Research on Optimization of Cross-Disciplinary Practical Training in Application-Oriented Undergraduate Programs under Digital-Intelligent Transformation

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Abstract: This paper takes the cross-disciplinary comprehensive practical training course of economics and management at Hubei Commerce University as the research object, and summarizes the teaching reform practices that have been carried out for this course since its launch in 2021. The article analyzes the explorations and deficiencies in aspects such as course positioning, teaching design, faculty team, and evaluation system of the course. On this basis, from theoretical perspectives such as digital and intelligent technology empowerment, human-computer collaborative teaching, and industry-academia integration, it proposes optimization methods for the optimization of the digital and intelligent teaching model. This study argues that private universities stand to benefit from their institutional flexibility—an advantage that allows them to adapt more quickly than their public counterparts. To begin with, digital-intelligent technologies can play a key role in reshaping how practical training is delivered. At Courses need to cut across disciplines—no more staying in your own lane. Companies have to put real money and resources on the table. Get all three pieces right, and the people coming out of the system will actually be ready for the digital economy.

Keywords: Digital-Intelligent Transformation; Cross-Disciplinary Comprehensive Practical Training; Private Undergraduate Universities; Teaching Model Optimization; Human-Machine Collaboration

1. Introduction

Advances in next-generation technologies including big-data analytics, artificial intelligence and cloud computing have turned the digital economy into a key driver of socioeconomic change. According to official data, China's core digital-economy sectors accounted for around 10% of its GDP in 2023, alongside an estimated shortfall of almost 30 million skilled professionals. The widening gap between what economics-management graduates can offer and what the digital economy actually requires has become a pressing structural challenge [1].It raises a fundamental question for higher education: how should economics and management programs be restructured—not merely to equip students with proficiency in digital tools, but to get students thinking across disciplines, solving problems from multiple angles, and building the kind of well-rounded skills that digital employers actually want.

This interdisciplinary comprehensive training initiative has erased silos between different academic disciplines. It pulls together know-how from different fields and gets students learning by doing. More and more applied universities are picking up this approach. Even so, real-world application brings about a host of practical hurdles. A great number of higher-education institutions use highly simplified training environments. Their simulations draw only on one single firm's processes, with rigid, standardised workflows — hardly reflective of how actual supply chains operate collaboratively. Most students never see the whole data pipeline in action, or get a feel for how humans and machines actually team up on the ground.[2]. Assessment approaches also tend to be outdated. They largely follow informal operational guidelines and place little emphasis on fostering students' capacity for innovation. [3]. Most school-enterprise partnerships never really get past setting up internships and helping students find jobs. There's still a long way to go before we see real resource sharing and true collaborative talent development. In terms of teachers, the digital intelligence literacy of teachers is uneven, and many teachers' use of digital technology still stays in basic operation without deeper understanding and application [4].

Hubei University of Commerce is an application-oriented private undergraduate institution. In 2021, the university launched the Comprehensive Interdisciplinary Training for Economics and Management Majors for its economics and management programs. Leveraging UFIDA's comprehensive business practice platform, it began exploring reforms for interdisciplinary practical training. However, the problem is equally obvious: the integration of digital intelligence technology and teaching process is not deep enough, and the overall teaching model also has many places to be polished. Using this course as a case study, this paper examines what has worked and what hasn't in the reform effort, and puts forward a framework for improving cross-disciplinary comprehensive training in the age of digital intelligence.

2. Current State of the Cross-Disciplinary Practical Training at Hubei Business College

2.1 Course Orientation and Learning Objectives

The School of Economics and Management at Hubei University of Commerce runs a hands-on course: *Comprehensive Interdisciplinary Training for Economics and Management Majors*. Built for undergraduates on economics and management tracks, it's worth 2 credits and runs for 32 contact hours.

In class, students enter a virtual business and social environment with the help of Yonyou's comprehensive practical training software. The software simulates the real job division, management process and business documents, and is also equipped with 3D live display. Students get to work in a highly realistic setup, handling operations and business tasks just like they would in a real company. It bridges what they learn from textbooks and what they actually do on the job.

The course has straightforward goals. It lets students see how a business operates end to end, and get hands-on with what key roles actually involve. More importantly, students need to learn to flexibly use the management knowledge they have learned to really solve practical problems.

The course focuses on a few core things-execution, judgment, and an eye for innovation. These are exactly what you need to run a business in today's environment. It also trains students to read and steer business performance amid volatile, fast-shifting markets. Beyond all that, the curriculum also puts a real emphasis on professional character—things like integrity, a drive for quality, and the habit of keeping the bigger picture in mind.

2.2 Course Content and Instructional Design

This course is organised into four phases: preparation, execution, decision-making, and review, with 4, 12, 12 and 4 hours assigned to each. It takes students from first-time exposure to the platform all the way to autonomous practical operation.

The first two phases are about getting teams together, figuring out who does what, and running business tasks with help from AI agents. Through these exercises, students gain insight into different job functions while building their communication, teamwork, and competitive-thinking capabilities. A review of the operational exercise takes place in the concluding phase. The AI agent gives the group a reference point for peer evaluation, and also puts together a capability profile based on how each person performs.

2.3 Assessment and Evaluation Methods

This course employs a balanced assessment framework covering individual-group, qualitative-quantitative, and process-outcome dimensions. Individual marks come from personal summaries, experimental reports, and intra-group peer reviews, while team grades are based on the group's overall business-simulation performance. The final grade breaks evenly-you get half from the summary report you turn in, and the other half from showing up and taking part along the way.

While the framework incorporates multi-dimensional assessment thinking, significant shortcomings remain when benchmarked against digital-intelligent teaching-reform requirements. Process data is captured in fairly limited ways, so a lot of meaningful learning behaviors never get recorded. In addition, there is a lack of reliable quantitative assessment criteria to measure soft skills such as interdisciplinary competence, digital literacy, and innovative thinking. Besides, using AI agents in assessment is still pretty new. We need more real-world experience to see whether these tools are actually reliable and fair.

2.4 Instructional Outcomes and Remaining Challenges

A few years in, this course is beginning to yield meaningful and encouraging results. Students are doing better in competitions like the Challenge Cup, showing more creativity, and their rates of pursuing further study and landing jobs have both gone up. Feedback from hiring organisations has been largely positive. These observations suggest cross-disciplinary practical training broadens students' skill bases and enhances their employability. However, in the era of digital intelligence, this challenge has become even more pronounced.

(1)The deployment of relevant technologies remains largely superficial in practice. Technology is often viewed as just one more tool in the teaching toolkit, rather than being thoughtfully integrated into the curriculum itself. Many students continue to focus primarily on step-by-step procedures; as a result, they may not yet develop a deeper appreciation for what data can enable-or for how to collaborate effectively with machines.

(2)Cross-disciplinary efforts remain fragmented. The course is open to multiple majors, but it's still built around business management processes. Disciplinary knowledge from other areas never quite finds its way in. Workable solutions for the organic integration of big-data and artificial intelligence into practical training remain elusive.

(3)University-industry collaboration lacks substantive depth. School-enterprise cooperation tends to be confined to platform provision and internship arrangements. There is currently no clear way for companies to actually participate in course design and content updating.

(4)Teachers lag behind in terms of their digital-intelligence competencies. The teaching team has rich practical training experience, but the knowledge and skills base in artificial intelligence, big data and other emerging fields is relatively weak. This, in turn, has a direct impact on the depth of digital-intelligent curriculum transformation.

3. Theoretical Framework for Optimizing Cross-Disciplinary Practical Training under Digital-Intelligent Transformation

3.1 Theoretical Logic of Digital-Intelligent Technology Empowering Instruction

Digital-intelligent transformation is far more than just upgrading teaching tools. At its core, it uses digital technologies to boost educational quality and efficiency, and ultimately build teaching models that are personalized, smart and ecosystem-oriented[5]. From the perspective of talent training, the economic and management talents needed in the digital economy era must not only be able to use the technical tools of big data and artificial intelligence, but also have comprehensive ability to truly shoulder the work and help enterprises optimize the process [6]. So where does digital intelligence actually fit into all this? How does it empower cross-disciplinary comprehensive training? We can break it down into three levels.

(1)Technology as an extension of cognitive capacity. Technical tools are not something external to people. In fact, they are an extension of human body, thinking and ability, and a key intermediary connecting people with society and culture [4]. This implies that the application of digital-intelligent technologies in education should not be regarded as a mere addition of external tools, but rather as an extension and enhancement of human cognitive and practical capacities. Students in this cross-disciplinary training use big data tools and AI systems—but it goes beyond just completing operational tasks These technologies effectively push out their cognitive boundaries. Judgements once based on experience now have data to back them up, and decisions formerly made by gut feeling can draw on algorithms to map out different possible outcomes. This is exactly how students' decision-making abilities get expanded and sharpened..

(2)Human-machine collaboration as a new pedagogical paradigm. The deepening integration of artificial intelligence into education is reshaping the pedagogical paradigm, transforming the relationship between teachers and intelligent technologies from one of "tool application" to "collaborative co-creation," with its philosophical foundation shifting from "subject-object dualism" toward "interactive symbiosis" [7]. Human-machine collaborative instruction enhances efficiency through the division of labor and organic coordination among teachers, students, and machines, promoting the mutual growth of student intelligence and machine intelligence, facilitating the completion of complex tasks, and advancing students' knowledge construction and cognitive development [8]. Within cross-disciplinary comprehensive practical training, human-machine collaboration manifests at three levels: first, artificial intelligence serves as a “cognitive scaffold,” outsourcing portions of information processing and reasoning to free learners to direct their cognitive resources toward higher-order cognitive tasks [9]; second, teachers leverage AI to handle standardized and repetitive tasks, thereby conserving their energy for creative activities [7]; and third, a new mechanism of equal-footed dialogue among "teachers, students, and technology"is established.

(3)The integration of distributed cognition and situated learning theory. Distributed cognition theory emphasizes that cognition exists and is distributed within individuals, among individuals, and across media, environments, cultures, societies, and time [8]. This provides theoretical support for team collaboration, human-computer interaction, and environmental design in cross-disciplinary comprehensive practical training. Meanwhile, embodied cognition theory emphasizes that cognition is rooted in bodily action and that experience is constructed through interaction, which requires that the design of practical training instruction attend to the creation of highly authentic simulated contexts and the modeling of real-world business scenarios.

3.2 Constituent Elements of the Cross-Disciplinary Comprehensive Practical Training Model

Based on the theoretical analysis above, the cross-disciplinary comprehensive practical training model can be understood as an organic whole comprising four interconnected layers: the objective layer, the content layer, the implementation layer, and the support layer.

The goal level solves the problem of "who to cultivate". In the era of digital intelligence, compound talents need to have interdisciplinary vision, solid digital literacy and excellent professional ability. This breaks down into five areas: tech literacy, human-machine collaboration, cross-disciplinary integration, contextual application of knowledge, and tech-driven problem-solving [9].

When it comes to content and course design, one practical approach is the “platform- plus- module” model. We first build a general- purpose platform for competency development, then develop targeted functional modules tailored to different majors and industry scenarios. This lets big data, AI and similar technologies integrate naturally into professional coursework[9].

The implementation level involves three key points: how to organize teaching, what technical environment to use, and how to cooperate with human machine. In teaching, teachers should not talk and students should practice, but should turn to project-driven, situational generation and collaborative inquiry. On the tech side, we need an environment that knits together the physical and the digital [8]. Human- machine collaboration needs to run through the whole process. Technology aids decision- making, teachers guide reflection, and students build knowledge on their own — the three feed into one another in a positive cycle.

Finally, the guarantee conditions, mainly teachers and the integration of industry and education. Teachers should have four qualities: role identity, tech literacy, collaborative know-how, and ethical judgment [7]. Industry- education integration should not remain superficial. It needs to move toward deeper collaboration where resources, talent development and value are all jointly built and shared.

4. Optimization Strategies for the Cross-Disciplinary Practical Training Model at Hubei Business College

Combined with the previous status quo and theoretical analysis, this paper believes that the digital intelligence upgrading of courses is not a problem that can be solved by a single breakthrough, but involves four links: how to design courses, how to allocate teaching resources, how to build teachers and how to evaluate the effect. These aspects are interlinked and need to be promoted simultaneously.

4.1 Curriculum System Restructuring: From "Process Simulation" to "Digital-Intelligent Integration"

The current curriculum is structured around corporate operational workflows. While this aligns well with real-world business management practices, it fails to integrate digital and intelligent technologies in a systematic manner. Three key strategies can be adopted for optimization.

(1)Add modules related to digital intelligence.

Beyond the four existing stages, we build in data analytics and intelligent decision-making. During business- operation phases, tasks on data collection and cleaning can be incorporated. Students can then use platform- based tools to carry out preliminary analysis on operational data. In the decision-making and management stage, intelligent prediction and optimization tasks can be introduced, and students can try to use machine learning algorithms to make decision such as sales prediction and inventory optimization. The thinking behind this is simple: in this training, students shouldn't just go through the motions of running a business. They also need to get their hands on data and figure out how to use AI.

(2)Strengthen practical integration of interdisciplinary knowledge. According to the line of "task-ability-knowledge", the course content is reorganized, and the different disciplines are connected with real business problems. Take supply chain management, for example. It cuts across several areas—cost accounting from finance, demand analysis from marketing, and data mining methods from big data tech. Students absorb interdisciplinary knowledge naturally as they work through complex real- world problems, instead of having it tacked together in a forced way.

(3)Introducing the concept of full-stack instructional design. Drawing on the full-stack teaching model, which takes full-stack competence as the training objective and the full-stack process as the instructional process, this approach encompasses the cultivation of comprehensive capabilities across all stages， including needs analysis, solution design, product development, project management, and effect evaluation. This concept is highly congruent with the essence of cross-disciplinary comprehensive practical training and helps to transcend the limitations of "executing prescribed processes" characteristic of traditional practical training, cultivating in students a complete capability chain from problem identification to solution implementation.

4.2 Instructional Implementation Innovation: From "Teacher-Led" to "Human-Machine Collaboration"

The optimization of instructional implementation lies at the heart of teaching model reform, with the key being the construction of a new tripartite collaborative mechanism among "teachers, students, and technology."

(1)Deepening human-machine collaborative instructional organization. Building upon the existing "AI agent-assisted operations," the role of AI should be further extended across all stages of instruction. In the pre-class phase, AI agents can be used to deliver preparatory materials and assess students' prior knowledge. In the process of teaching, the agent should not only give rule reminders and decision-making suggestions, but also record the operation process and give immediate feedback, so that the teachers and students can keep track of the learning progress and problems at any time. Following class sessions, AI tools draw on data accumulated throughout the learning process to construct personalised learning profiles and competency visualizations for every student, so they can pinpoint areas requiring further development. This liberates teachers from repetitive and routine administrative work. Teachers may therefore dedicate more time to developing learning scenarios, encouraging critical reflection among students, and offering customized individual guidance.

(2)Design scenario-based training tasks. After optimization, should add more open, the task of dynamic evolution. Specifically, key variables from real- world working scenarios should be incorporated - including fluctuating simulation parameters, shifting operating conditions, and system malfunctions. This allows tasks to support multiple viable solutions while opening up the possibility of unforeseen emergent situations [9]. For example, in the supply chain management, we can consider supplier suddenly interrupt or steep fluctuations in market demand, and so on and so forth. Students have to make calls with incomplete information. It fosters students’ adaptability and gives them greater exposure to the complexities of actual business practice.

(3)Establish a Collaborative Learning Community. What makes cross-disciplinary training so effective is the mix-students from different fields collaborate and pick things up from one another. These efforts deserve further reinforcement. Through group- level competition and in- team role rotations, students with varied backgrounds gain more opportunities to exchange professional know- how and draw on one another’s strengths. It can, for example, recommend task allocation based on individual academic backgrounds and performance, or diagnose team collaboration dynamics and help groups adjust their coordination in real time.

4.3 Digital-Intelligent Platform Upgrading: From "Functionally Available" to "Intelligently Adaptive"

The digital intelligent training platform underpins the entire teaching reform. Now an AIE intelligent environment comprehensive training platform has good virtual simulation training function, but in such aspects as personalized support, intelligent diagnosis still has room to improve. Building a digital- intelligent training platform delivers value that goes far beyond technical capabilities alone. What really matters is how it mixes virtual and real settings to get students thinking outside the box, develop a nose for business, and learn to handle uncertainty [10].

(1)Sharpen data collection and analysis. The next step is to focus on the process-how students do it, how long it takes them, how many times they modify it, whether they ask for help or not. Such data may be compiled into personalised profiles documenting each student’s learning behaviors. On top of that, big data can flag common sticking points and predict outcomes, so teachers know exactly where to step in.

(3)Personalized learning pathways. Drawing on learning behavior data, the system can deliver customized learning resources and tasks tailored to each student. Students who are shaky on the fundamentals? The system can point them to remedial modules and more basic drills. For higher- performing students, the system provides more demanding coursework and innovation- focused project tasks. Such different levels of students can get their support, and not everyone at the same speed.

(3)Enhancing intelligent decision support capabilities Building on existing intelligent agents, more advanced algorithms can be introduced to deliver higher- level functions such as multi- scenario simulation, risk early- warning and optimization suggestions. For example, in the decision-making operation stage, the system can automatically generate several alternative plans according to the historical data and market environment of the enterprise, and simulate the possible results of each plan. By comparing the strengths and weaknesses of various alternatives, students gain a clearer understanding of the implications of each decision, and their capacity for rational decision-making gradually strengthens.

4.4 Assessment System Reform: From "Results-Oriented" to "Data-Driven"

Evaluation reform is often the most overlooked part of teaching reform, yet its importance can hardly be overstated.

The traditional evaluation pays too much attention to the results and the operation rules are not standardized. After the reform, the attention should be extended to the whole process of learning. With behavioral data automatically collected by the digital-intelligent platform, we can look at students across multiple dimensions—knowledge readiness, class participation, collaborative contribution, and innovative performance. Analyzing this full set of data produces a holistic competency profile for each student, instead of just a single numerical grade.

Drawing on the concept of three- dimensional mixed evaluation, we can combine AI- driven assessment, instructor grading and student peer- evaluation[8]. The AI does the heavy lifting on collecting and analyzing objective behavioral data. Teachers center their assessment on evaluating students’ thought quality and creative capabilities. And peers rate each other on their contribution to the team and their collaborative spirit. The three dimensions each have emphasize particularly on, mutual support, more comprehensive and objective evaluation results.

Grading is only half the story—the real purpose of evaluation is to help instructors do a better job. After each round finishes, a complete review of evaluation data is carried out, highlighting effective elements, existing shortcomings, and areas to be revised in future cycles. Do that consistently, and the teaching model evolves with each cycle.

5. Implementation Safeguards and Recommendations

Good design alone cannot guarantee the implementation of the optimization plan. Corresponding supporting measures are also required. In light of the practical conditions of Hubei Business College, relevant work can be carried out in the following respects.

5.1 Strengthening the Development of Faculty Digital-Intelligent Competencies

Teachers are the key to the implementation of reform, and their ability directly determines how far the reform can go. A three-dimensional development system can be established, encompassing conceptual renewal, skill advancement, and practical support [8]. Through thematic workshops, industry-university collaborative teaching, and cross-institutional teacher communities, faculty can deepen their understanding of the nature and value of human-machine collaboration and develop proficiency in using intelligent teaching tools. Meanwhile, a development mechanism for "dual-competency teachers"[3] should be established. Teachers' practical performance in digital-intelligent teaching reform shall be included in performance assessment, so that devoted and productive teachers can gain recognition and positive incentives can be fostered.

5.2 Deepening the Industry-Education Collaborative Talent Development Mechanism

Promote school-enterprise cooperation from the level of platform use to the deep coordination of curriculum co-construction, resource sharing and talent co-education. Specific measures include: engaging enterprise technical experts in curriculum content design and instructional implementation; establishing a dynamic updating mechanism for case resources to incorporate in a timely manner new industry developments and technologies; and expanding off-campus practical training bases to provide students with hands-on opportunities in authentic business settings.

5.3 Improving Institutional Safeguards and Incentive Mechanisms

The institution should provide systematic support for teaching model reform at the policy level. This includes incorporating teaching reform outcomes into the indicator systems for faculty title review and performance evaluation; establishing special funds for teaching reform to support curriculum resource development, platform upgrading, and faculty training; and creating a fault-tolerant mechanism that encourages faculty members to experiment boldly and innovate in their teaching reform endeavors.

6. Conclusion

The digital-intelligent optimization of the cross-disciplinary comprehensive practical training teaching model is a systematic endeavor that requires coordinated advancement across four dimensions: curriculum system restructuring, instructional implementation innovation, platform upgrading, and assessment system reform. At the same time, it demands robust support from faculty development, deepened industry-education integration, and institutional safeguards. Although private undergraduate universities face certain constraints in areas such as recruiting high-level talent and securing research funding, their institutional flexibility and strong motivation for reform provide favorable conditions for pedagogical model innovation.

Looking ahead, as artificial intelligence, big data, and other technologies continue to evolve and educational philosophies are continually renewed, cross-disciplinary comprehensive practical training will move toward greater intelligence, personalization, and integration. Hubei Business College should seize this opportunity to persistently deepen its teaching reforms, exploring an effective pathway with distinct characteristics of private higher education for cultivating high-quality applied talents capable of meeting the demands of the digital economy.

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