Practical research on the construction of digital intelligent experimental teaching platform for new business subjects under the background of artificial intelligence

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Abstract: The vigorous development of a new round of technological revolution and industrial transformation, especially the rapid iteration of digital and intelligent technologies, has profoundly reshaped the business environment and set higher standards for the cultivation of new business talents. Shandong Technology and Business University takes "cultivating people with moral integrity" as its fundamental mission and responds to national strategic needs. In response to the problems existing in traditional experimental teaching such as disconnection from industrial needs, insufficient digital support, and fragmentation of collaborative education, Shandong Technology and Business University has built a new digital intelligent experimental teaching platform for business subjects driven by artificial intelligence based on the core concepts of interdisciplinary integration, practice orientation, and value leadership. The platform aims at "four-dimensional" ability portraits, relies on the "12345" talent training model, and integrates technologies such as digital twins and AIGC to form a closed-loop operating mechanism of "industrial demand - data support - teaching application - effect feedback". This article systematically elaborates on the core logic of platform construction (goal coordination, content structure, mechanism guarantee) and teaching implementation path (platform construction, model innovation, collaborative education, quality assurance), and verifies the effectiveness of the platform through practical results, aiming to provide an operational practical paradigm for the reform of experimental teaching in new business subjects and the high-quality cultivation of applied talents.

Keywords: Artificial Intelligence; New Business; Digital and Intelligent Experimental Teaching Platform; Integration of Science, Education and Industry; Talent Training

1. Introduction

1.1 Research Background and Problem Proposal

The construction of new business disciplines is an important part of the reform of higher education in the new era. Its core purpose is to break down the barriers to business and engineering disciplines, promote the deep integration of digital technology and business logic, and cultivate compound talents who "value ethics, understand business, and understand technology[1]."Against the background of the deep integration of artificial intelligence and the real economy, industries such as finance, e-commerce, and management have increasingly urgent needs for talents with digital application capabilities, scenario innovation capabilities, and collaborative leadership.However, there are many outstanding problems in traditional business experimental teaching: First, the experimental content lags behind and focuses on theoretical verification rather than industrial practice, resulting in a "disconnect" between experimental training and job requirements; second, the experimental platform lacks intelligent support and is difficult to simulate complex and dynamic business scenarios, which restricts the cultivation of students´ mathematical skills; third, the government-school-enterprise-society collaboration mechanism is incomplete, experimental resources are insufficiently shared, and the efficiency of education and teaching is low; fourth, the evaluation of experimental teaching focuses on process completion, neglecting ability improvement and quality development, making it difficult to accurately measure the comprehensive training effect[2].

Against this background, relying on artificial intelligence technologies such as digital twins, AIGC, and big data analysis to build a new digital and intelligent experimental teaching platform for business has become an inevitable choice to solve the pain points of traditional teaching, achieve deep integration of science, education, and industry, and cultivate high-quality applied talents. It is also a key measure to implement the requirements of "three comprehensive education" and promote the high-quality development of higher business education.

1.2 Research Status at Home and Abroad

In terms of foreign research, foreign universities have taken the lead in exploring the integration of digital technology and business experimental teaching. For example, Stanford University has built a digital business simulation platform based on big data and artificial intelligence, realizing the integration of real enterprise data and experimental teaching, and focusing on cultivating students´ data analysis and decision-making capabilities[3]. MIT has launched an entrepreneurial experimental platform combining virtual reality technology, which allows students to simulate the entire process of entrepreneurial projects in a virtual environment and has formed a mature collaborative education model with enterprises. However, foreign research focuses more on technological application and less on the adaptation to the national conditions and industrial characteristics of developing countries, and there is a lack of in-depth exploration of the collaborative mechanism between government, schools, enterprises and society.

In terms of domestic research, with the promotion of the national "new business" construction strategy, domestic universities have carried out relevant practice and research. Some scholars have studied the construction path of experimental teaching platforms from the perspective of interdisciplinary integration, emphasizing the integration of business and engineering knowledge[4]; some have focused on the application of a single technology such as digital twins in experimental teaching, but there is a lack of systematic research on the integrated application of multiple technologies such as AIGC and blockchain. In addition, most existing studies pay more attention to the functional design of the platform, and the research on the long-term operation mechanism, security guarantee system and dynamic quality evaluation of the platform is not in-depth enough, which cannot fully meet the actual needs of the high-quality development of new business talent training.

1.3 Research Significance

In terms of theoretical significance, this study constructs a core logic and implementation path of a digital intelligent experimental teaching platform for new business driven by artificial intelligence, which enriches the theoretical system of new business education reform and provides a new theoretical perspective for the research on the integration of science, education and industry. By exploring the integrated application of multiple digital technologies in experimental teaching, it compensates for the deficiency of existing research in the systematic application of technologies and provides theoretical support for the digital transformation of higher business education.

In terms of practical significance, the construction of the platform can effectively solve the problems of traditional business experimental teaching such as disconnection from industrial needs and insufficient digital support, and improve the matching degree between talent training and industry needs. The platform´s "government-school-enterprise-society" collaborative education mechanism and dynamic quality assurance system can provide practical reference for other universities to carry out new business experimental teaching reform. At the same time, the platform cultivates compound talents with digital intelligence skills and social responsibility, which can provide solid talent support for regional economic transformation and industrial upgrading, and promote the healthy development of the digital economy.

2. The core logic of the construction of new business digital intelligent experimental teaching platform under the background of artificial intelligence

Under the background of artificial intelligence, the construction of the new business digital intelligent experimental teaching platform is centered on the matching of industry needs and talent training. Based on the talent training syllabus, the core logic of "goal synergy - content structure - mechanism guarantee" is constructed to achieve the organic unity of technological empowerment, content innovation and mechanism optimization[4].

2.1 Goal synergy: Build a “four-dimensional” capability-oriented training goal system

The platform closely adheres to the future business characteristics of "intelligent drive, ecological symbiosis, and shared responsibility", and takes the 6C core competencies (innovation spirit, social responsibility, practical ability, digital intelligence skills, international vision, collaborative leadership) as the core to build a "four-dimensional" training goal system of "value leadership - knowledge support - capability drive - quality empowerment", pointing out the direction for platform construction[3].

Value dimension: focusing on the cultivation of family and country feelings and business ethics, guiding students to establish values and concepts that serve the real economy and abide by ESG principles;

Knowledge dimension: Strengthen the interdisciplinary knowledge chain of "business and industry integration", covering knowledge in core fields such as business management, digital technology, and industrial operations;

Capability dimension: Highlight digital intelligent scenario application and agile evolution capabilities, focusing on cultivating core skills such as data analysis, intelligent decision-making, and scenario innovation;

Quality dimension: Incorporate practical indicators such as innovation and entrepreneurship, risk prevention, and collaboration to comprehensively improve students´ comprehensive quality.

2.2 Content architecture

Build a technology-driven platform functional system. The platform takes "technology empowerment, demand orientation, practicality and efficiency" as its core principles, and is based on the four-layer architecture of "data-technology-application-support" to build a multi-level, integrated functional system to achieve full process coverage of experimental teaching, practical training practice, innovation and entrepreneurship, and form a closed-loop operation logic of "data-driven technology, technology-supported application, and application-based support".

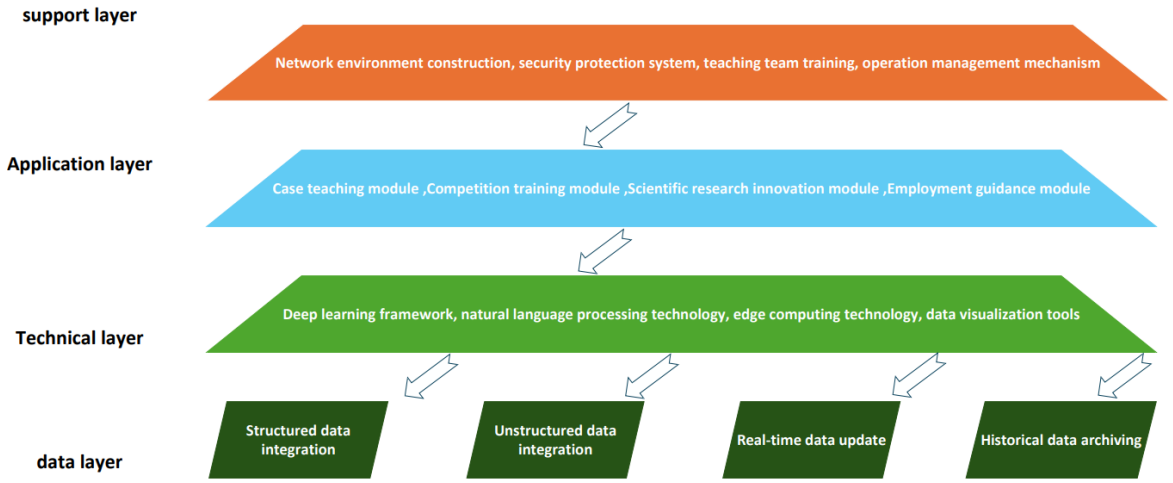

Figure1 Schematic diagram of the structure of the new business digital and intelligent experimental teaching platform

2.2.1 Data layer

three-dimensional dynamic data resource library The data layer is the "source of running water" for platform operation, building a three-dimensional data resource library covering industry, teaching, and enterprises. The industrial data is connected to the API of the recruitment platform to capture the job requirements of more than 20 industries, and is analyzed by AIGC to generate a dynamic capability map, which is collected in daily increments and updated monthly[4]. The teaching data is recorded through the platform´s burying technology to record multi-dimensional information such as students´ experimental operations and task progress, and establish a personal profile. Personal learning archives, accumulatively storing more than 12,000 student data; corporate data is stored in the database after desensitization, covering more than 30 companies´ 500GB+ business data and more than 1,000 front-line cases, forming a closed loop of "collection-cleaning-analysis-application" to provide accurate support for each module.

2.2.2 Technology layer

multi-technology collaborative support matrix The technology layer is the "core engine" of the platform, integrating multiple cutting-edge technologies with artificial intelligence as the core. Machine learning algorithms analyze student data and generate personalized learning suggestions; natural language processing supports intelligent question answering, with a response rate of 95%; digital twins build high-simulation virtual scenes and support VR immersive experiments; AIGC quickly generates experimental plans, cases, and question banks, and has produced more than 800 sets of teaching resources[5]; big data analysis mines data patterns to provide a basis for teaching optimization; blockchain ensures the storage of experimental results and data security, forming a multi-tech collaborative empowerment pattern.

2.2.3 Application layer

Hierarchical experimental teaching module The application layer covers three core modules and covers the entire process of ability training. Virtual simulation experiments focus on basic skills, and 12 of the more than 150 projects have been rated as provincial first-class, supporting autonomous training and repeated optimization; industrial training relies on 14 industrial colleges and more than 20 joint laboratories, introducing real business systems of enterprises, and organizes 2 More than ,000 people have received on-the-spot training, achieving "seamless connection between practical training and jobs"; the innovation and entrepreneurship module has built a full-chain service of "simulation-incubation-investment and financing" and has incubated more than 50 projects, 12 of which have received tens of millions of angel investments to meet the capability needs at different stages.

2.2.4 Support layer

multi-dimensional collaborative guarantee system The support layer provides all-round guarantee from three aspects. Policy support relies on national and provincial teaching reform projects, with supporting local special support funds exceeding 5 million yuan; teachers support the formation of a three-dimensional "academic + industry + technology" team, with professors and associate professors accounting for 70%, and the average number of corporate tutors is more than 1 In 0 years, a total of 1,056 collaborative guidances have been carried out; resources support the construction of a "government, school, enterprise and society" shared library, integrating 38 provincial first-class courses and more than 600 inter-school shared resources, with a total of more than 150,000 visits, providing a solid guarantee for teaching.

2.3 Mechanism guarantee

Improve the collaborative education mechanism of "government, school, enterprise and society". The platform takes "three academies, three halls and three teachers" as the core to build a collaborative education mechanism for multiple subjects and realize the closed-loop linkage of

"scientific research-teaching-industry".

2.3.1 “Three Academies Linkage”

Demand-Treatment-Teaching Transformation Relying on the "College-Research Institute-Industrial College" synergy, the Industrial College surveys companies every quarter and holds two industry seminars every year to collect more than 200 industrial needs[6]. The institute has established more than 20 special teams to work with corporate technical backbones to tackle key problems and transform more than 40 results into teaching content. The college has updated the experimental syllabus and curriculum system, developed 15 customized practical training courses, and achieved precise integration of industrial needs and teaching through 8 full-process education projects.

2.3.2 “Three Lectures for Empowerment”

A bridge to connect industrial resources. Three levels of lectures, namely “Intimate Knowledge Lecture Hall, Entrepreneur Classroom, and Entrepreneurship Lecture Hall” were opened, with a total of 322 lectures held. The Near Knowledge Lecture Hall invites industry experts to interpret policies and trends, covering more than 8,000 people; the Entrepreneur Classroom adopts a "case + interaction" model and invites entrepreneurs such as Fu Sheng and Feng Lun to teach, with a satisfaction rate of 96.3%; the Entrepreneurship Lecture Hall organizes road shows and financing guidance, covering more than 5,000 people, cultivating innovative thinking and entrepreneurial awareness.

2.3.3 "Three-teacher collaboration"

personalized guidance throughout the entire process. A three-dimensional mentor team of "academic + industry + peers" is established. Academic mentors are responsible for professional teaching and learning planning, industrial mentors guide practical training and career development, and peer mentors play the role of "helping and guiding"[7]. Through tutor meetings, group discussions and other forms, a total of 1,056 collaborative activities have been carried out, covering modules such as business planning and entrepreneurial simulation, to help students improve their practical and innovative abilities.

2.4 Security and Adaptability Guarantee: Build a solid foundation for the stable operation of the platform

2.4.1 Full-Process Data Security Control Mechanism

Security and adaptability are the core prerequisites for the long-term operation of the digital intelligent experimental teaching platform. It is necessary to build an all-round guarantee system from the three dimensions of data security, technology adaptation, and group adaptation to ensure that the platform can meet the use needs of different scenarios and groups on a safe and controllable basis.

In terms of data security, a “whole-process security management and control” mechanism has been established. Implement hierarchical and classified management of corporate desensitized data, student personal information, and teaching process data, and set up access permission barriers so that only authorized personnel can view core data; use technologies such as encrypted transmission and disaster recovery backup to prevent data leakage, loss, or tampering; rely on blockchain technology to realize the traceability and storage of key data to ensure that the entire data flow is traceable; formulate data security emergency response plans, regularly carry out security vulnerability inspections and attack and defense drills, and respond to risks such as network attacks and abnormal data access in a timely manner to ensure the security and compliance of platform data.

In terms of technical adaptation, both "compatibility" and "iteration" are taken into consideration.

The platform adopts a modular design, supports multiple operating systems such as Windows and Mac, adapts to multiple terminal devices such as computers and tablets, and is compatible with mainstream professional software such as Python and SPSS, ensuring that teachers and students can use it smoothly without additional adaptation. It has established a technology iteration mechanism to track cutting-edge technologies such as artificial intelligence and digital twins, evaluate technology adaptability every quarter, and carry out platform function upgrades twice a year to optimize the operation interface and interaction logic, lower the threshold for use, and is compatible with older versions of experimental projects to avoid waste of resources.

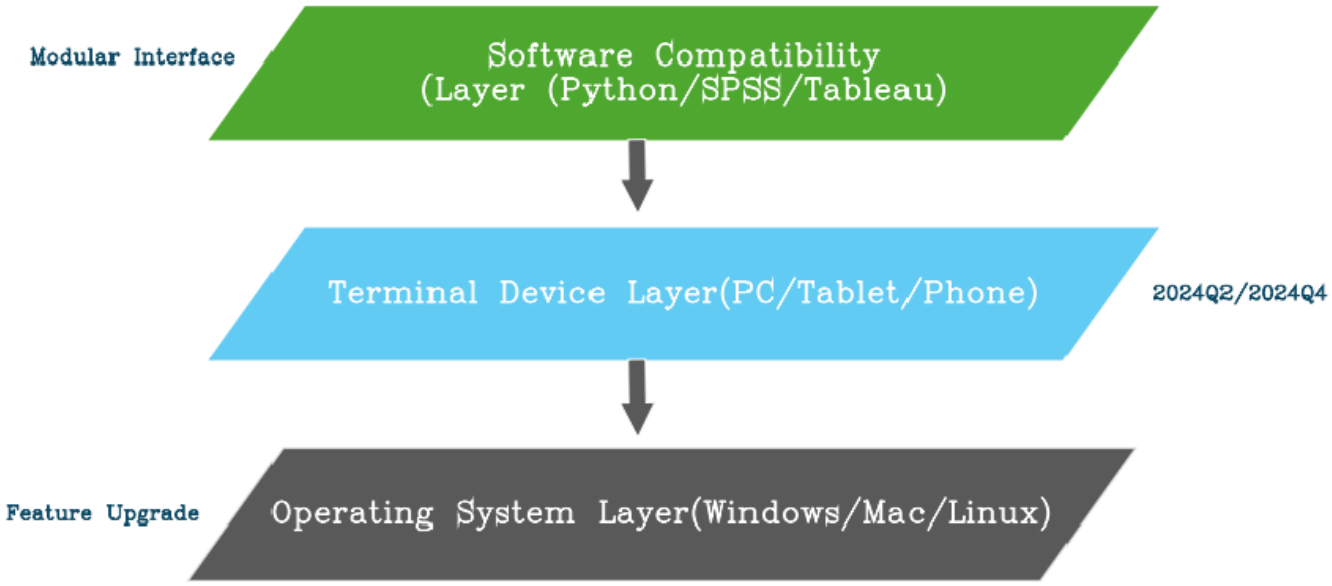

Figure2 Platform Technology Adaptability Architecture

In terms of group adaptation, the unity of "personalization" and "universal benefit" is achieved. To meet the teaching needs of different majors (finance, e-commerce, business administration, etc.), customized functional modules and experimental resource packages are provided; taking into account the differences in student foundations, three operating modes are set up: basic version, advanced version, and expert version. Students with weak foundations can complete experiments through guided operations, and students with strong abilities can design their own experimental plans; it integrates barrier-free design and supports functions such as font amplification and voice broadcasting to protect the rights and interests of students from special groups and allow the platform to cover more teaching scenarios and user groups.

2.4.2 Emergency Response Mechanism: Enhancing Risk Handling Efficacy

In response to sudden security incidents, establish an emergency mechanism featuring "minute-level response and hour-level disposal". Set up a 7×24-hour technical support hotline and deploy a full-time security operation and maintenance team, which will respond within 15 minutes upon receiving an alarm and issue a preliminary disposal plan within 2 hours; establish risk level classification standards (general / major / significant). For significant risks (such as data leakage), immediately activate the emergency plan, suspend the operation of the involved modules, notify the regulatory authorities, and simultaneously activate the backup data center to ensure the continuity of teaching; after the incident, formulate a "Security Incident Review Report", update protection strategies (such as adding AI abnormal behavior monitoring algorithms), and achieve a spiral improvement of "disposal - review - optimization".

3. Teaching implementation path of the new business digital intelligent experimental teaching platform

3.1 Platform construction

Deep integration of technology and resources Platform construction creates a core carrier through three-dimensional efforts. In terms of technological empowerment, more than 80 virtual simulation projects have been upgraded based on digital twins, and the VR immersive experiment satisfaction rate has reached 94%; the intelligent evaluation system generates student portraits through machine learning, and the accuracy rate of personalized recommendations exceeds 88%. In terms of resource integration, it has built 14 industrial academies and more than 20 joint laboratories with JD.com, Inspur Software, etc. to introduce real enterprise systems; it has connected with government departments to obtain industrial policies and shared more than 600 resources with 28 universities. In terms of scenario upgrading, more than 500 experimental scenarios covering more than 10 industries have been constructed. They are divided into three categories: basic, practical and innovative according to the level of capabilities. They are dynamically updated every quarter, and the annual new additions account for more than 30%.

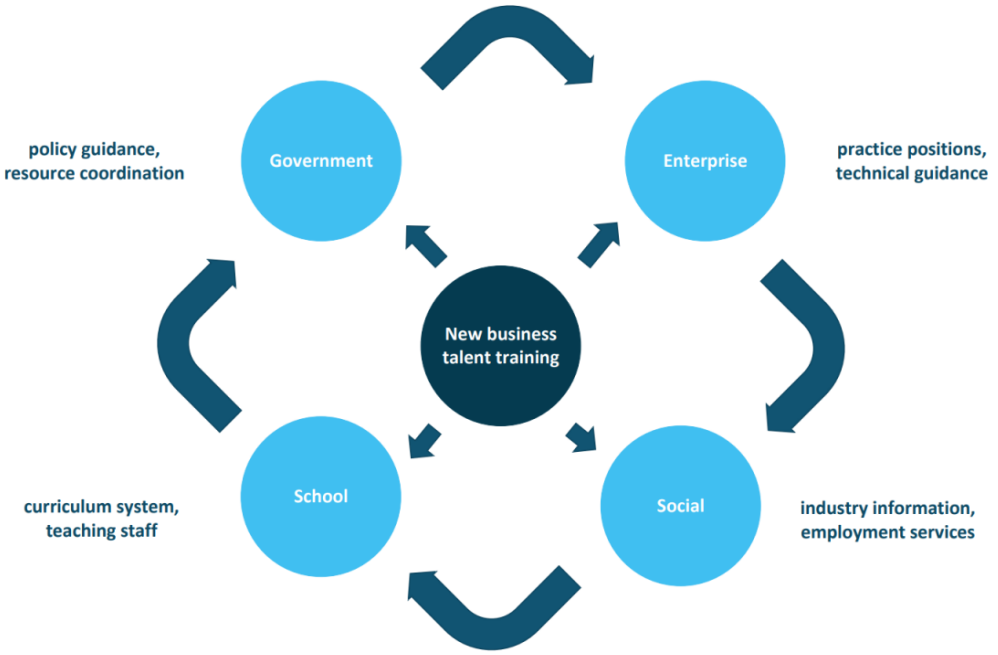

Figure 3 Schematic Diagram of the "Government-University-Enterprise-Society" Multiple Collaborative Education Mechanism

3.2 Teaching model innovation

Reconstruct the experimental teaching process and build a "scenario-driven + task-oriented + interactive and advanced" teaching process. Scenario-driven is based on industrial reality, and forms personalized scenarios through "demand collection - AIGC generation - review and optimization" to design cross-domain comprehensive experimental projects; the task orientation is decomposed into three-level tasks of basic operation, practical application, and innovation and creation, with clear evaluation standards and time limits, and the platform tracks feedback in real time; the interaction is advanced through the multi-dimensional form of "case discussion + online Q&A + cross-professional collaboration + competition linkage"[5]

3.3 Collaborative education mechanism

expand the boundaries of experimental teaching and build a multiple collaborative system of "government, school, enterprise and society". The government has introduced supportive

policies, granted tax incentives and financial subsidies to enterprises, coordinated resources to build docking platforms, and jointly formulated talent training standards; enterprises have jointly built teaching resources, provided more than 50 internship bases, participated in the formulation of talent training plans and student evaluations, and accepted more than 2,000 internships each year; the school has established a collaborative leadership group to coordinate resources from all parties, organize teaching implementation and reform research; industry associations provide skills certification, scientific research institutions transform scientific research results, and entrepreneurial incubation institutions provide venues and financial support for projects, forming a comprehensive education pattern.

3.4 Quality Assurance: Build a dynamic system of "goal-oriented-multiple evaluation-continuous improvement"

3.4.1 Construction of Three-Dimensional Evaluation Index System

Quality assurance is a key closed loop for teaching implementation. It is necessary to closely adhere to the talent training goals of "emphasis on ethics, business knowledge, and understanding technology" and build a dynamic system of "goal orientation-multiple evaluation-continuous improvement" to ensure that the platform's teaching effects are effective.

At the goal-oriented level, the three-dimensional quality goals of knowledge, ability, and quality are clearly defined: the knowledge dimension requires a pass rate of over 95% for core knowledge points, the ability dimension focuses on digital intelligence skills and innovation capabilities, with an excellent rate of over 85%, and the quality dimension highlights business ethics and social responsibility, with an evaluation rate of no less than 90%. At the same time, we benchmark the needs of industrial positions and transform the core competency requirements of enterprises into quantifiable evaluation indicators to achieve accurate alignment between training goals and industry needs.

At the multi-evaluation level, a combination of "process evaluation + summative evaluation + third-party evaluation" is adopted. Process evaluation accounts for no less than 40%, and the platform records dynamic data such as students' experimental operations, task completion, and group collaboration performance; summative evaluation is mainly based on comprehensive experimental reports, skill tests, and project defenses to assess knowledge application and innovation capabilities; corporate mentors and industry associations are introduced to participate in third-party evaluations, and students' practical results are scored from a practical perspective to ensure an objective and comprehensive evaluation.

At the level of continuous improvement, a closed-loop mechanism of "monitoring-feedback-optimization" is established. Every semester, teaching problems are collected through platform data analysis, teacher-student discussions, and corporate surveys to form a quality report; in response to problems such as lagging experimental scenarios and complex tool operations, the technical team and corporate experts are jointly optimized within a time limit; the improvement effects are tracked, and the optimization results are verified through student satisfaction surveys and subsequent course performance, and evaluation indicators and teaching strategies are dynamically adjusted. Relying on platform data empowerment, we can realize the transformation of quality assurance from "experience-driven" to "data-driven" and continue to improve the quality of talent training.

3.4.2 Application of evaluation results: driving precise optimization of teaching

The effective application of evaluation results is an extension of the quality assurance system. Establish a "evaluation-feedback-improvement" data closed loop to automatically trigger special rectifications for weak indicators in the radar chart (such as a practical score of mathematical intelligence skills below 80%): jointly develop targeted experimental projects with enterprises (such as adding a Python data analysis practical module), and arrange for industry tutors to

conduct online Q&A; modules with excellent evaluations for two consecutive semesters (such as business ethics case discussion) will be included in the school-level excellent teaching resource library for promotion.[3] At the same time, students´ growth files are established, and through vertical comparison of radar chart changes (from freshman to senior year), the trajectory of ability and quality improvement is visually presented, providing data support for the adjustment of personalized training plans.

4. Conclusion

In the context of artificial intelligence, the construction of a digital and intelligent experimental teaching platform for new business subjects is a key measure to adapt to the needs of new business subjects and promote the reform of higher business education. Shandong Technology and Business University has built a complete platform system through "goal synergy - content structure - mechanism guarantee", relying on the implementation of the four-in-one path of "platform construction - model innovation - collaborative education - quality assurance" and achieved remarkable results: 12 national first-class undergraduate majors and 38 provincial first-class courses were approved; students won 8 national awards such as the China International College Student Innovation Competition Gold Medal, and 1,289 provincial and ministerial level awards. Project; outstanding students such as Gong Yuben, the most beautiful grassroots graduate in the country, and Liu Jinhu, the "Youth Entrepreneurship Pioneer" have emerged; relevant results have been featured in CCTV and "People´s Daily" reports, providing reference for 28 universities, and were highly praised by Ji Bingxuan, Vice Chairman of the National People´s Congress.

In the future, the platform will further deepen the linkage of the four chains of "innovation chain, industrial chain, talent chain, and education chain", continue to optimize the technical support system and resource library, innovate the collaborative education mechanism, and strive to create the "Shandong Province New Business Science, Education, Industry Integrated Talent Training Demonstration Project" to provide solid talent support for regional economic transformation and industrial upgrading, and contribute more to the high-quality development of higher business education.

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Funding project:

"2025 Higher Education Scientific Research Planning Project" of China Higher Education Association: Practical Research on the Construction of New Business Digital Intelligence Experimental Teaching Platform under the Background of Artificial Intelligence

2024 Shandong Province Undergraduate Teaching Reform Research Project (Key Project): Diversified Collaboration, Integrated Innovation: Research on the Talent Training Model of the Integration of Science, Education, and Industry from the Perspective of New Business.