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Strategies to Improve Digital Competency of Management Students in the Context of Employment Stability: Taking the Curriculum Reform of Management Information Systems as an Example

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Abstract

Driven by the employment stabilization strategy and the rapid development of the digital economy, enterprises increasingly demand hybrid "business-technology" management professionals. However, the traditional Management Information Systems course fails to support high-quality employment due to theory-practice disconnection, student technophobia, and mismatched evaluation metrics. To address these challenges, this study proposes a systematic reform based on the Outcomes-Based Education (OBE) philosophy. First, driven by the philosophy of differentiated competition, the reform cultivates "business-savvy and technologically literate" talents by utilizing interdisciplinary integration and real-life scenario-based teaching to concretize abstract knowledge. Second, a four-dimensional upgrade in teaching content, such as reorganizing the content of theory, innovating teaching experiments, integrating industry frontiers, and promoting academic competitions, is implemented. Finally, unlike the teacher-centric approach for the evaluation of teaching quality, a dual assessment framework is established to evaluate students' digital competency. This reform offers a theoretical and practical paradigm for the digital transformation of management curricula under the "New Liberal Arts" initiative.

Keywords

Stabilizing Employment, Digitalization, Curriculum Reform, Management

Information Systems, Management Students

1. Introduction

According to the People's Daily, the number of college graduates in 2025 is expected to reach 12.22 million in China. This represents a year-on-year increase of 430,000 [1]. China's economy is currently experiencing a recovery-driven expansion. Yet structural imbalances in the labor market persist, particularly affecting vulnerable groups such as recent college graduates. In August 2023, the National Bureau of Statistics revised the methodology for calculating the youth unemployment rate by excluding full-time students aged 16 to 24 from the labor force denominator [2]. While this adjustment led to a decline in the reported rate, it does not fully capture the underlying employment challenges confronting young job seekers. Youth employment therefore remains a pressing socioeconomic issue demanding targeted policy attention. Meanwhile, the credibility of university-reported graduate employment rates remains a subject of public scrutiny. While most institutions publish comparatively high employment figures, widespread phenomena such as slow employment, meaning delayed job placement beyond graduation, and phantom employment, including informal or short-term contracts misreported as stable employment, undermine data reliability. Empirical evidence from university career service centers indicates persistent discrepancies between officially reported rates and verified employment outcomes. These gaps are especially pronounced among liberal arts graduates, who confront acute labor market mismatches due to skill demand misalignment. In response to these escalating challenges and structural mismatches, the Chinese government has elevated graduate employment to a top national priority, launching comprehensive "stabilizing employment" policies. These policies focused on job creation and market facilitation. Key measures include offering financial subsidies and tax incentives to enterprises that hire recent graduates, expanding recruitment quotas within the public sector and state-owned enterprises, and optimizing campus-to-career job matching services. However, alleviating structural unemployment requires more than merely creating or offering suitable positions, necessitating a fundamental upgrade of the talent supply chain. In this context, the Ministry of Education issued guidelines mandating the digital transformation of academic disciplines, including curriculum redesign, pedagogical innovation, and the integration of industry-relevant competencies, alongside the development of knowledge graphs and competency frameworks [3]. Consequently, curriculum adjustment is not merely advisable but imperative. Strengthening undergraduate domain-specific digital competency and applied technical capabilities thus constitutes a strategic priority for enhancing labor market resilience and sustaining graduate employability.

Jing *et al.* [4] conducted a dual-stakeholder survey of graduate employability, engaging both university administrators and employers. Their findings reveal a pronounced assessment gap. While universities rate graduates' overall employability highly, employers assign them only moderate scores, particularly in computer-based analytical capabilities and up-to-date, discipline-specific knowledge. Information technology, grounded in computing systems and networked communications, serves as the foundational infrastructure for digital society development. Consequently, enterprises increasingly prioritize graduates with robust, operationally relevant digital competencies, including data extraction, acquisition, preprocessing, and structured database querying [5] [6]. Yet empirical studies indicate a persistent mismatch between student skill profiles and industry requirements [7]. This misalignment stems from two interrelated systemic constraints. First, curricula remain overly theoretical, and textbooks lag behind technological and industrial advancements. Second, pedagogical tools and infrastructure are outdated, with limited deployment of hands-on information platforms or enterprise-grade big data application environments for experiential learning. From an industry standpoint, cultivating data-informed decision-making mindsets and equipping students with digital skills directly aligned with real-world operational workflows is therefore essential [8]. To bridge this gap, universities must co-develop scalable, industry-integrated big data platforms that mirror authentic enterprise data architectures and processing pipelines. Such institutional commitments constitute critical levers for aligning graduate capabilities with evolving labor market demands.

Management Information Systems (MIS) is highly relevant to information systems education among management majors, particularly in Business Administration, E-commerce, and Information Management programs. It is one of the nine core courses mandated for undergraduate management curricula. Conceptually, a management information system integrates people, hardware, software, and procedures to collect, transmit, store, process, maintain, and utilize the management enterprise's information. Upon completing this course, students should develop data-informed decision-making capabilities. They apply computer hardware, software, and mathematical models to integrate and analyze organizational data, so as to enable efficient management of enterprise operational data and support evidence-based business forecasting. However, the current teaching work faces several problems. First, existing textbooks comprehensively summarize relevant knowledge. Yet, the structure of the textbook does not align with enterprise big data operational concepts. This prevents students from forming a systematic knowledge structure based on real business operations. Second, MIS is a highly practical course. Students must combine basic theories with practice to achieve desired results. Using enterprise platforms or software is crucial to attract students' interest. In practice, however, most teachers report significant difficulties in arranging such practical teaching activities. Third, students lack a clear understanding of why they should learn this course. They do not see the connection between the course and future employment. This makes it difficult for them to develop an interest in the subject. Therefore, universities must optimize textbooks and classroom content. They need to strengthen experimental teaching platforms and enhance students' deep understanding of the course. These actions are key to improving students' interest and professional skills, and the implementations also respond to national demands for enhancing college students' digital skills.

Against this background, this study aims to improve the digital competency of management students. It details the reform plan for the MIS course from three aspects. These aspects include 1) aims and principles of the curriculum reform, 2) detailed contents and approaches of the reform, and 3) the adjustment of the curriculum evaluation system.

2. Literature Review

Critical studies are reviewed from two aspects including 1) Digital competency improvement in universities, and 2) The curriculum reform of MIS.

2.1. Digital Competency Improvement in Universities

As Hsu and Chen [9] pointed out, digital competencies refer to the set of skills, knowledge, and attitudes that enable students to effectively use digital technologies for learning, communication, problem solving, and creative expression in various contexts. Recent studies related to digital competency improvement in higher education are summarized as follows. Wang [10] conducted a survey involving 44 students from rural regions in China, and he/she discovered that there was a positive relationship between students' digital skills and academic self-efficacy. Xu *et al.* [11] evaluated the impact of digital education (including big data analytics courses) on the employability of engineering students (e.g., human capital, social capital, individual attributes, and career development). They found that courses on big data analytics enhanced employability through the improvement of hard skills (knowledge skills, technology skills, and analytical skills) and soft skills (e.g., decision-making competency, critical and creative thinking, as well as communication skills). Li *et al.* [12] examined the impact of digitalization and digital competencies among students on the educational performance of low-income college students. Their results indicated that digitalization and digital competencies were positively linked to educational performance. In addition, parental support significantly moderates the relationship between digital competencies and educational performance. Zulfiqar *et al.* [13] used a two-wave lagged data from business schools at Chinese universities, and the data revealed that AI-enabled capabilities (e.g., AI-enabled automation, analytical, and relational capabilities) foster entrepreneurial bricolage and digital entrepreneurship. Further, digital (AI-powered) training positively moderates the relationship between entrepreneurial bricolage and digital entrepreneurship. Naamati-Schneider & Alt [14] pointed out that the use of generative AI (e.g., ChatGPT) could render certain digital skills obsolete by assuming competencies that students were previously required to master. Thus, they further investigated the deficiencies in digital competency among college students in the context of generative AI applications. Kumar *et al.* [15] defined digital competence across six dimensions (e.g., digital knowledge, information management, individual digital communication, collective digital communication, networked collaboration, and network leadership) and investigated the relationship between professional training and digital competence. Tang *et al.* [16] studied the impact of digital technologies (e.g., generative AI) on entrepreneurial self-efficacy and entrepreneurial intention. They compared two datasets (one from a group using generative AI technology and the other not) and found that the use of generative AI had a strong positive effect on enhancing students' entrepreneurial self-efficacy and promoting entrepreneurial intention.

2.2. The Curriculum Reform of MIS

MIS is an interdisciplinary and comprehensive course involving management science, information science, systems science, computer science and information technology. It requires students to have both a deep and broad theoretical foundation and strong practical skills. This course requires frequent updates and needs to constantly adjust its content to align with the digital transformation of society. In detail, Du & Hu [17] conducted a teaching reform for MIS, and they suggested that the quality enhancement of MIS courses should implement the following actions, such as strengthening the experimental practice teaching system, launching various innovative talent training programs at different levels, and fostering extensive international exchange and cooperation. Li *et al.* [18] summarized the shortcomings of traditional MIS instruction, such as a lack of active learning and the disconnect between theory and practice. To address these issues, they introduced an online teaching and training platform and integrated relevant practical operations into system design, data storage and querying, and course selection design, which increased students' interest. Li *et al.* [19] also studied the reform model of the MIS course in the context of the digital transformation of teaching models for finance and economics majors in higher vocational colleges. Specifically, this model included reconstructing the "Business-driven Finance" teaching to precisely analyze students' learning needs, formulating the teaching goals of "legal compliance, practical operations, and process comprehension", and introducing ARE simulation and other teaching resources. Zhao [20] reformed a National First-Class Undergraduate Course (a blended online and offline course) for MIS. With the aim of inheriting revolutionary traditions, enriching digital resources, and adhering to the integration of science and education, the author carried out in-depth reforms in three aspects, such as reforming the civic and moral education (ideological and political) teaching mode of the course, designing blended teaching scenarios, and improving the course assessment plan, ultimately achieving positive outcomes.

2.3. Summary of Recent Studies

Based on the above statements, some observations are concluded.

1) Existing research on students' digital skill development largely focuses on the fields of science, technology, engineering and mathematics, paying limited attention to liberal arts disciplines. However, digitalization constitutes an organizational, commercial, and cognitive revolution rather than a purely technological one. Therefore, in disciplines such as management, enhancing digital skills is crucial, serving as a core driver for both future corporate survival and high-quality macroeconomic development.

2) As one of the nine core required courses for management disciplines, the MIS curriculum currently suffers from notable limitations, primarily the gap between theoretical frameworks and real-world applications, coupled with obsolete laboratory technologies. Given these challenges, the reform of this curriculum should center on recalibrating theoretical content, updating experimental modules, and integrating hands-on practical instruction.

3. Aims and Principles of the Curriculum Reform

3.1. Reshaping Positioning: Adhering to Differentiated Competition and Cultivating Hybrid Talents Proficient in Business and Technology

In the past, management students' career aspirations have centered on traditional functional roles (e.g., sales, human resources, and accounting). In contrast, the rise of the Internet and digital economy has given rise to high-value, cross-domain positions (e.g., product manager and business data analyst) that represent a promising new frontier for management graduates. Yet in practice, many students experience "technology anxiety". They mistakenly assume that proficiency in programming or algorithm design is a prerequisite for these roles. This misconception fosters an unwarranted sense of inadequacy when compared with computer science peers, leading some to prematurely disengage from such opportunities [6]. In reality, firms across the digital value chain rarely lack coding capacity. Rather, they face a persistent shortage of professionals who can accurately interpret user needs, diagnose organizational challenges, and effectively translate business requirements into actionable technical specifications.

Regarding the product manager, its core function is to bridge development capabilities with user needs and expectations. In curriculum design, priority should therefore be placed on cultivating two interrelated competencies including requirements engineering and user interface design. Requirements engineering entails deep immersion in real-world business contexts. Students must learn to identify, clarify, and articulate ambiguous user pain points and translate them into structured specifications, functional prototypes, or prioritized feature backlogs that development teams can reliably implement. This serves as a critical upstream input for technical execution. Such practice draws upon foundational knowledge, such as enterprise planning theory, the Critical Success Factors method, design for system architecture, modular design, and requirements traceability. User interface design focuses on crafting intuitive interfaces and optimizing interaction flows to enhance usability, accessibility, and task efficiency. These competencies equip students to fulfill their distinctive value proposition (e.g., defining what should be built and for whom), thereby enabling technical teams to focus effectively on how to build it.

Regarding the training of business data analysts, students must move beyond the pervasive misconception that analytical sophistication, measured by model complexity, necessarily correlates with business value. Instead, they should internalize the foundational principle that data analysis exists to empower evidence-informed decision making. In conventional instruction, emphasis often rests on explaining the theoretical underpinnings of analytical methods, while practical application, particularly in authentic managerial contexts, receives limited attention. This imbalance reinforces a narrow, technique-centric view of analytics, leading students to overvalue algorithmic intricacy at the expense of interpretability and actionability. In practice, however, the primary objective of business data analysis is not methodological novelty but managerial insight (e.g., identifying operational inefficiencies, diagnosing strategic gaps, and informing interventions that measurably improve organizational performance). Enterprise decision makers rarely assess analytical outputs by their mathematical obscurity. Rather, they evaluate them by their clarity, relevance, and direct linkage to concrete business challenges. For example, they ask questions such as: "Which customer retention strategy, informed by cohort analysis, reduced churn by 12 percent?" or "How did predictive inventory modeling resolve chronic stockouts in Region X?". Such questions anchor analysis in a closed-loop, problem-driven cycle that begins with a real-world challenge, proceeds through data-informed diagnosis and actionable recommendations, and culminates in a measurable outcome. Cultivating this mindset, grounded in business impact rather than technical display, is central to developing a sustainable, differentiated competitive advantage for management graduates, one that clearly distinguishes them from technically trained peers.

3.2. Interdisciplinary Integration: Building Connections between Disciplines and Deepening the Collaborative Educating Model of Multi-Course Integration

The textbook MIS (7th ed.), published by Higher Education Press, defines a MIS as "an integrated system comprising people, hardware, software, and data resources, designed to collect, process, store, transmit, and deliver information accurately and in a timely manner to support the management, coordination, and control of organizational activities". From this definition, two core functions including information integration and supports for decision-making emerge.

In terms of integrating information, courses such as "Principles and Applications of Databases", "Principles and Applications of Python", "Programming Language Design", "Mathematical Statistics and Analysis", and "Statistics and Applications" provide a theoretical foundation for understanding issues such as "where information comes from", "how information is stored in systems", and "how information is effectively integrated". For instance, when teaching the concept of how information is stored, a brief review of the development history of databases, conceptual models and data models, relational databases and Structured Query Language (SQL) is conducted. When explaining the information integration function of decision support systems, a brief review of statistical content such as regression analysis, analysis of variance, and factor analysis is required.

In terms of decision support, the teaching team has abandoned traditional theoretical instruction and instead adopted a "domain-driven" teaching strategy, contextualizing management information systems within specific management scenarios for analysis. For instance, in the field of production and manufacturing, this strategy deeply integrates concepts from the "Production and Operations Management" course. Building upon students' thorough understanding of push/pull production, process/discrete production, and additive/subtractive manufacturing, the course deduces the evolutionary logic of information systems from MRP to ERP. In the field of supply chain management, the curriculum relies on the classic supply chain network structure in the "Supply Chain and Logistics Management" course to identify key decision-making nodes (e.g., facility location and product pricing). Furthermore, it guides students to utilize analytical tools from methodological courses such as "Operations Research" and "Technological Economics". For example, students use the model of transportation problem to solve location optimization and apply game theory to analyze multi-party pricing strategies. The interdisciplinary connections are shown in **Figure 1**.

3.3. Knowledge Implementation: Promoting Life-Oriented Scenario Teaching and Explaining Abstract Concepts with Concrete Cases

From a disciplinary perspective, MIS is a highly complex course involving multidisciplinary integration. However, constrained by the practical teaching environment, students rarely experience the real operation of enterprise-level systems. This leads to a dual dilemma of cognitive emptiness and experience gap. Hence, they struggle to understand core concepts such as enterprise information system architecture, information entropy, relational databases, and business process reengineering.

First, regarding the cognitive disconnect, students often lack an intuitive understanding of information systems, struggling to grasp the internal logic, operating principles, and front-end interactions. Relying solely on textbook descriptions or video demonstrations is insufficient to build a comprehensive knowledge framework. To address this, the teaching team adopted a contextualized teaching strategy during the course reform. By deconstructing the widely used "smart campus" management system as a primary example, and introducing digital-twin-based management systems from peer universities as supplementary cases, we materialized abstract concepts. This approach successfully helped students establish a more intuitive understanding of how these systems function.

Second, regarding the experiential gap, contemporary college students are

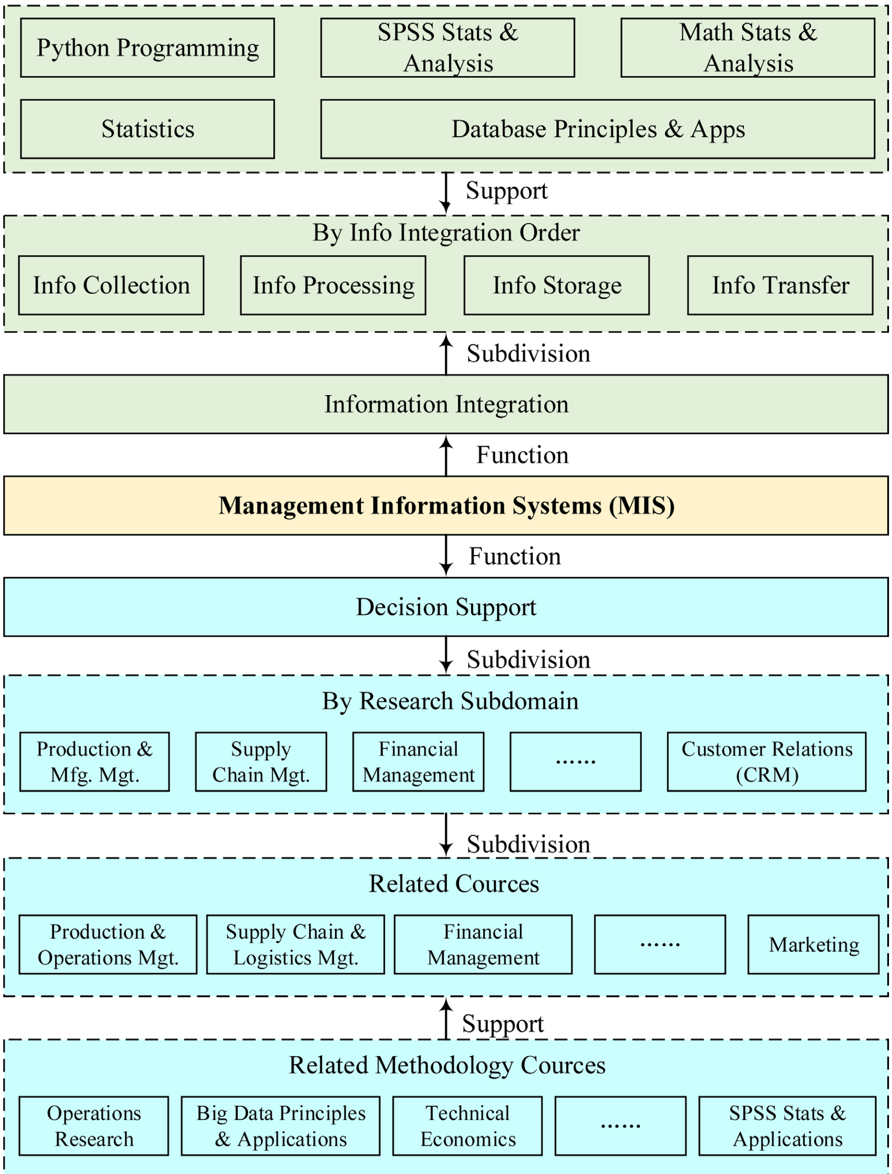


Figure 1. The interdisciplinary connections between MIS and other courses.

"digital natives" who have never experienced the era of manual information processing. Consequently, it is difficult for them to appreciate the dramatic efficiency improvements brought about by digital transformation. Consider the classic Walmart procurement process as an example, the traditional cycle involved lengthy steps (e.g., supplier sourcing, contract signing, delivery acceptance, and financial settlement), generating three key documents (*i.e.*, purchase contracts, acceptance receipts, and sales invoices). In the era of manual management, financial personnel faced the immense burden of manually verifying the consistency of these massive paper documents before issuing payments. This not only caused a sharp increase in workloads during year-end accounting but also severely hindered capital turnover efficiency. Although the introduction of a management information system (MIS) replaced manual verification with automated "three-way matching" and accelerated payment processing from hours or days to mere seconds, teaching feedback indicated that students, lacking prior enterprise experience, found it difficult to appreciate the transformative scale of this industrial-level efficiency leap.

To counter this, the teaching team introduced relatable everyday micro-cases, such as the digital transformation of the student leave-of-absence process. By contrasting the pain points of offline applications (e.g., navigating multiple departments, cumbersome signature requirements, and slow processing times) with the convenience of online applications (routing data electronically rather than making students run errands), students quickly overcame their cognitive barriers. This relatable comparison allowed them to deeply understand the core value of business process reengineering and digital transformation.

4. Teaching Innovation: Contents and Approaches

The teaching team conducted a systematic analysis of management students' distinctive competitive advantages in the labor market and formulated a pedagogical reform framework centered on employment-oriented competency development. This framework deliberately shifts emphasis away from the conventional, theory-heavy approach and instead integrates domain-specific relevance throughout the curriculum. To operationalize this vision, we designed a four-dimensional reform architecture comprising: 1) theoretical reconstruction aligned with industry practice; 2) experiment-based skill development; 3) structured industry collaboration through real-world projects and co-supervision; and 4) competition-driven learning that leverages national and provincial information systems contests as authentic assessment and motivation platforms.

This course reform was launched at Xiangtan University, a national "Double First-Class" university, in the spring semester of 2023 and has been sustained through four consecutive undergraduate cohorts (2023-2026), reaching a total of 511 students. It serves two majors including Business Administration (32 contact hours per semester) and Electronic Commerce (48 contact hours per semester). While both majors operate under the same reform framework, implementation is deliberately differentiated to align with curricular constraints and learning outcomes. In detail, theoretical content redesign and experimental pedagogy optimization are mandatory for all students. In contrast, industry expert lecture series and competition-integrated learning are optional. This tiered implementation ensures fidelity to core reform principles while enabling contextual adaptation and scalable transfer.

4.1. Optimizing Theoretical Teaching: Adhering to Problem Orientation and Strengthening Business Logic

The teaching team adopted MIS (7^{th} ed., Higher Education Press) as the core textbook. This book is a nationally recognized "Outstanding Textbook" by China's Ministry of Education, praised for its authoritative content structure. However, analysis revealed a structural misalignment between the textbook's coverage and management students' cognitive readiness, thus undermining motivation. Two interrelated factors explain this gap. First, the textbook's excessive technical density, particularly its code-centric logic, overwhelms management students who lack an engineering background. Second, it fails to sufficiently articulate professional relevance. leaving students uncertain how course concepts translate into career-essential competencies. This leaves students uncertain about how course concepts translate into career-essential competencies. This ambiguity fosters an identity tension. When benchmarked against computer science peers, management students perceive themselves as technically underprepared and managerially unformed.

The teaching team realized that traditional technical logic does not suit the training goals of management professionals. Therefore, we established a teaching philosophy centered on managerial empowerment. We restructured the curriculum into a progressive, four-dimensional problem chain that guides students in building a comprehensive knowledge map. The four dimensions are:

1) Historical evolution and situational logic: Exploring the emergence of typical systems and their business backgrounds.

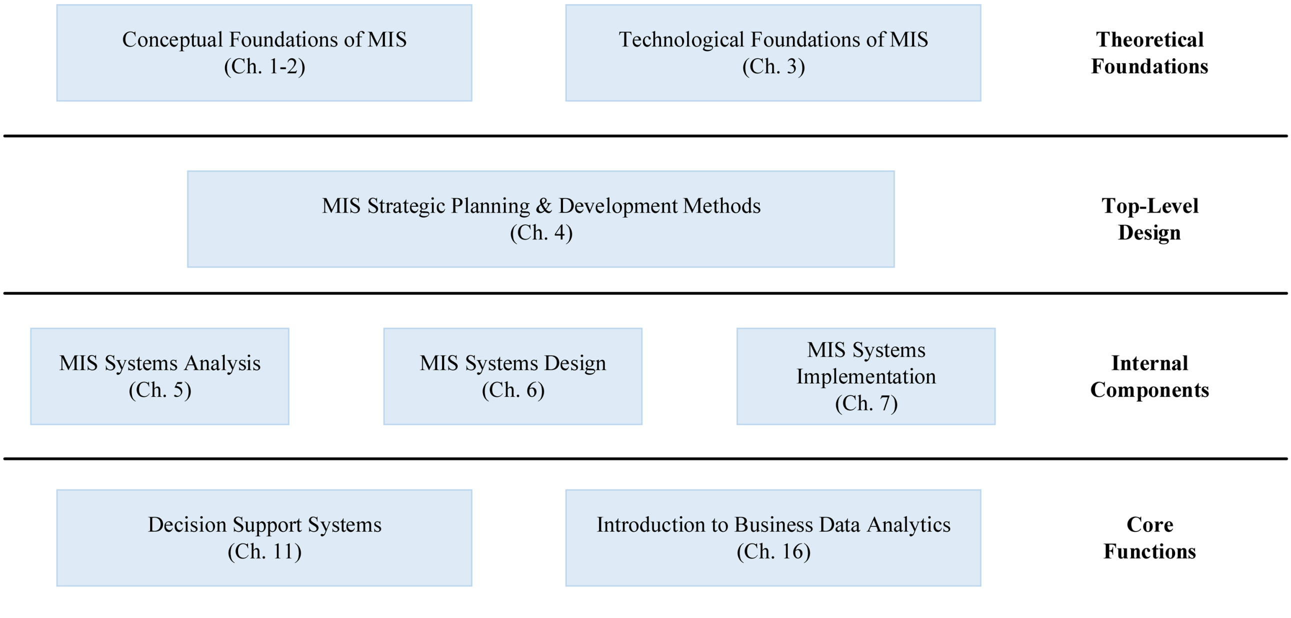
2) Functional positioning and pain point analysis: Examining the specific management problems these systems solve and the differences between them.

3) Market ecology and architectural awareness: Identifying mainstream products and how their architectures support business operations.

4) System design and decision-making empowerment: Training students to design information system solutions for complex management challenges.

Next, the teaching objectives are reset based on the above four aspects. First, students should understand the development of MIS and acknowledge the current products related to MIS, so as to provide suggestions for enterprise deployment. Second, they should briefly understand the hardware and software facilities. Third, they should master strategic planning and development methods for top-level design. Fourth, they should provide specific implementation plans based on strategic goals. Fifth, they should understand decision support systems to diagnose operational problems and provide support. Based upon, nine chapters are selected, and a new teaching logic is conducted in Figure 2.

To ensure curricular relevance, the teaching team integrated four emerging technologies (e.g., blockchain, digital twins, the metaverse, and generative AI) into the syllabus. For each, students engage with core concepts, real-world application contexts, comparative strengths and limitations, enterprise adoption criteria, and representative system architectures. As part of this effort, students independently research and curate industry-specific use cases (from automotive manufacturing and tourism to internet platform operations) and present them in structured group reports. During presentations, instructors probe conceptual depth and practical reasoning. For instance, students must articulate how the Byzantine Fault Tolerance consensus mechanism enables trustless coordination in blockchain systems, and critically evaluate how such technologies resolve concrete operational challenges. Figure 3 presents the reports related to the applications of emerging technologies.



Note. The chapter titles are selected from the book "MIS (Seventh Edition)" published by Higher Education Press.

Figure 2. A new teaching logic for management students.

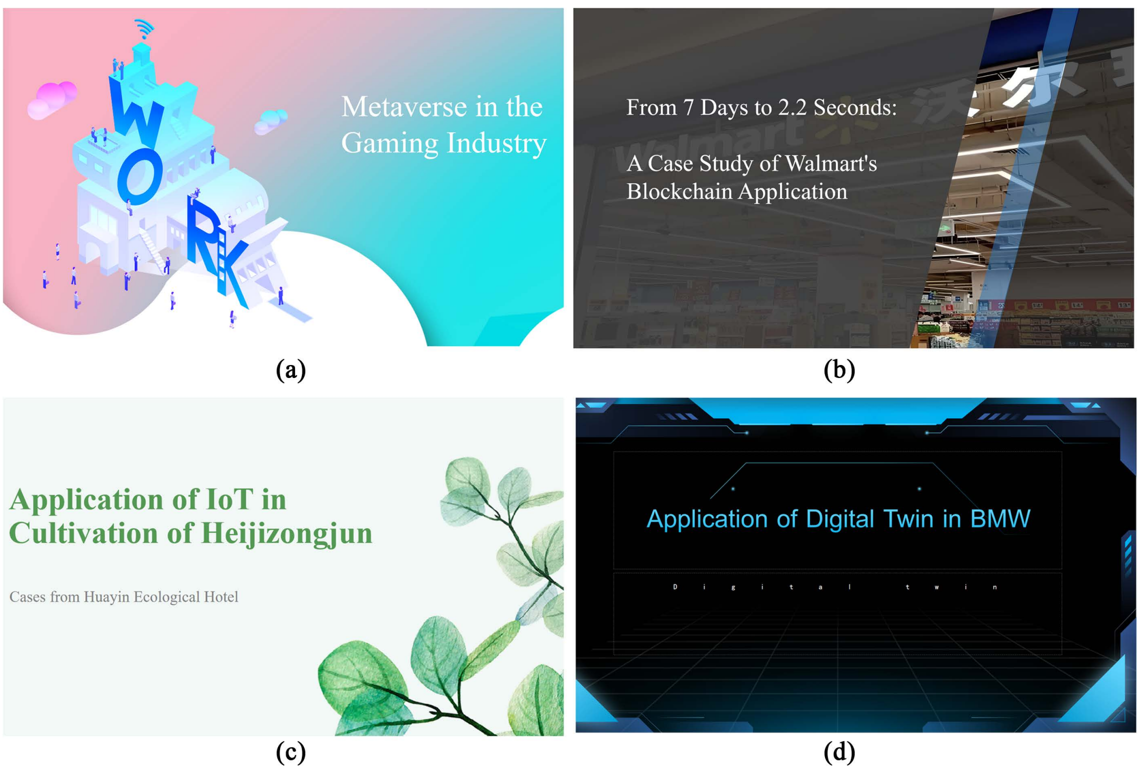


Figure 3. Samples of students' reports. (a) The metaverse and game; (b) Blockchain and retailing; (c) Internet of Things and agricultural planting; (d) Digital twin and automobile manufacturing.

4.2. Innovating Experimental Teaching: Building Practical Skills with Low-Code Tools

Traditional experiments of MIS mainly focus on verification operations (e.g., ERP system entry), lacking the cultivation of students' creativity and core skills for the modern workplace. Under the "stable employment" background, the teaching team has thoroughly restructured the experimental system and introduced three practical training projects closely related to the actual needs of enterprises, aiming to transform theoretical knowledge into "hard currency" on students' job application resumes.

Experiment Project 1: Automated commercial data collection based on low-code tools. This experiment utilizes a low-code tool (e.g., Houyi Collector) for the automated collection of business data. Dispelling the myth that Python programming is required for data scraping, it introduces students to the low-code/zero-code Houyi Collector. Students will complete a step-by-step training process covering "single-page list collection", "multi-page loop collection", and "deep detail page collection" across real commercial platforms such as Taobao, JD.com, and Pinduoduo. Ultimately, students are required to convert the unstructured web data they have collected into structured business data tables. This project aligns directly with the requirements of in-demand roles, such as e-commerce operations specialists, market research analysts, and business data analysts. In an era where data is often referred to as the "new oil," the ability to acquire data is the prerequisite for all business analysis. This experiment equips management students with a powerful tool to legally and efficiently gather massive amounts of competitor data, user reviews, and pricing information without needing a deep programming background. Ultimately, these agile data acquisition skills enable students to demonstrate strong, practical market research capabilities during interviews, significantly broadening their career prospects.

Experiment Project 2: Business process reengineering and system prototype design based on Axure. This experiment is a core component in cultivating a "product management" mindset. The training is divided into three progressive modules:

1) Tool proficiency: Mastering the interface logic and core components of Axure.

2) Business modeling: Encouraging students to look beyond the underlying code and analyze operations from a commercial perspective. Students use Axure to draw standardized process diagrams for specific business scenarios, clarifying the system's information flow and control logic.

3) Visualizing requirements: Transitioning from low-fidelity wireframes to high-fidelity interactive prototypes, and ultimately generating standardized interaction specification documents.

Axure is currently the industry-standard tool for product managers and UX designers in the tech sector. While the core strength of management students lies in their understanding of business logic, this experiment equips them with the practical tools to translate abstract management concepts into actionable "technical blueprints" that developers can easily implement. Mastering this skill empowers students to compete directly for highly sought-after roles such as product managers, project managers, and digital transformation consultants. It successfully transitions them from traditional business personnel who merely suggest ideas into capable product designers who can deliver tangible design solutions.

Experiment Project 3: Industry frontier mapping and macro insight based on CiteSpace. The experiment requires students to step back from micro-level data processing and cultivate a macro-level perspective. The training modules include:

1) Knowledge graph application: Understanding the value of knowledge graphs in processing large volumes of literature and unstructured text, and mastering the data cleaning and import mechanisms of CiteSpace.

2) Industry mapping: Independently collecting industry reports and academic literature for a specific sector (e.g., new energy vehicles, cross-border e-commerce). Students will generate "keyword co-occurrence networks" and "evolutionary timeline views" for this field to visually present industry hotspots and development trends.

Although CiteSpace is traditionally used in academic research, the "bibliometric and network analysis mindset" behind it holds immense practical value in today's highly commercialized environment. This experiment directly prepares students for high-level roles such as strategic planners, industry researchers, investment analysts, and management consultants. It teaches students how to leverage visualization tools to map out an industry's upstream and downstream relationships, track technological evolution, and identify market gaps when exploring an entirely unfamiliar industry. Ultimately, this ability to "rapidly construct a holistic industry overview" is a highly sought-after competency by strategic decision-making departments in modern enterprises.

4.3. Expanding Industry Lectures: Linking with Workplace Frontiers and Removing Technology Panic

To bridge the gap between academia and industry, the teaching team introduced external resources by establishing a guest lecture series featuring industry experts and distinguished alumni. We invite professionals at different stages of their careers to help students understand relevant roles from two distinct dimensions.

To provide an entry-level perspective, the teaching team invited an outstanding peer currently interning at Didi Chuxing to share firsthand experiences from the company's core business department. The session systematically addressed the managerial logic underpinning algorithmic systems, including order dispatch optimization and incentive mechanism design, as well as daily operational improvements enabled by data dashboards. This peer-led instruction proved highly persuasive. It concretely demonstrated that top-tier internet companies are attainable career destinations and reinforced the idea that a mastery of business logic and data-driven thinking empowers students to assume pivotal roles in operational decision-making. As a result, apprehension toward technical roles was alleviated, and professional confidence was strengthened.

To illustrate career depth, we invited a senior product manager with eight years of industry experience. Holding a background in business administration, this mentor delivered a case-based lecture on the end-to-end lifecycle of an internet product, drawing upon a real commercial project. Key phases covered included market research, competitive analysis, requirements documentation, cross-functional development coordination, quality assurance testing, and system deployment. Serving as a tangible example of interdisciplinary success, this mentor substantiated the capacity of management graduates to excel as product managers. Crucially, students were guided to recognize that coding implementation constitutes only one component of the product development process. Instead, success hinges on demand insight, process structuring, and end-to-end project leadership. This insight established a credible and actionable pathway for non-technical students to transition into technical management roles.

4.4. Driving Academic Competitions: Promoting Learning through Competitions to Solve Real Problems

The ultimate goal of building a management information system is to support decision-making. To achieve this goal, practitioners need to have acute business insight and data interpretation skills, which are the core competencies and differentiating barriers that distinguish management students from those in science and engineering fields such as computer science and mathematics. Science and engineering students excel in constructing and optimizing algorithms, while management students should be proficient in the contextual application and value extraction of algorithms.

To this end, the teaching team has implemented a "competition-based learning" strategy, actively encouraging students to form teams and participate in high-level academic competitions, thereby extending classroom theories into real-world competitive arenas. Key recommended competitions include the "Business Big Data Analysis" and "Cross-border E-commerce Data Analysis" tracks of the National College Students' E-commerce Innovation, Creativity and Entrepreneurship Competition, the "National College Students' Market Research and Analysis Competition", and the "CMAU National College Students' Market Research and Business Planning Competition". Simultaneously, we have reformed the traditional course evaluation system by introducing a diversified assessment mechanism. This mechanism incorporates competition achievements as a key indicator for continuous assessment (or formative assessment), thereby stimulating students' enthusiasm and spirit of exploration.

When mentoring students for these competitions, the teaching team consistently adheres to the principle of "management problems driving data analysis", steering students away from the trap of "model worship". We repeatedly emphasize that the starting point of data analysis must be real business pain points, rather than mere technical showmanship. Instead of blindly pursuing complex mathematical models, students are urged to focus on applying appropriate analytical tools to solve actual enterprise challenges. Through this intensive practical training, students can personally validate the full cycle of "data empowering business decisions". They gain a deep understanding of the practical value of abstract decision-making models in real business environments, ultimately achieving a transformative shift from "passive knowledge reception" to "active skill building". Figure 4 shows selected award-winning projects and student achievements from these competitions.

(a) (b) (c)

Figure 4. Students' competition works on data-driven business decisions. (a) Plans for Hanfu promotion; (b) Optimization of Kimchi store operations; (c) Promotion for Gaizhang culture.

Figure 4(a) presents the national First Prize-winning project in the Business Big Data Analysis track of the 14th National College Students' E-commerce Innovation, Creativity and Entrepreneurship Competition. This project established a multi-dimensional market analysis framework, comprehensively analyzing the market size, sales trends, consumer sentiments (based on textual analysis of user reviews), and pricing strategies within the Hanfu industry. Building upon this, the team developed a novel Hanfu demand prediction model and formulated detailed product innovation and market expansion strategies across aspects such as fabric selection, color aesthetics, design style, and application scenarios.

Figure 4(b) showcases the provincial First Prize-winning project in the Business Big Data Analysis track of the 15th National College Students' E-commerce Innovation, Creativity and Entrepreneurship Competition (Hunan Province). By diagnosing real-world operational data, this project identified critical bottlenecks for a kimchi store, including poor customer acquisition, low delivery efficiency, ineffective product bundling strategies, and a confusing ordering interface. To address these pain points, the students proposed a data-driven optimization plan. After three months of implementation, the store achieved a revenue increase of nearly 10,000 RMB, with a significant boost in bundled product sales. This process allowed the students to practically validate the strategic value of business data analysis in guiding decisions within a complete, real-world business cycle.

Figure 4(c) features the First Prize-winning project in the Hunan region of the 15^{th} National College Students' Market Research and Analysis Competition. This project applied the Theory of Planned Behavior to empirically analyze the key factors influencing the willingness of young and middle-aged demographics to participate in the "stamp-collecting and check-in" tourism trend. Transcending a purely commercial perspective, the team provided evidence-based policy recommendations and strategic pathways for tourism and culture departments, aligning the promotion of this trend with the broader goal of urban cultural brand building.

5. Reforming the Teaching Evaluation System

The traditional teaching evaluation system for Management Information Systems (MIS) courses is predominantly teacher-centered and grounded in a supply-side logic, namely the standardization and procedural fidelity of instructional delivery [21]. Typical evaluation criteria include linguistic clarity and pedagogical appropriateness in lecturing, timeliness and consistency in assignment grading, frequency and quality of classroom interaction (e.g., structured discussion facilitation), richness and accessibility of teaching resources (e.g., slides, annotated videos, supplementary datasets), and the currency of course content relative to industry developments. This framework rests on the implicit linear assumption that when standardized instructional inputs are rigorously implemented, high-quality learning outcomes will naturally follow.

Yet, this process-oriented, outcome-agnostic model reveals growing limitations in practice, highlighted by a concerning pedagogical paradox. Educators who uphold rigorous academic standards, assign complex tasks, and demand conceptual depth frequently encounter lower student evaluations, whereas those who apply lenient grading or simplify content generally achieve higher scores. Driven by the pressure to satisfy these evaluation metrics, some instructors inadvertently compromise academic rigor by reducing cognitive demands, relying on formulaic assessments, and eliminating open-ended analytical tasks. As a result, the curriculum becomes increasingly disconnected from authentic managerial challenges. This trend exacerbates growing public skepticism about the professional relevance of higher education, especially within applied fields such as management. Empirical evidence highlights that stellar academic grades in MIS courses rarely equate to tangible workplace proficiencies, including data-driven decision-making and systems thinking. Ultimately, this disconnect reveals a severe structural flaw. That is, the existing evaluation framework not only fails to support but actively undermines the institutional goal of producing analytically agile, career-ready professionals.

Facing the dual pressures of a volatile job market and the digital wave, teaching evaluation must shift its focus from monitoring what teachers teach to assessing what students actually learn. Adopting the concept of Outcome-Based Education (OBE), the teaching team believes universities must break away from the closed loop of purely internal, campus-centric evaluations. Instead, we propose a dual evaluation system that integrates the student's perspective of learning gains with the industry's perspective of talent demand.

From the student perspective, the evaluation focuses on the enhancement of digital competencies. Students no longer merely judge how well the instructor teaches; instead, they evaluate the extent to which the course improves their own digital skills. Guided by existing literature [22]-[24], the evaluation dimensions should encompass four levels including 1) digital thinking and ethics, 2) practical proficiency with cutting-edge tools, 3) acute awareness of digital business scenarios, and 4) digital self-efficacy and career confidence. The specific evaluation indicators are detailed in **Table 1**.

From the industry perspective, the evaluation focuses on the alignment between

Table 1. Indicator system for the course evaluation of MIS from the student perspective.

Dimensions	Examples of indicators
Digital thinking and ethics	1. Does this course enabled you to identifying management issues from practical data? 2. Does this course equipped you with computational thinking to transform ambiguous business requirements into technical language? 3. Does this course helped you establish a sense of digital ethics regarding data security and privacy protection?
Practical abilities with cutting-edge tools	1. Can you use tools like Visio to help you draw the flowchart of system design? 2. Have you mastered low-code/no-code development platforms (e.g., Axure) to describe lightweight applications? 3. Can you use tools like CiteSpace to help you build a knowledge graph to understand the development history of the industry and predict its future direction? 4. Do you have the ability to use BI business intelligence tools (e.g., Tableau or Power BI) for data visualization?
Keen senses of digital scenarios	1. Does the course content cover the current mainstream digital business scenarios (e.g., new retail, supply chain finance or digital community management)? 2. Can the knowledge learned be utilized to digitally reconstruct and optimize real business processes?
Digital efficacy and career confidence	1. Have you overcome the fear of technology? 2. When facing unstructured management challenges, do you have the confidence to solve problems through human-machine collaboration?

students' acquired capabilities and actual workforce demands. Specifically, universities should engage industry mentors and experts to co-create an external evaluation mechanism rooted in a job competency model. This approach effectively validates the market relevance of the educational outcomes. Key evaluation dimensions encompass 1) the alignment of skills with specific job requirements, 2) the capacity to solve complex, real-world problems, 3) the quality and professional readiness of project deliverables, and 4) cross-functional communication and professional writing proficiency. The specific evaluation indicators are outlined in **Table 2**. Notably, this indicator framework is highly adaptable and can be customized by partner enterprises to suit their specific operational needs.

Table 2. Indicator system for the course evaluation of MIS from the enterprise perspective.

Dimensions	Examples of indicators
The alignment of skills with specific job requirements	1. Does the technology stack mastered by students (e.g., SQL or Axure) meet the ability requirements of a specific job description in the current recruitment market? 2. Can the learned management information system theory directly connect with the logic of ERP, CRM, or SaaS systems currently used by enterprises?
The capacity to solve complex, real-world problems	1. Can students only operate software functions, or do they possess hybrid problem-solving abilities that balance business and technology? 2. When facing open-ended real enterprise projects with no standard answers, do students have logical closure abilities and innovative thinking?
The quality and professional readiness of project deliverables	1. Do course outputs (e.g., system prototypes or analysis reports) have value for resume display? 2. Can students directly prove their practical ability in interviews using their course projects?
Cross-functional communication and professional writing proficiency	1. As management students, do they have the ability to act as a communication bridge between the technology team and the business team? 2. Do they possess efficient collaboration literacy on digital collaboration platforms?

The dual evaluation system is structured to create a continuous improvement loop through internal and external feedback. The internal student-level evaluation is conducted via structured questionnaires at the end of each semester, with results collected and analyzed by the instruction team to assess teaching effectiveness and student satisfaction. The external industry-level evaluation comprises three dimensions: 1) feedback from corporate managers following guest lectures; 2) performance assessments from industry mentors during student competitions; and 3) longitudinal tracking of graduates employed as "Product Managers" or "Data

Analysts." Although collecting data from the third group (employers of alumni) is methodologically challenging, the teaching team maintains this effort to ensure the course's market alignment. To date, eight in-depth responses from key employers have been secured. This feedback revealed that while students demonstrate strong digital application skills in specific, practiced scenarios, they often encounter difficulties when adapting to unfamiliar business domains. In direct response to this finding, the teaching team has initiated a systematic update of the course, focusing on the development of a comprehensive repository of diverse, real-world business cases. This iterative process ensures that the pedagogical framework evolves to bridge the gap between classroom exercises and the complexity of actual industry environments. Regarding the weighting of these inputs, student feedback is primarily utilized to optimize teaching methods and pace, while industry feedback is prioritized as the core metric for refining curriculum relevance and professional competency standards.

Based on the above-mentioned evaluation system reform, students can better enhance their core competitiveness and professional adaptability. On the one hand, by introducing an enterprise-oriented evaluation perspective, it compels students to master high-level digital skills such as low-code development, AIGC application, and data analysis that are urgently needed by enterprises during their school years, effectively alleviating the reluctance of liberal arts students towards technical positions. On the other hand, the reformed evaluation system emphasizes "product-oriented" outputs (e.g., system prototypes or data reports), allowing students' course assignments to directly transform into portfolios in their job application resumes, significantly increasing their interview success rates.

For educators, the reform drives the continuous refinement of pedagogical methods and fosters the development of practitioner-academics (dual-qualified faculty). On one front, the shift in evaluation metrics forces instructors to step out of their comfort zones, proactively update their expertise, and integrate real-world enterprise cases. This facilitates their transition from traditional lecturers to dynamic digital learning designers. On another front, involving industry mentors in the evaluation process dismantles the information silos between academia and industry. This enables teaching content to be dynamically adjusted in response to rapid technological upgrades (such as the generative AI boom), thereby ensuring the curriculum remains cutting-edge and relevant.

From a societal perspective, the reform addresses skills mismatches in the labor market and actively serves the "Digital China" strategy. Primarily, the system cultivates a robust pipeline of interdisciplinary management professionals who are proficient in both business logic and digital technologies, effectively bridging the talent gap enterprises face during digital transformation. Additionally, by significantly enhancing the career readiness of graduates, the reform reduces corporate onboarding costs and shortens the workplace learning curve for new hires. On a macro level, this promotes high-quality employment and achieves a seamless integration of the educational ecosystem, talent pipelines, industry demands, and innovation networks.

6. Conclusions

Driven by the macro imperative of stabilizing employment and the micro demand for enterprise digital transformation, this study addresses management students' "tech-anxiety" and the pervasive disconnect between theory and practice in the MIS course. To resolve this, a comprehensive teaching reform plan encompassing goal reshaping, content reconstruction, and evaluation restructuring is systematically designed.

In terms of pedagogical goals, this study adopts a core strategy of differentiated competition. Moving away from purely technology-oriented training, it establishes a framework designed to cultivate interdisciplinary professionals who are fluent in both business logic and digital technology. The reform dismantles traditional disciplinary barriers through cross-functional integration and demystifies abstract technical knowledge by anchoring it in everyday business scenarios.

Regarding teaching content and formats, we implemented a progressive, four-dimensional reform including 2) reshaping theoretical instruction through the lens of business logic to clarify the 'why' of learning, 2) innovating experimental teaching with low-code tools to build a closed-loop skill set, thus answering the 'how' of application, 3) integrating industry guest lectures with workplace frontiers to alleviate technological apprehension, and 4) leveraging academic competitions to drive practical training and experiential learning.

For the evaluation system, the reform breaks away from the conventional, single-instructor grading model. Instead, it establishes a dual-perspective evaluation framework that assesses both students' perceived learning outcomes (value-add) and the alignment with industry demands. This dual approach ensures that educational outcomes directly translate into enhanced employability. The relationship among reform components, student capacities, and intended employability outcomes is summarized in **Table 3**.

The theoretical and practical significance of this study is profound. For individual students, it provides a viable pathway for non-technical majors to master core digital skills. By introducing cutting-edge tools like low-code platforms and AIGC, the reform effectively lowers the technical barrier, eliminates tech-anxiety, and enables students to showcase tangible digital portfolios (e.g., system prototypes and data reports) on their resumes. Consequently, they secure a differentiated competitive advantage in a fierce job market. At the institutional level, the reform disrupts the traditional paradigm of the MIS course by shifting the focus from purely theoretical lectures to applied problem-solving. By embedding enterprise mentors and academic competitions into the curriculum, real-world industry demands are brought directly into the classroom, achieving a precise match between educational supply and workforce demand. Ultimately, this offers a micro-level solution to alleviate broader skills mismatches in the labor market.

Table 3. The relationship among reform component, student capacities, and intended employability outcomes.

Reform components	Student capacities	Intended employability outcomes
1. Theoretical redesign (Problem-oriented, focuses on management & application, introduces AI, Metaverse, and Blockchain)	Ability to understand emerging technology architectures and evaluate their business value from a managerial perspective.	Readiness for roles like "Digital Consultant" or "Strategy Analyst" who bridge the gap between business and technology.
2. Low-code experimental reform (Hands-on labs using Houyi Collector, CiteSpace, and Axure)	Mastery of non-coding tools for data scraping, knowledge mapping, and UI/UX design logic.	Direct alignment with the technical requirements of "Junior Data Analyst" and "Associate Product Manager" positions.
3. Multi-level guest lectures (Peer sharing from interns, and industry insights from PMs and Data Analysts)	Understanding of real-world industry standards, professional communication, and daily operational workflows.	Reduced information asymmetry regarding job requirements, leading to higher interview success rates and smoother workplace transitions.
4. Competition-based Learning (Solving real business problems via data analysis and system design)	Ability to apply digital skills to diagnose and solve unstructured problems in authentic business environments.	A robust "Professional Portfolio" of tangible projects that provides a significant edge in recruitment for leading enterprises.

Crucially, the concepts pioneered in this study extend far beyond the MIS course, offering a highly scalable paradigm for other management disciplines and the broader "New Liberal Arts" initiative. First, it establishes a universal model for integrating technology with business. It demonstrates that management majors can cultivate high-level digital application skills without getting bogged down in complex coding, a model that can be readily replicated in courses like Marketing or Human Resource Management. Second, the reform sets a new benchmark for industry-academia integration in student evaluation. By championing an employment-oriented, dual-perspective assessment system focused on project deliverables and job readiness, it drives a fundamental paradigm shift (moving the focus from what teachers teach to what students can actually do) in higher education. Ultimately, this provides robust practical support for universities striving to better serve regional economic development and the broader "Digital China" strategy.

While this paper presents a comprehensive pedagogical reform framework, several limitations must be acknowledged. First, the current manuscript functions primarily as a descriptive conceptual model rather than a rigorous empirical study. It lacks large-scale statistical data, such as pre- and post-intervention assessments, to quantitatively substantiate the causal impact of the reform on students' digital competencies. Second, the preliminary evidence of success (e.g., showcasing prize-winning competition projects) is subject to selection bias, as it predominantly reflects the achievements of highly motivated top-tier students rather than demonstrating cohort-wide learning outcomes for the average student. Finally, the study currently lacks longitudinal employment tracking to verify the long-term effects of the curriculum on actual labor-market success.

To address these limitations, future research will transition from a descriptive framework to an evidence-based effectiveness study. We plan to implement standardized pre- and post-course quantitative assessments to measure the actual acquisition of digital skills across the entire student cohort, ensuring the reform benefits average learners. Additionally, we aim to establish a longitudinal alumni tracking mechanism in collaboration with university career centers and employers. This will allow us to collect objective data on graduate employment rates, job-person fit, and career stability over time, thereby providing robust empirical validation for the proposed pedagogical model.

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Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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