

# Redesigning the Business Intelligence and AI Course: A Four-Dimensional Teaching Model

Shiqi Bao\*

Artificial Intelligence School, Shanghai Normal University Tianhua College, Shanghai 201815, China

*\*Author to whom correspondence should be addressed.*

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**Abstract:** Amid the rapid evolution of the digital economy, the convergence of business intelligence (BI) and artificial intelligence (AI) has become a key driver of enterprise digital transformation, intensifying the demand for interdisciplinary professionals who possess both business acumen and technical expertise in intelligent systems. As an emerging interdisciplinary course that integrates computer science, management science, and statistics, Business Intelligence and Artificial Intelligence faces several pedagogical challenges. These include a disconnect between technical instruction and real-world business contexts, superficial integration of AI content into the curriculum, and a misalignment between practical training and current industry needs. Drawing on existing teaching reform literature and emphasizing the integrated nature of BI and AI education, this paper proposes a comprehensive teaching framework centered on content, methodology, practice, and assessment. Specifically, it outlines innovative pathways across four dimensions: redesigning curriculum content, transforming instructional approaches, constructing a multi-tiered practical training system, and refining evaluation mechanisms. Each pathway is discussed in terms of implementation strategies and necessary resource support, with a focus on applied instruction that embeds AI technologies within authentic business scenarios. The proposed model aims to enhance teaching quality and cultivate applied, interdisciplinary talent equipped to meet evolving industry demands.

**Keywords:** Business intelligence; Artificial intelligence; Curriculum integration; Teaching mode; Innovative paths; Interdisciplinary talents

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## 1. Introduction

The continuous advancement of information technologies has accelerated the convergence of business intelligence (BI) and artificial intelligence (AI), fundamentally transforming how enterprises make decisions and conduct operations. This integration has emerged as a critical foundation for organizations seeking to establish competitive advantages<sup>[1]</sup>. According to a study by the Association for Information Systems, BI technologies have consistently represented the largest portion of corporate IT expenditures over the last ten

years. As AI becomes more deeply embedded across industries, there is a surging need for professionals who can combine strategic business reasoning with the ability to deploy intelligent systems.

For academic programs such as Big Data Management and Application, as well as Information Management and Information Systems, the course Business Intelligence and Artificial Intelligence serves as a pivotal bridge between technological tools and their commercial applications <sup>[2]</sup>. The primary educational objective is to equip students with proficiency in key AI techniques—including data mining and machine learning—and the ability to adapt these methods to diverse business contexts like e-commerce, financial risk assessment, and customer relationship management. Ultimately, learners are expected to gain the competence necessary to formulate comprehensive BI solutions independently. The curriculum is structured around the synergy of BI and AI, drawing upon computer science (intelligent algorithms), statistics (data analysis), and management science (business logic). Core topics encompass data warehousing, machine learning models, and the architecture of intelligent decision support systems.

Despite its importance, the delivery of this course in higher education institutions is confronted with several persistent difficulties. One major issue is the wide variation in students' prerequisite knowledge: their grasp of fundamental areas such as management principles, database concepts, and Python programming differs considerably, which in turn leads to inconsistent learning progress <sup>[3]</sup>. Additionally, instructional approaches often concentrate heavily on theoretical underpinnings of AI algorithms, yet fail to adequately address how these techniques can be adapted to specific business problems. This creates a gap between technical proficiency and contextual application <sup>[4]</sup>. Moreover, the inclusion of AI topics tends to be shallow—merely appending isolated modules on machine learning or deep learning—without truly weaving them into the fabric of the BI curriculum <sup>[5]</sup>. Practical components are also frequently out of sync with industry practices; case studies and datasets are oversimplified, offering students limited exposure to the complexities of real-world intelligent system deployment. Collectively, these shortcomings contribute to a mismatch between graduate competencies and employer expectations, underscoring the pressing need for pedagogical reform.

## 2. Related research foundation

To address the pedagogical challenges outlined above, researchers and educators have explored various instructional frameworks in the context of business intelligence and related courses. Among these, blended learning, the Conceive-Design-Implement-Operate (CDIO) concept, the BOPPPS model, and school-enterprise collaboration have gained traction, each offering distinct contributions to curriculum design and delivery.

Blended learning, for instance, has been adopted to accommodate students' heterogeneous backgrounds by shifting foundational content online, allowing for self-paced learning before classroom sessions. This approach not only mitigates disparities in prior knowledge but also frees up face-to-face time for interactive discussions and hands-on exercises, thereby fostering active engagement rather than passive reception.

Similarly, the CDIO framework, originally developed for engineering education, has been adapted to structure project-based learning in business intelligence courses <sup>[4]</sup>. By organizing the curriculum around the lifecycle of a real-world project, CDIO helps students integrate discrete technical skills—such as data mining and algorithm implementation—with the iterative process of problem-solving and system development. Some implementations have further leveraged data mining techniques to recommend personalized learning paths, aligning with the principle of individualized instruction.

The BOPPPS model, which structures a lesson into six phases—Bridge-in, Objective, Pre-assessment, Participatory Learning, Post-assessment, and Summary—has also proven effective in maintaining student engagement <sup>[6]</sup>. Its emphasis on participatory learning, often through case studies drawn from actual business scenarios, encourages students to apply theoretical concepts in a simulated environment, while the built-in assessment loops provide immediate feedback to both learners and instructors.

Beyond classroom innovations, partnerships with industry have emerged as a vital mechanism to bridge the gap between academic training and workplace demands. By involving enterprises in curriculum design, providing real-world datasets, and offering internship opportunities, such collaborations ensure that students are exposed to the complexities and constraints of authentic business problems, thereby enhancing their readiness for professional roles.

Furthermore, a bibliometric examination of the literature reveals divergent emphases between domestic and international scholarship: while foreign studies tend to concentrate on managerial decision-making applications of business intelligence, Chinese research often prioritizes technical implementation. Notably, artificial intelligence has emerged as a shared focus across both communities, underscoring the need for a curriculum that balances technical depth with business acumen <sup>[7]</sup>.

### **3. Innovative paths for the teaching mode of the business intelligence and artificial intelligence course**

This paper designs innovative paths for the teaching mode from four dimensions, forming an inherent logical connection of “content as the core, methods as the carrier, practice as the support, and evaluation as the guarantee”. These dimensions cooperate with each other to form a closed loop, constructing a comprehensive curriculum teaching system.

#### **3.1. Restructure the curriculum content system to achieve in-depth integration of technology and business**

The curriculum is organized into three progressive tiers, each designed to build upon the previous one while maintaining a clear connection to the overarching goal of applying AI in business contexts. The foundational tier, accounting for approximately 30% of the total 96 hours (28 hours), focuses on technical competencies essential for subsequent stages. Topics include data warehouse construction, ETL processes, Python programming, and foundational machine learning algorithms <sup>[8]</sup>. To accommodate students with weaker backgrounds, online modules and resources are made available prior to the course, enabling them to acquire prerequisite skills at their own pace.

The core of the course lies in the business integration tier, which comprises half of the instruction time (48 hours). Here, AI algorithms are not taught in isolation but are embedded within six representative business scenarios—such as intelligent recommendation in e-commerce and risk assessment in finance. Each scenario module follows a complete workflow: from data collection and model building to result interpretation and decision support, ensuring that students grasp not only the technical details but also the contextual application.

The final tier, dedicated to intelligent innovation, occupies the remaining 20 hours and introduces emerging technologies like generative AI and digital twins <sup>[5]</sup>. This segment is designed to cultivate forward-thinking and adaptability, with content aligned with national policy directions <sup>[9]</sup>. A curriculum design project is incorporated to challenge students to synthesize their learning and propose novel solutions, thereby fostering creativity and

industry insight.

### **3.2. Innovate teaching implementation methods to strengthen students' dominant position**

To enhance student engagement and accommodate diverse learning paces, the teaching approach integrates the strengths of the BOPPPS framework with blended learning, resulting in a three-phase instructional model.

Prior to each offline session, students engage with online materials that include guided cases and preliminary knowledge checks. For each module, three to five integrated case studies are provided to prompt early reflection on how AI techniques can be applied in business settings. The instructor monitors students' progress and identifies common misconceptions, which then inform the focus of the subsequent face-to-face meeting.

The offline sessions, totaling 48 hours, are structured according to the BOPPPS model <sup>[6]</sup>. Each class begins with a bridge-in activity—often a real-world business problem—to stimulate curiosity and set the stage. The participatory learning phase, which forms the core of the session, involves group discussions and hands-on exercises where students work through problems collaboratively; the instructor acts as a facilitator rather than a lecturer <sup>[10]</sup>. The session concludes with a student-led summary, reinforcing key takeaways and promoting knowledge consolidation.

After class, an online platform provides additional resources tailored to individual needs. Drawing on concepts from personalized learning recommendation systems, the platform automatically suggests supplementary materials—such as video tutorials or advanced readings—based on each student's performance and interaction history, thereby supporting continuous and customized learning.

### **3.3. Build a diversified practical system to strengthen application capabilities in real scenarios**

Practical training is structured as a three-tiered progression, with school-enterprise cooperation serving as a foundational support.

At the basic level, students complete twelve laboratory experiments that align with core course topics. These exercises use publicly available business datasets and require independent execution and reporting, ensuring that fundamental skills are solidified <sup>[8]</sup>.

The intermediate tier involves comprehensive projects that simulate real-world challenges. Interdisciplinary teams are formed, and each project is co-supervised by a faculty member and an industry engineer, following the CDIO framework <sup>[4]</sup>. Enterprises contribute anonymized datasets and provide technical guidance, while assessment is conducted jointly by academic and industry partners, offering students authentic feedback.

The advanced tier consists of enterprise internships, where students are immersed in actual project work within partner companies <sup>[2]</sup>. Each intern is assigned a company mentor who oversees their progress and contributes to their evaluation. This direct exposure to workplace practices not only hones technical abilities but also cultivates professional competencies such as teamwork and communication.

To further support hands-on learning, an online platform has been developed that visualizes algorithms and processes through web-based services, making practical resources accessible anytime and anywhere.

### **3.4. Optimize the evaluation mechanism to realize a comprehensive evaluation**

Assessment is redesigned to move beyond a single final examination, adopting a multi-faceted approach that captures the breadth of student learning.

Process evaluation accounts for 30% of the total grade and reflects students' engagement in both online preparatory activities and offline classroom participation. Practical evaluation, weighted at 40%, covers performance across the three tiers of the practical system; it is jointly determined by instructors and industry mentors to ensure that real-world competencies are recognized. The remaining 30% is allocated to a final assessment, which takes the form of a curriculum design proposal defense—a format that requires students to articulate and justify their solutions in a manner akin to professional presentations.

To enhance fairness and depth, evaluation involves multiple perspectives: peer assessments within groups, self-evaluations, and input from enterprise supervisors <sup>[11]</sup>. All results are communicated to students promptly, with detailed feedback that highlights strengths and areas for improvement. This transparency not only aids individual development but also feeds back into course refinement, creating a continuous quality improvement loop.

## **4. Conclusion**

This paper has presented a systematic redesign of the Business Intelligence and Artificial Intelligence course, addressing the persistent challenges of integrating technology with business and theory with practice. The proposed three-tier curriculum structure ensures deep coupling of AI techniques with business applications; the three-phase instructional model fosters active learning; the progressive practical system builds comprehensive problem-solving skills; and the multi-dimensional evaluation scheme provides a holistic measure of student achievement <sup>[2, 4-5]</sup>.

Nevertheless, this study has limitations. The proposed model has yet to be empirically tested across diverse institutional contexts, and the integration of cutting-edge topics such as generative AI remains at a preliminary conceptual stage.

Future research should focus on implementing this teaching model in various university settings to gather empirical evidence on its effectiveness. Additionally, deeper exploration of how emerging technologies can be embedded into the curriculum, along with the development of intelligent teaching platforms, will be crucial. Strengthening school-enterprise partnerships and investing in faculty development will further enhance the model's impact, ultimately contributing to the cultivation of interdisciplinary talent equipped for the digital economy.

## **Disclosure statement**

The author declares no conflict of interest.

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