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THE PATHWAYS AND MECHANISMS OF DATA-INTELLIGENCE DISCIPLINARY COMPETITIONS EMPOWERING BUSINESS TALENT CULTIVATION

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Abstract: Driven by the accelerated evolution of the digital economy and the construction of "New Business," data-intelligence disciplinary competitions have emerged as a critical vehicle for cultivating business talents with interdisciplinary integration capabilities, data-driven decision-making skills, and innovative practical literacy. This paper, grounded in multidimensional contexts including macroeconomic and social development, educational policy guidance, technological empowerment, and evaluation system reform, systematically reviews the literature on how data-intelligence competitions empower business talent cultivation. It thoroughly examines the positive impacts of such competitions on students' innovative thinking, interdisciplinary integration abilities, innovation and entrepreneurship literacy, and practical application skills. The study identifies several persistent challenges in the empowerment process, such as the disconnection between competitions and teaching, insufficient resource investment, weak faculty capacity, low student participation awareness, poor integration of professional and innovation-entrepreneurship education, and imperfect evaluation mechanisms. In response, this paper proposes a systematic and actionable optimization pathway and collaborative mechanism from three dimensions: optimizing competition systems and content design, innovating teaching models and curriculum systems, and improving support mechanisms and incentive policies. The aim is to effectively integrate competitions into the entire talent cultivation process, providing theoretical reference and practical guidance for cultivating high-quality business talents in the digital economy era.
Keywords: Data intelligence; Disciplinary competitions; New business; Talent cultivation; Competition empowerment; Innovative practice

1 INTRODUCTION

The background for the role of data-intelligence disciplinary competitions in cultivating business talent is rooted in the triple convergence of the accelerated evolution of the global digital economy, industrial intelligent transformation, and the paradigm shift in higher education[1]. As new-generation information technologies such as artificial intelligence, big data, and cloud computing become deeply embedded in the business ecosystem, the traditional business education model centered on functional division and theoretical instruction can no longer meet the market's urgent demand for interdisciplinary and innovative talents. Against this backdrop, the construction of "New Business" explicitly proposes a "technology + business" integrated development path, emphasizing the cultivation of students' abilities to integrate knowledge from multiple domains, harness intelligent tools, and solve systemic problems within authentic, complex contexts. Data-intelligence disciplinary competition,such as the "Internet Plus" University Student Innovation and Entrepreneurship Competition, the National University Student E-commerce "Innovation, Creativity, and Entrepreneurship" Challenge, and the Business Data Analysis Segment of the National Vocational College Skills Competition—serve as crucial practical carriers for this transformation need[2]. Their rise is an inevitable outcome of the synergistic evolution between supply-side educational reform and demand-side industrial upgrading.

2 BACKGROUND OF DATA-INTELLIGENCE DISCIPLINARY COMPETITIONS EMPOWERING BUSINESS TALENT CULTIVATION

2.1 From a Macro Economic and Social Perspective

China is comprehensively advancing high-quality development and accelerating the construction of a modern economic system driven by new quality productive forces. New quality productive forces are not only reflected in technological breakthroughs and industrial upgrading but more fundamentally require a reshaping of the talent structure. Corporate expectations for business graduates have shifted from traditional competencies in financial analysis, marketing, or human resource management towards higher-order literacies such as data-driven decision-making, human-machine collaborative innovation, and digital business model reconstruction. In fields like smart retail, intelligent manufacturing, and digital finance, practitioners need to simultaneously understand business logic and algorithmic logic, interpret behavioral patterns behind data, and design implementable solutions accordingly [3]. Such capabilities cannot be acquired through single-discipline courses but must be honed in highly simulated, comprehensive tasks. Data-intelligence competitions precisely provide such scenarios. Their topics often stem from real corporate pain points, requiring teams to complete a full-chain practice from problem identification and data collection to model building and

business validation within limited time, thereby compelling students to cross disciplinary boundaries and actively integrate computer science, statistics, design thinking, and management theory.

2.2 From an Educational Policy Guidance Perspective

The Ministry of Education has been continuously promoting the "Four New" construction in recent years. As an important branch of the New Liberal Arts, New Business explicitly advocates interdisciplinary integration, industry education collaboration, and practice-oriented education. Documents such as Opinions on Deepening Undergraduate Education and Teaching Reform to Comprehensively Improve Talent Cultivation Quality emphasize strengthening the cultivation of students practical abilities and innovation and entrepreneurship capabilities," encouraging universities to "incorporate disciplinary competitions into the talent cultivation system." Motivated by such policies, many universities have begun linking high-level competition achievements with credit recognition, awards and honors, and postgraduate recommendation eligibility, forming an institutional pull. More crucially, some institutions have attempted to build an integrated Course-Competition-Certification-Innovation-Application cultivation model, making competition content an organic component of teaching content and realizing a virtuous cycle of promoting teaching, learning, and reform through competitions[4].

2.3 From a Technology Empowerment Perspective

The proliferation of generative artificial intelligence has significantly lowered the barrier for non-technical background students to participate in data-intelligence practices. In the past, business students were often excluded from technology-intensive projects due to insufficient programming skills. Today, with tools like ChatGPT, SciSpace, and AI image generators, they can complete tasks such as literature review generation, code debugging, and visual prototype design through natural language instructions, thereby engaging more deeply in the technological innovation process. Research shows that after using such AI tools in digital business courses, students at the master's level not only gained a deeper understanding of complex concepts but also significantly improved communication efficiency and solution iteration speed in interdisciplinary collaboration[5]. This human-machine collaborative mechanism is reshaping the role positioning of business students from passive recipients to "questioners," "tuners," and "value judges" of intelligent systems—which is precisely the core competency of future business leaders.

2.4 From the Perspective of Evaluation System Reform

The traditional summative evaluation model, predominantly based on final exams, struggles to capture the dynamic development process of interdisciplinary abilities. Data-intelligence competitions, however, naturally fit within multi-dimensional assessment frameworks based on digital rubrics. These frameworks can provide structured scoring of student performance across various dimensions such as originality, technical feasibility, commercial value, social impact, and teamwork[6]. Combined with learning analytics technologies, educators can also track student behaviors during preparation like literature search strategies, frequency of AI tool usage, and number of solution revisions to generate personalized learning profiles and achieve formative feedback throughout the process. This evaluation method not only enhances the objectivity and efficiency of assessment but also makes competency growth visible, intervenable, and optimizable, providing data support for precise talent cultivation.

In summary, data-intelligence disciplinary competitions have become a key lever for business talent cultivation because they accurately respond to the era's demand for interdisciplinary talents, align with the strategic direction of national education reform, leverage the inclusive empowerment of intelligent technology, and promote the scientific evolution of evaluation systems[7]. In the future, with the establishment of regional competition alliances, the development of universal data sandbox platforms, and the exploration of blockchain-based mechanisms for credentialing competency achievements, data-intelligence competitions are expected to become further institutionalized, standardized, and open, truly becoming a core hub connecting education, industry, and innovation.

3 LITERATURE REVIEW ON DATA-INTELLIGENCE DISCIPLINARY COMPETITIONS EMPOWERING BUSINESS TALENT CULTIVATION

Against the backdrop of rapid digital and intelligent technology development, the business talent cultivation model is undergoing profound transformation. Data-intelligence technologies, represented by big data and artificial intelligence, are not only reshaping the business ecosystem and industrial landscape but also posing new requirements for talent's knowledge structure, practical abilities, and innovation literacy. In this process, disciplinary competitions, serving as a vital bridge connecting theoretical learning and practical application, have evolved from traditional knowledge assessment tools to a key mechanism empowering the cultivation of interdisciplinary business talent. Integrating data-intelligence disciplinary competitions into the talent cultivation system can effectively stimulate students' learning initiative, promote interdisciplinary knowledge integration, and systematically enhance their data analysis, intelligent decision-making, and innovative practice abilities through authentic or simulated complex problem scenarios. Research indicates that the competition-based "promoting learning and teaching through competitions" model can significantly enhance students' sense of engagement and accomplishment, thereby optimizing learning experiences and improving educational outcomes[8]. Particularly within the context of New Business construction, the traditional teacher-centered

classroom teaching model struggles to meet the demand for cultivating students' higher-order abilities, while disciplinary competitions provide a dynamic, open, and challenging learning field. For instance, in high-level competitions like the Internet Plus Innovation and Entrepreneurship Competition and the E-commerce Triple-Creation Challenge, student teams must comprehensively apply knowledge from management, economics, information technology, and data science to complete the entire process from market research and business model design to technical implementation and roadshow presentation a process that itself constitutes a complete innovation practice training[9]. Furthermore, research points out that feeding competition outcomes back into teaching and constructing an integrated Course Competition Certification Innovation Application talent cultivation pathway can achieve precise alignment between educational supply and industrial demand, delivering high-quality technical and skilled talent for developing new quality productive forces.

The deep integration of data-intelligence technology has also brought innovation to the competitions themselves. On one hand, AI tools like ChatGPT and SciSpace are used during competition preparation, assisting students with literature reviews, idea generation, and content optimization. This not only improves preparation efficiency but also prompts students to contemplate new human-machine collaborative working models[10]. On the other hand, competition evaluation systems are also evolving towards intelligence. The application of digital rubrics and automated learning analytics technologies makes the assessment of contestants' complex abilities more objective, efficient, and formative[11]. Notably, the effectiveness of this empowerment mechanism highly depends on the overall synergy of the education system. Teachers need the capability to guide students in utilizing data-intelligence tools, the curriculum system needs interfaces for competition articulation, and institutions need to establish corresponding incentive and support policies. Empirical studies find that when competition activities form positive interactions with curriculum teaching, research projects, and corporate practice, their effects on cultivating students' entrepreneurial self-efficacy and enhancing employment competitiveness are particularly significant.

However, empowering business talent cultivation through data-intelligence disciplinary competitions still faces many challenges. First, competition resources are unevenly distributed. Some universities have shortcomings in faculty, platforms, and funding, limiting student participation opportunities. Second, disconnection between competition content and daily teaching persists, failing to fully achieve competition-teaching integration. Furthermore, understanding of the educational value of competitions needs deepening; they should not merely be viewed as a pathway to awards but rather greater emphasis should be placed on their long-term benefits in shaping student resilience, teamwork spirit, and complex problem-solving abilities. Future research and practice should focus on constructing more systematic and normalized competition based education mechanisms, exploring how to use cutting-edge technologies like generative AI to lower the participation threshold for high-quality competition projects, establishing robust systems for competition outcome translation and credit recognition, and ultimately forming an open, inclusive, and sustainable innovative talent cultivation ecosystem.

4 THE IMPACT OF DATA-INTELLIGENCE COMPETITIONS ON BUSINESS STUDENTS' INNOVATION CAPABILITIES

4.1 Cultivating Diversified Thinking in Business Students

The cultivation of business students' innovation capabilities through data-intelligence disciplinary competitions encompasses cognitive restructuring, enhancement of practical abilities, interdisciplinary integration, and the fostering of human-machine collaborative thinking. By simulating complex problems in real business scenarios, such competitions prompt students to break out of traditional classroom knowledge frameworks, actively integrate knowledge from multiple domains like data science, artificial intelligence, and management decision-making, thereby achieving a fundamental shift from passive acceptance to active creation. Research shows that students participating in high-level data-intelligence competitions like the "Internet Plus" Innovation and Entrepreneurship Competition, E-commerce Triple-Creation Challenge, and Big Data Analysis Challenges demonstrate significantly better trends in innovation self-efficacy, problem identification ability, and solution design level compared to non-participating peers[12]. This impact is not accidental but stems from the inherent driving logic of the competition mechanism: it constructs a high-incentive, high-feedback-density learning environment where students continually refine creative thinking through iterating project solutions. Specifically, data-intelligence competitions first stimulate students' deep learning motivation through task-oriented design. Unlike regular course assignments, competition topics are often open-ended, ambiguous, and bound by real-world constraints such as optimizing supply chain forecasting models based on real enterprise datasets or developing new digital marketing content using AI generation technology. These tasks force students to autonomously define problem boundaries, select appropriate tools, and test hypotheses, a process that constitutes the core of innovation training[13].

4.2 Promoting Organic Integration of Interdisciplinary Knowledge

Modern business innovation rarely confines itself to a single discipline, and data-intelligence competitions inherently possess integrative attributes team members must collaboratively complete modules like market analysis, algorithmic modeling, business pitching, and technical implementation. This collaborative model effectively breaks down disciplinary barriers and cultivates systemic innovation thinking. More crucially, with the widespread application of generative AI and research assistance tools, data-intelligence competitions are reshaping the methodological foundation

of innovation. Research indicates that student teams proficient in using AI tools for literature review generation, code debugging, and visual design can devote more energy to high-level creative conception and strategic judgment, thereby enhancing the overall innovation quality of projects. This signifies an evolution in the connotation of innovation capability from "isolated individual flashes of insight" towards "human-machine collaborative cognitive expansion." Simultaneously, the application of intelligent evaluation systems also enhances the malleability of the innovation process. Automated feedback systems based on digital rubrics and learning analytics can multi-dimensionally assess the originality, feasibility, and social value of student proposals, providing immediate improvement suggestions. This makes innovation no longer a black-box trial-and-error process but a trackable, optimizable growth path. This model emphasizes feeding competition content back into the teaching system—for example, transforming past outstanding cases into teaching materials or embedding competition standards into course assessments—thus forming a virtuous cycle.

4.3 Enhancing Business Students' Innovation and Entrepreneurship Capabilities

With the in-depth development of the digital economy, digital technologies such as big data, cloud computing, artificial intelligence, and blockchain are widely applied across all aspects of business activities. Business talents need solid digital literacy to understand and apply these technologies, for instance, using big data analysis for market forecasting, leveraging AI to optimize decision-making processes, and mastering e-commerce platform operations. Traditional business education models struggle to adapt to the digitalized, intelligentized, and globalized development needs of e-commerce; thus, mastery of digital technologies has become an indispensable core competency for business talents. The rapid changes in the digital economy have spawned numerous new business formats and models, such as the rapid growth of cross-border e-commerce. This demands that business talents possess a strong sense of innovation and entrepreneurial spirit, enabling them to identify market opportunities, propose innovative solutions, and put innovative ideas into practice. Disciplinary competitions are considered a key measure for deepening the reform of the innovation and entrepreneurship education system. Through competition participation, students can enhance their problem-solving abilities, teamwork skills, and innovation awareness in practice.

4.4 Strengthening Business Students' Practical Application Abilities

Commercial practice within the context of the digital economy is more pragmatic, requiring business talents not only to possess theoretical knowledge but also to be able to apply theory to practical scenarios to solve real business problems. Disciplinary competitions provide students with opportunities to apply theoretical knowledge in practical settings, helping bridge the gap between theory and practice For example, through project-driven practical teaching models, students can exercise their ability to solve practical problems in real or simulated business environments. Faced with complex business environments and massive data, business talents need powerful comprehensive analysis abilities to examine problems from multiple angles and dimensions and propose effective solutions. The teaching philosophy of "project-driven disciplinary competitions" in electronic practical training aims to cultivate students' independent learning and comprehensive analysis abilities, thereby fostering their problem-solving skills. Activities like mathematical modeling competitions also aim to train students in using mathematical tools to solve practical problems, thereby enhancing their comprehensive analysis capabilities.

5 CHALLENGES FACED IN THE PROCESS OF DATA-INTELLIGENCE COMPETITIONS EMPOWERING BUSINESS TALENT CULTIVATION

While data-intelligence competitions play a significant empowering role in cultivating business students' innovation capabilities, they also face numerous challenges and issues. These problems are mainly reflected in the integration of competitions and teaching, resource investment, faculty competency, student participation, and evaluation mechanisms, constraining the full realization of their effect on cultivating innovative talents.

5.1 The "Two-Skin" Problem of Competition and Teaching

Some universities may exhibit a phenomenon of "competition for competition's sake" when conducting disciplinary competitions. This means competition activities lack deep integration with daily teaching, leading to a disconnect between competition content and the curriculum system. The knowledge and skills students gain from competitions may not effectively feed back into their specialized learning, thereby affecting the educational effectiveness of competitions. If competitions are not effectively integrated into the teaching system—such as in course design, practical training, and graduation projects—their positive effects will be greatly diminished, and they may even become an extra burden for students rather than a driver for promoting innovation.

5.2 Insufficient Resource Investment in University Disciplinary Competitions

Universities often face dilemmas of insufficient equipment and funding when conducting disciplinary competitions. Data-intelligence competitions typically involve cutting-edge technologies like AI, big data, and cloud computing, which place high demands on hardware, software platforms, and experimental environments. Without necessary

material guarantees, students struggle to conduct practical operations and innovative exploration in real or simulated digital environments. Furthermore, insufficient funding may affect the organizational level of competitions, prize settings, and incentives for excellent instructors, thereby reducing the attractiveness and influence of competitions.

5.3 Insufficient Relevant Faculty Strength in Universities

Instructors guiding data-intelligence disciplinary competitions need not only solid professional business knowledge but also mastery of cutting-edge digital technologies. However, there remains a shortage in the "dual-qualified" structure of faculty teams at many universities—that is, a relative scarcity of interdisciplinary teachers who understand both theory and practice, both business and digital technology. The insufficiency of teachers' digital technology competencies and competition guidance capabilities directly impacts students' learning experience and the quality of innovation guidance during competitions. Without high-level instructors, students find it difficult to obtain effective guidance and help when facing complex problems and new technological challenges.

5.4 Weak Student Awareness of Competition Participation

Some students may lack interest in competitions or perceive them as time-consuming and effort-intensive with little relevance to their studies. This may lead to narrow participation in disciplinary competitions, failing to benefit more students and thus limiting the widespread cultivation of innovation capabilities. Additionally, if competition incentive mechanisms are not well-established—for example, if competition achievements carry insufficient weight in comprehensive quality evaluation, credit recognition, or scholarship assessment—it may also affect students' enthusiasm for participation.

5.5 Low Integration Between Professional Education and Innovation & Entrepreneurship Education

Although disciplinary competitions are considered a key measure for deepening innovation and entrepreneurship education system reform, if innovation and entrepreneurship concepts and methods are not effectively integrated into professional competitions, competitions may deviate from their original purpose of cultivating innovative talents For instance, some competitions might overemphasize technical implementation or theoretical application while neglecting critical innovation and entrepreneurship aspects like business model innovation and market demand analysis.

5.6 Inadequate Evaluation Mechanisms

Current university evaluations of disciplinary competitions may focus more on competition outcomes, paying insufficient attention to process indicators such as the cultivation of innovative thinking, enhancement of teamwork abilities, and mastery of problem-solving methods during the competition. The lack of scientific and comprehensive evaluation mechanisms makes it difficult to accurately measure the real effect of competitions on cultivating students' innovation capabilities and cannot provide effective feedback for teaching reform[14].

6 PATHWAYS AND MECHANISMS FOR OPTIMIZING DATA-INTELLIGENCE COMPETITIONS EMPOWERING BUSINESS TALENT CULTIVATION

The pathway for data-intelligence disciplinary competitions to empower business talent cultivation is a multidimensional, systematic process. Its core lies in deeply integrating digital intelligent technology with professional business knowledge through competition activities, thereby cultivating high-quality talents adapted to the digital economy's development[15].

6.1 Optimizing Competition Systems and Content Design

Integrate Cutting-Edge Digital Technologies: Competition content should be closely integrated with frontiers like AI, big data, cloud computing, and blockchain to ensure advancement and practicality. For example, competitions can be designed around themes like big data analysis, machine learning applications in marketing, and intelligent supply chain management.

Promote Interdisciplinary Integration: Encourage business students to participate in data-intelligence competitions from computer science, mathematics, etc., fostering deep integration between business and fields like information technology and data science. This helps cultivate interdisciplinary thinking and complex problem-solving abilities.

Enhance Practicality and Authenticity: Competition projects should stem from real enterprise cases or industry pain points, allowing students to enhance professional skills and career literacy while solving practical problems. For instance, collaborative enterprise projects can be introduced where students provide solutions like digital marketing or data analysis for companies.

Focus on Soft Skills Development: Besides technical abilities, competitions should also value cultivating soft skills such as teamwork, communication, innovative thinking, and critical thinking.

6.2 Innovate Teaching Models and Curriculum Systems

Competition-Teaching Integrated Models: Organically integrate disciplinary competitions into the teaching process, achieving "promoting learning and teaching through competitions." For example, in course design, incorporate competition projects as important components of practical teaching, guiding students to consolidate theoretical knowledge and enhance practical abilities through participation.
Construct Modular Curriculum Systems: In response to the diverse competency demands of the data-intelligence economy, construct modular "foundation + core + expansion" curriculum systems to meet the learning needs and career development directions of different student groups.
Case-Based Teaching and Project-Based Learning: Introduce rich data-intelligence business cases and adopt project-based learning approaches, enabling students to master digital technologies and business knowledge while solving specific problems.
Digital Resource Construction and Sharing: Establish digital teaching resource repositories, including online courses, case libraries, and simulation platforms, providing students with diverse learning resources.

6.3 Improve Support Mechanisms and Incentive Systems

Increase Investment and Provide Resource Guarantees: Increase equipment and funding investment for disciplinary competitions, providing students with a favorable competition environment and necessary technical support. Data-intelligence competitions often involve cutting-edge technologies requiring adequate material guarantees for hardware, software, and experimental environments.
Establish Sound Management Systems: Establish and improve disciplinary competition management systems, clarifying departmental responsibilities to ensure standardized and efficient competition organization.
Develop Robust Incentive and Evaluation Mechanisms: Establish diversified incentive and evaluation mechanisms to encourage active student participation and recognize their efforts and achievements in competitions. Competition results can be incorporated into comprehensive quality evaluations, credit recognition, and scholarship assessments to stimulate student enthusiasm.
Strengthen Inter-university and University-Enterprise Exchange and Cooperation: Encourage exchanges and cooperation between universities and between universities and enterprises, building competition platforms, sharing resources, and elevating competition standards.
In summary, data-intelligence disciplinary competitions are a crucial pathway for cultivating business talent in the context of the digital economy. By optimizing competition systems, innovating teaching models, and improving support mechanisms, students' digital literacy, innovation and entrepreneurship capabilities, and practical abilities can be effectively enhanced, cultivating high-quality interdisciplinary talents that meet the needs of future business society development.

7 CONCLUSIONS

The profound integration of digital intelligent technology and business education has rendered data-intelligence disciplinary competitions a crucial and dynamic path for cultivating high-quality, interdisciplinary business talents in the era of the digital economy. Through a systematic analysis of the background, mechanisms, challenges, and optimization pathways, this study draws the following conclusions:
In summary, data-intelligence disciplinary competitions possess significant value and potential in empowering business talent cultivation. To fully realize this potential, it is essential to move beyond viewing competitions merely as extracurricular activities or award-seeking channels. Instead, they should be systematically integrated into the overall talent cultivation system through top-level design, resource coordination, and mechanism innovation. This will foster a virtuous cycle where competitions promote learning, teaching, and reform, ultimately contributing to the cultivation of innovative and practical business talents who can meet the challenges of the future digital society.

COMPETING INTERESTS

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