: In the ' international exchange ' scene, if the student violates the cultural norms (such as using the left hand to pass things), the virtual character will prompt errors through facial expressions or voices. Corresponding to the requirements of the outline: cultural sensitivity training covering ' tourism and culture ' and ' international exchange ' units (units 10 and 9 of the outline).

5.2.2 The course content and VR function mapping

The mapping between course content and VR features is presented across three dimensions: syllabus units, functions and scenarios, and technical implementation, as detailed in Table 3.

Table 3. Course Content and VR Function Mapping

Syllabus unit	Functions and scenarios	Technical implementation
Unit 1 : Introduction to interpreting	Summary of simultaneous interpretation module : demonstrate the working process of simultaneous interpretation through 3D animation, including more than 5 knowledge points (such as simultaneous interpretation equipment operation, interpreter literacy).	The Unity3 D engine builds a virtual simultaneous transmission box, and AI simulates the speed change of the speaker to train students ' ability to delay adjustment.
The second unit : business visit	Airport pick-up and factory visit scenarios : students act as interpreters to complete business reception tasks, and AI evaluates language fluency and cultural adaptability.	Dynamic parameter adjustment : speech rate is divided into three levels (120-200 words / min), environmental sound interference (airport broadcast, factory noise).
Unit 4 : Business Negotiations	" One Belt and One Road " business scenario : simulation of Sino-Russian railway negotiations, built-in " Chongqing-Xinjiang-Europe Railway " proper noun lexicon (≥ 40 terminology annotations).	Multilingual support : AI recognizes accented English (such as British English), real-time transliteration and term matching.
Unit 10 : Tourism and culture	World Heritage Conference Scene : Students need to translate such as Confucius introduction, Dunhuang cultural protection concept, and compare Chinese and Western cultural differences.	D landmark modeling (Taj Mahal, Arc de Triomphe) combines spatial audio to enhance immersion and cultural cognition.

5.2.3 Practice teaching conditions and evaluation system

Students can enter the virtual scene through the VR head display or PC, without relying on the physical training room. With the expansion of dynamic scenes, teachers can upload real corpus (such as recordings of Canton Fair negotiations) and support dynamic updates such as national cultural libraries along the ' Belt and Road '. Intelligent evaluation and feedback, data collection, recording student operation logs, voice data. AI scoring model is used to evaluate the quality of the translation and generate the ability radar map. It supports ' process assessment (50 %) + final practice (50 %) ', which matches the ' interpreting practice ' and ' team project ' required by the outline.

5.2.4 Curriculum ideological and political integration with production and education

Cultural self-confidence integration, cultural module: in the scene of ' Chinese and Western cultural convergence ', Confucius introduction, Confucian temple introduction, strengthen cultural output consciousness. The origin and development of the Maritime Silk Road echoes the ideological and political goal of " telling the Chinese story well " in the outline.

Industry-education collaborative innovation, enterprise corpus access : teachers import enterprise project negotiation record language, students complete the training data synchronization to the enterprise talent assessment, shorten the employment adaptation period. The " Belt and Road " thematic database covers the economic and cultural data of 15 countries (such as Kazakhstan 's investment law), and supports training related to national strategies such as the " Chongqing-Xinjiang-Europe Railway".

Through the three core designs of scene reconstruction, intelligent evaluation and cross-cultural simulation, it comprehensively covers the curriculum objectives, content modules and assessment requirements of the "Business Interpreting " syllabus.

6. Conclusion

Aiming at the core problems of virtual simulation laboratory of foreign language specialty in colleges and universities, such as insufficient quantity, weak interdisciplinary cooperation and low resource utilization rate. By taking the "scene-technology-data-discipline-industry" five-in-one foreign language teaching reform paradigm as the core, a virtual simulation laboratory with virtual and real symbiosis is constructed. Taking the course of "business interpretation" as an example, a virtual simulation project is designed to create high simulation practice scenarios such as "simultaneous interpretation of international conferences," "simultaneous interpretation of international conferences "and" business negotiations along the Belt and Road, " so as to innovate the traditional foreign language teaching mode and improve students ' practical ability. Promote the construction of foreign language virtual simulation laboratory and the development of teaching application.

References

[1] Wu.Construction of a First-class Virtual Simulation Experimental Teaching Course of English for Specific Purposes under the Background of New Liberal Arts—Taking Spoken English of Traditional Chinese Medicine as an Example.Chinese Medicine Modern Distance Education of China,2025,23(19):8-11.

[2] Song.Research on the Innovative Application of Virtual Simulation Technology in Foreign Language Teaching. Science &Technology Information, 2025, 23(15): 238-241.

[3] Liu et al.Enhancing Non-Verbal Information in VR-Based Foreign Language Learning: An AI Approach in a Korean Intercultural Communication Simulation. Technology Enhanced Foreign Language Education, 2024, (02): 13-17.

[4] Hu and Zhang.Characteristics and trends of university liberal arts laboratoryconstruction under the background of “New Liberal Arts”. Experimental Technology and Management, 2023, 40 (01): 221-226.

[5] Sheng.Construction design of virtual simulation training platform for economic and trade foreign language. Computer Knowledge and Technology, 2021, 17(22): 142-143.

[6] Ma.The application of virtual simulation training platform in the teaching of English majors in colleges and universities—Taking Yunnan University of Finance and Economics as an example. Modern English, 2021, (05): 48-51.

[7] Shen.Application of Virtual Simulation

Technology in Cultivating Intercultural Communication Competence in Tourism English. Modern English, 2025, (06):66-68.

[8] Zhang et al.The Exploration, Practice and Commentary of Language Virtual Simulation Experiment Teaching—Taking the Public Elective Course of ―College English Virtual Simulation Experiment for Example. Modern Educational Technology, 2018,28(05): 75-81.

[9] Tang and Zhang.The construction of virtual simulation laboratory and the reform of experimental teaching. Knowledge Library, 2016, (14):131.

[10]Zheng et al.Construction and Practice of a Virtual Simulation Laboratory for Material Forming and Control Engineering.Experimental Technology and Management, 2019, 36(03): 261-265.

[11]Yin et al. Construction of virtual simulation laboratory based on modularization. Experimental Technology and Management, 2020, 37(6): 259-262.

[12]Liu. Discussion on the sharing platform of virtual simulation experiment teaching resource in foreign language universities.Laboratory Science, 2022, 25(3): 125−127.

[13]Wen. Research on the application of virtual reality technology in foreign language teaching from the perspective of situational cognition theory. Journal of Guangxi College of Education, 2024(3): 54-60.

[14]Zhao and Sun.Exploring and Practicing the Development Path of Virtual Simulation. Experimental Science and Technology, 2025, 23(04): 147-155.

[15]Chen and Zhang. Progress, Hotspots, and Trends of VR Experimental Foreign Language Teaching Research in the Past Three Decades—Based on a Visual Analysis of WOS Journal Articles. Technology Enhanced Foreign Language Education, 2023(3): 100-109.

[16]Wang et al. Design and Practice of Foreign Language Virtual Simulation Experiment Instruction Project—Take the Japanese Intercultural Communication Virtual Simulation Project as an Example. Technology Enhanced Foreign Language Education, 2021(3): 57-62.