Quest Journals
Journal of Research in Business and Management
Volume 14 ~ Issue 5 (May 2026) pp: 142-146
ISSN(Online):2347-3002
www.questjournals.org

Research Paper

Research on the Cultivation and Achievement of Professional Competencies in Big Data Management and Application

Wenying Zhuang[1] , Siqi Chu[1] , Yuxin Zhang[1]

1.Beijing Information Science and Technology University , School of Management Science and Engineering , Beijing , China.

Abstract
In the era of big data, with the growing demand for employability, big data programs in universities are confronted with the issue of mismatch between graduates' employability and enterprises' needs.This study analyzes the training program of the Big Data Management and Application major and conducts in-depth student surveys to explore the current effectiveness of professional competency cultivation. It proposes suggestions such as updating the curriculum system, strengthening guidance on practical training and competitions, promoting intelligent teaching, and implementing early career planning, so as to optimize the talent training mode in universities. The research has certain practical application value for the development of the major and discipline..
Keywords: *Big Data Management and Application; Talent Cultivation; Questionnaire Survey; Text Mining*

Received 12 May., 2026; Revised 25 May., 2026; Accepted 27 May., 2026

I. Introduction

Amid the high-quality development of the digital economy, the integration of AI and education has emerged as a key trend, propelling "AI + Major" and "AI + Curriculum" reforms for big data-related majors with strong policy support. The big data industry is thriving: China's data industry scale has exceeded 5.8 trillion yuan (growing over 15% annually), with the core sector projected to reach 2.3 trillion yuan by 2025, and the global market set to surpass 450 billion US dollars by 2028. This boom has spurred intense demand for talent, especially compound professionals with technology, management, business acumen, and compliance literacy, leading to a 2.3 million core talent gap in China by 2025.

Approved in 2017, the interdisciplinary Big Data Management and Application major (integrating management, technology, and humanities) has developed rapidly as a key new liberal arts major. Enterprises now seek talents with cross-field integration capabilities, requiring not only core technical skills (e.g., big data processing, machine learning) but also comprehensive literacy (data governance, business adaptation, digital ethics). Thus, cultivating high-quality talents aligned with industrial and AI-era needs is an urgent task for universities.

This study focuses on the effectiveness of talent cultivation in this major. By analyzing university training programs, student questionnaires, enterprise recruitment needs, and industry cases, it examines competency development in technical application, management thinking, business integration, and compliance literacy, and offers targeted optimization suggestions to support universities in designing scientific training plans and enterprises in talent recruitment and development

II. Literature Review

Against the background of the integration of digital economy and "AI + Education", academic circles have carried out multi-dimensional research on talent cultivation in Big Data Management and Application.

Regarding "what competencies to cultivate" and "how to evaluate them", scholars have clarified the professional competency framework in combination with the needs of AI education: Liu Jun [1] (2025) proposed from the perspective of smart education that big data talents need to possess "AI tool teaching application capabilities", and suggested adding a module of "intelligent data analysis teaching case design" to the curriculum to adapt to the digital transformation of the education field; Chen Ming et al. [2] (2025) constructed a

data governance curriculum system under AI education scenarios, emphasizing coverage of "education data privacy protection and intelligent teaching data cleaning" to fill the gap of traditional courses in education scenario applications; Zhang Li [3] (2024) pointed out that talents need "multi-source educational data aggregation and teaching scenario adaptation" capabilities in combination with educational informatization scenarios, and suggested increasing scenario-based case teaching such as smart campuses and online education; Xu Xukan and Xue Mengyao [6] (2021) established a data literacy evaluation system with 7 first-level indicators, proposing a "cultivation-evaluation-feedback" closed loop to provide tools for curriculum adjustment; Wang Xiwei et al. [7] (2021) compared domestic and foreign training programs, identifying four core competencies: "information management, data analysis, mathematical modeling, and programming", and pointing out the insufficiency of domestic courses in "business insight in the education field and international perspective".

To address the problem of "disconnection between theory and practice", scholars have proposed optimization plans in combination with the needs of smart education: Yang Li et al. [8] (2020) surveyed 64 universities and found that most courses are "simple superposition of economics and management + technology", suggesting offering elective courses of "Big Data + Smart Education" to strengthen the connection between technology and education business; Anonymous [9] (2020) pointed out that interdisciplinary cultivation needs to break through the "curriculum patchwork" model and build an integrated curriculum group of "technology-education management-humanities", such as cultivating achievement transformation capabilities through "educational data visualization + teaching communication"; Zhou Xia [10] (2022) proposed a "smart education enterprise internship + competition-driven" model, suggesting universities cooperate with educational technology enterprises to build practice bases, requiring junior and senior students to complete 1 real educational data project and incorporate competition results into credits; Yu Haiyan et al. [11] (2023) supplemented "ethical collaborative cultivation", suggesting embedding "educational data compliance review" in practical projects to achieve synchronous improvement of "technology + ethics".

At the level of employment demand and industry adaptation, academic circles have verified the adaptability of cultivation to the needs of the education industry through surveys: Li Zhonglin [12] (2023) interviewed HR personnel of educational technology enterprises and found that the demand for "single technical talents" has decreased by 15%, and enterprises prefer to recruit "technology + education management + business" compound talents, which specifically require capabilities such as "Python-based educational data processing, teaching report interpretation, and cross-departmental reporting"; Zhao Yang et al. [13] (2023) proposed increasing "cross-role collaboration training" from the perspective of educational team collaboration, such as simulating scenarios where "data teams report analysis results to teaching departments"; Li et al. [14] (2024) compared the training programs of 120 universities in China and the United States, finding that top American universities have incorporated "educational AI tools (such as TensorFlow educational model training)" into compulsory courses, while only 30% of domestic universities cover this content, which also explains the insufficiency of domestic graduates in educational AI tool application capabilities.

Data from Qianzhan Industry Research Institute [15] (2019) shows that the scale of China's educational data industry exceeds 5.8 trillion yuan, and the core industry scale is expected to reach 2.3 trillion yuan by 2025, further highlighting the urgency of cultivating talents adapting to the needs of the education industry.

III. Design And Implementation Of The Talent Cultivation Questionnaire Survey

To address the mismatch between university cultivation and industrial demand—where enterprises urgently need compound talents with technology, management, business, and compliance capabilities, but universities lag in practical innovation and interdisciplinary training—this study conducted a questionnaire survey to identify strengths and weaknesses in professional competency cultivation and clarify competency differences across student stages, providing support for competency profiling and training program optimization.

3.1 Questionnaire Design and Implementation

Six universities of different types (comprehensive, science and engineering, finance and economics) in Beijing were selected as samples. Based on their training programs, core competency modules were extracted to design the questionnaire, which aligned with enterprise needs and training goals, covering four core modules: basic information (grade, university type, practice participation), curriculum mastery (five-point scale self-evaluation for quantitative analysis, data management, etc.), practical capabilities (tool proficiency, project participation), and personal literacy (foreign language, collaboration, data compliance). The anonymous online survey was conducted via Wenjuanxing from April 10 to May 10, 2023. A total of 363 questionnaires were collected, and after screening out invalid and non-major responses, 259 valid questionnaires were obtained with an effective rate of 71.3%, meeting statistical analysis requirements.

3.2 Questionnaire Data Preprocessing

To ensure data quality, three preprocessing steps were taken: first, eliminating invalid questionnaires through logical verification and filtering non-majors; second, removing duplicate questionnaires using submission time, IP address, and core answers as criteria; third, coding and standardizing subjective rating questions into quantitative data based on the five-point scale, facilitating subsequent analysis and benchmarking with enterprise competency needs.

IV. Research On Talent Competency Cultivation And Achievement Based On Questionnaire Survey

4.1 Achievement Statistical Analysis

4.1.1 Basic Characteristics and Satisfaction

A total of 259 valid questionnaires were collected, with sophomores accounting for the highest proportion and freshmen the lowest, which meets the research needs of investigating competency differences across different learning stages. The feedback from juniors and seniors is more referential as they have completed core courses. Regarding satisfaction, nearly half of the students recognize the systematicness of theoretical teaching and practicality of basic tool training in the existing system, while over 30% express dissatisfaction with the lack of practical opportunities and insufficient advanced technical instruction, highlighting the room for optimizing the connection between theory and practice.

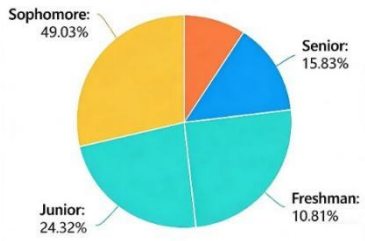

Figure 4.1 Grade Distribution of Respondents

4.1.2 Outcomes of Technical Competency Cultivation

Technical competency covers quantitative analysis, data management and application, and practical competitions. Quantitative analysis courses and big data visualization modules perform well, but machine learning—due to abstract theories and high mathematical requirements—has gaps in teaching coverage and a high failure rate. Courses like big data marketing and governance are generally well-mastered, yet some students have not taken data governance courses, which is misaligned with enterprises' demand for compliance talents. In practical competitions, database-related events have high participation and award rates, while interdisciplinary innovation competitions see low participation and an award rate of less than 10%, exposing students' shortcomings in interdisciplinary integration and innovative design.

Figure 4.2 Score Distribution of Big Data Application Related Courses

4.1.3 Big Data Development Technical Capabilities

There are significant differences in course mastery: "Database System and Application" has a pass rate exceeding 90%, making it the best-mastered course; "Data Structure" and "Management Information System" have relatively high failure rates due to abstract logic and practical operation requirements. In programming, Python is the most proficient tool among students, while Java is generally at a good level but with very few proficient users. R language and C language have low pass rates, with over 10% of students reporting no prior learning, indicating obvious gaps in teaching coverage.

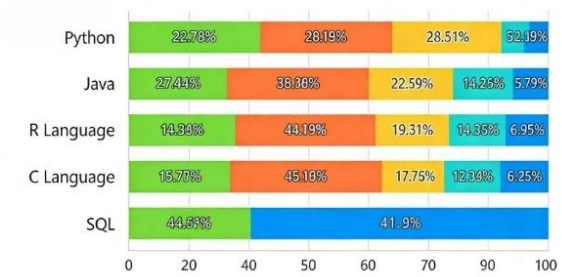

Figure 4.3 Mastery of Programming Languages

4.1.4 Outcomes of Personal Literacy Cultivation

Basic management courses have a pass rate exceeding 90%, with "Principles of Management" achieving the highest excellent rate, laying a foundation for interdisciplinary capabilities. English reading and writing skills show a distribution of "more in the middle, fewer at both ends": only 11.97% of students are proficient, and 34.75% struggle with professional literature reading. In terms of collaboration, over 80% of students have basic collaborative experience, but nearly 20% have never participated in group projects, and more than 60% report issues such as unclear division of labor and inefficient communication in teams, requiring the cultivation of collaboration skills to deepen from "participation" to "effective competence".

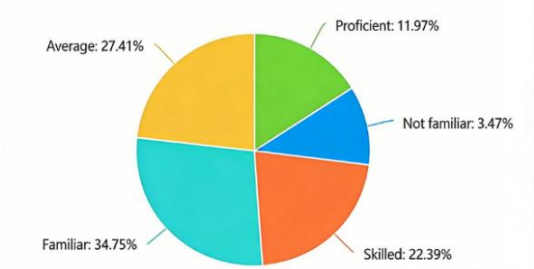

Figure 4.4 Mastery of English Reading and Writing Abilities

4.2Analysis of Cultivation Competency and Development Suggestions

Students' feedback reflects competency gaps, with key demands for enhanced practice, broader courses, stronger programming, and more competition guidance. The survey shows solid foundational skills but insufficient advanced capabilities (technical application, innovation, comprehensive literacy), stemming from the system's overemphasis on theory over practice and individual skills over integration.

Most students (over 70%) have a solid foundation, while top talents (over 10%) are scarce—failing to meet enterprises' high-end needs. The core issue is the theory-practice disconnect: students lack "technology + management + business + compliance" comprehensive capabilities for complex scenarios, which drives the university-enterprise talent mismatch and is the focus of optimization.

Figure 4.5 Word Cloud Map of Suggestions for Professional Training Competence

V. Research Conclusions And Recommendations

Against the backdrop of digital economy and "AI + Education" integration, this study addresses the talent supply-demand imbalance in the big data industry (over 5.8 trillion yuan in scale, with a 2.3 million core talent gap by 2025) by examining Big Data Management and Application talent cultivation.

Through analyzing university training programs, surveying 259 students, and aligning with enterprise needs, the study finds that students have solid foundational capabilities (over 80% proficient in Python, SQL, and basic theoretical courses), meeting entry-level requirements. However, prominent deficiencies exist in

advanced capabilities and comprehensive literacy: insufficient coverage of machine learning and data compliance courses, low mastery of tools like SAS and R, less than 8% award rate in interdisciplinary competitions, and only 11.97% proficient in English professional reading/writing. A "triple disconnect"—between theory and practice, curriculum and industry needs, technical skills and comprehensive literacy—results in 76.8% of students failing to meet enterprises' demand for "technology + management + business + compliance" compound talents.

To address these issues, universities should optimize training from three dimensions: supplement advanced technical and industry-aligned curriculum content, strengthen enterprise internships and competition guidance, and enhance English proficiency and collaboration skills. Students should adopt a phased development plan: laying a solid foundation in lower grades and boosting practical capabilities in middle and senior grades.

The study's limitations include a Beijing-concentrated sample and lack of direct enterprise evaluations. Future research should expand the sample scope, incorporate enterprise perspectives, and adapt to the "Data Factor ×" strategy and generative AI development to promote win-win outcomes for universities, enterprises, and individuals.

VI. Acknowledgement

The work of this study is supported by Higher Education Research Project of Beijing Information Science and Technology University (Project No. 2021GJYB25) , and Beijing Information Science and Technology University "Young Backbone Teachers" Support Program (YBT202439).

References

[1]. Liu J. Research on Cultivating AI Tool Teaching Application Competence of Big Data Talents under the Background of Smart Education[J]. China Educational Technology, 2025, (8): 45-52.
[2]. Chen M, Li N, Zhang W. Construction of Data Governance Curriculum System for Big Data Management and Application Major in AI Education Scenarios[J]. Modern Educational Technology, 2025, 35(5): 89-96.
[3]. Zhang L. Cultivating Multi-source Educational Data Aggregation Competence of Big Data Talents in the Era of Educational Informatization 2.0[J]. E-education Research, 2024, 45(12): 34-41.
[4]. Zhao X. Interdisciplinary Curriculum Design for Big Data Major under the Integration of AI + Education: A Case Study of "Educational Data Visualization"[J]. Journal of Higher Education Management, 2024, 18(3): 78-85.
[5]. Wang J. Innovation of Practical Teaching Mode for Big Data Major with the Participation of Smart Education Enterprises[J]. Experimental Technology and Management, 2024, 41(7): 156-162.
[6]. Xu X K, Xue M Y. Construction of Data Literacy Competence Evaluation Index System for Big Data Management and Application Major[J]. Information Studies: Theory & Application, 2021, 44(9): 50-56. DOI:10.16353/j.cnki.1000-7490.2021.09.007.
[7]. Wang X W, Li Y Q, Jia R N, et al. Talent Training Mode of Big Data Management and Application Major under the Background of New Liberal Arts[J]. Library and Information Service, 2021, 65(17): 45-56. DOI:10.13266/j.issn.0252-3116.2021.17.005.
[8]. Yang L, Xu X K, Li Y M. Research on Data Literacy Education for Big Data Management and Application Major[J]. Information Studies: Theory & Application, 2020, 43(10): 45-49+18. DOI:10.16353/j.cnki.1000-7490.2020.10.009.
[9]. Anonymous. Content Analysis on Training Characteristics of Big Data Management and Application Major under the Background of New Liberal Arts[J]. Library and Information, 2020, (6): 26-34+92.
[10]. Zhou X. Exploration on Practical Competence Training System of Big Data Management and Application Major under the Background of New Liberal Arts[J]. Computer & Telecommunication, 2022, (11): 41-44. DOI:10.15966/j.cnki.dnydx.2022.11.001.
[11]. Yu H Y, Liu J, Lu A W, et al. Analysis on the Collaborative Training Mode of Professional Competence and Ethical Governance for Big Data Management and Application Major[J]. Policy & Scientific Consult, 2023, (1): 4-9.
[12]. Li Z L. Analysis on Talent Training Mode of Big Data Management and Application Major[J]. Science & Technology Economic Market, 2023, (1): 158-160.
[13]. Zhao Y, Sun Y, Wu D. Research on the Cultivation Path of Cross-role Collaboration Competence of Educational Data Teams[J]. Research in Educational Development, 2023, 43(10): 67-74.
[14]. Li X, Wang H, Zhang L. Comparative Study on AI-in-Education Curriculum of Big Data Major in China and the United States[J]. Journal of Educational Technology & Society, 2024, 27(2): 112-128.
[15]. Qianzhan Industry Research Institute. 2024 China Educational Data Industry Development Research Report[EB/OL].20244.