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Research on the Construction Path of Micro-Majors in Local Universities under the Background of Intelligent Transformation —— Digital Intelligence Micro-Major of Jiaxing University as an Example

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ABSTRACT
Under the accelerating background of intelligent transformation, local universities respond to the talent demand of industrial upgrading through micro-major construction. Taking the Digital Intelligence Micro-Major of Jiaxing University as an example, this paper explores its construction path and practical effectiveness. The study finds that the university constructs a modular curriculum system, school-enterprise collaborative education mechanism, and intelligent teaching model through a four-dimensional path of "demand orientation, interdisciplinary integration, industry-education integration, and technology empowerment," providing a reference paradigm for micro-major construction in local universities.

KEYWORDS
Intelligent transformation; Local universities; Micro-major; Industry-education integration; Digital intelligence

1 Introduction

With the deep penetration of technologies such as artificial intelligence and big data, the industrial structure is accelerating its transformation toward intelligence, and the demand for composite talents presents "specialized, refined, and innovative" characteristics. As the core carrier of regional talent cultivation, local universities need to respond to industrial demands through educational model innovation. Micro-majors, with their "small but refined" curriculum design and flexible training mechanisms, have become an important breakthrough for universities to connect with industries and deepen industry-education integration. As a local university in the Yangtze River Delta, Jiaxing University takes the lead in establishing the Digital Intelligence Micro-Major, relying on its digital economy industry advantages, to explore effective paths for micro-major construction under the background of intelligent transformation.

2 Background and theoretical basis of micro-major construction

2.1 Challenges and opportunities for higher education in intelligent transformation

Intelligent technologies have reconstructed the mode of knowledge production and dissemination, highlighting issues such as disciplinary barriers and curriculum lag in traditional professional education. By focusing on cutting-edge industrial fields, micro-majors adopt a "modular curriculum + project-based practice" model to achieve precise docking between talent cultivation and industrial demands. For example, Nanjing University of Posts and Telecommunications has introduce 12 interdisciplinary micro-majors, integrating resources from disciplines such as communication and computer science to cultivate the urgently needed job skills for enterprises.

2.2 Realistic needs for micro-major construction in local universities

Local universities need to serve regional economic development, and their micro-major construction should closely integrate with local industrial characteristics. As a strong city in the digital economy, Jiaxing City issued policies in 2025 to explicitly build a Yangtze River Delta computing power industry cluster and promote scenario applications such as "artificial intelligence + manufacturing." The establishment of the Digital Intelligence Micro-Major at Jiaxing University is a typical practice in response to local industrial demands.

3 Analysis of the construction path of the digital intelligence micro-major at Jiaxing university

3.1 Demand-oriented curriculum system design

The Digital Intelligence Micro-Major at Jiaxing University constructs a three-tier curriculum system of "basic courses + core modules + practical projects" with "digital technology + industry application" as the core. Basic courses cover general technologies such as artificial intelligence fundamentals and data science; core modules offer direction-specific courses such as intelligent algorithms and intelligent system development; practical projects introduce real enterprise cases, such as the implementation testing of scenarios like smart transportation and intelligent port equipment control. The curriculum credit system is flexible, allowing students to complete 3-10 courses through an online-offline hybrid model,

in line with the requirements of the Ministry of Education's "Double Thousand" Plan.

3.2 Interdisciplinary integration and faculty collaboration

The micro-major breaks through traditional disciplinary boundaries, integrates resources from disciplines such as computer science and electronic information, and introduces enterprise technical backbone as "industrial professors." For example, in cooperation with Huawei (Shandong) AI Innovation Center, it jointly builds a full-link curriculum of "operating system development-hardware adaptation-scenario application," with enterprise engineers directly participating in the formulation of talent training programs.

3.3 Industry-education integration collaborative education mechanism

Jiaxing University has established a "three-helix" collaborative mechanism with local enterprises: first, curriculum co-construction, jointly developing digital textbooks such as *Intelligent Supply Chain Management*; second, platform sharing, co-building provincial and municipal R&D platforms such as the "Intelligent Vision Yantai Engineering Research Center"; third, talent co-cultivation, implementing a "double tutor system" and project credit conversion mechanism, where students can obtain credit recognition through enterprise project experience, and outstanding students directly enter the enterprise talent pool. For example, the Cloud Computing Application Micro-Major in cooperation with Anchan Network enables students to participate in real projects such as data center operation and maintenance, with 28 students directly employed by the enterprise upon completion.

3.4 Empowerment of intelligent teaching technology

The university relies on the "Learning in Jiada" smart teaching platform to introduce artificial intelligence-assisted teaching tools. For example, in the course *Machine Learning Technology and Applications*, students use AI tools to solve practical problems through case-based teaching and project-based learning; the intelligent short video production course adopts a hybrid AI technology teaching approach, enabling zero-basis students to quickly master production skills. At the same time, a "theory + practice" dual-track evaluation system is constructed, tracking students' learning processes through intelligent systems and providing real-time feedback to optimize teaching strategies.

4 Implementation effectiveness and challenges

4.1 Significant progress

Since its establishment in 2023, the Digital Intelligence Micro-Major at Jiaxing University has attracted students from computer science, electronic information, and other majors. Through school-enterprise cooperation projects, students have won 12 provincial-level and above awards in competitions such as the "Challenge Cup" and "Internet +," with some achievements achieving industrial application. The employment rate of the first batch of graduates in 2025 reached 92%, mainly entering digital economy enterprises, and employers feedback that their technical application capabilities are significantly superior to those of traditional professional graduates.

4.2 Existing challenges

Despite certain achievements, micro-major construction still faces many challenges: first, the depth of school-enterprise cooperation is insufficient, with some enterprises' enthusiasm driven by short-term interests; second, the engineering practice capabilities of the teaching team need to be improved, and interdisciplinary teaching resource integration needs to be further strengthened; third, the quality assurance system is not yet perfect, lacking special evaluation standards for micro-majors.

In the field of digital intelligence, the speed of technological renewal is remarkable. Taking artificial intelligence (AI) as an example, new algorithms and models are emerging in large numbers. In recent years, the advent of new technologies such as Generative Adversarial Networks (GANs) and Transformer architecture has greatly promoted the development of fields like image generation and natural language processing. Statistics show that over the past five years, the number of papers in the AI field has grown at an annual rate of more than 20%, and new research results continue to refresh people's understanding of this field. In the big data field, with the explosive growth of data volume, new data processing technologies and tools are constantly updated. For instance, new-generation stream processing frameworks like Apache Flink can achieve more efficient real-time data processing.

However, the teaching content in colleges and universities often fails to keep up with the pace of technological development. On one hand, the update cycle of teaching materials is relatively long. It takes multiple steps from compilation to publication, usually 2-3 years. This leads to the content in teaching materials often lagging behind the actual development of technology, resulting in a disconnect between the knowledge students learn and the practical application in the industry. For example, some teaching materials still focus on introducing traditional machine learning algorithms, while only making brief mentions of current popular deep learning algorithms such as Convolutional Neural

Networks (CNNs) and Recurrent Neural Networks (RNNs), which cannot meet students' needs for cutting-edge knowledge. On the other hand, teachers also face difficulties in updating their knowledge. The rapid development of digital intelligence technology requires teachers to continuously learn new knowledge and skills. However, teachers are burdened with heavy daily teaching and research tasks, lacking sufficient time and energy to in-depth study and master the latest technologies, which also affects the timely update of teaching content.

Building practical platforms for digital intelligence micro-majors is crucial for cultivating students' practical abilities, but this process faces many technical and financial difficulties. In terms of technology, practical platforms need to integrate a variety of digital intelligence technologies, such as AI development frameworks, big data processing platforms, and Internet of Things (IoT) devices, resulting in high technical complexity. Taking the construction of an AI practical platform as an example, it is necessary to configure high-performance computing equipment like GPU servers to support the training of deep learning models. It also requires the installation and configuration of various deep learning frameworks such as TensorFlow and PyTorch. The installation and debugging process of these frameworks is relatively complex and requires professional technical knowledge and rich experience. At the same time, effective integration and collaboration between different technical components are needed to ensure the stable operation of the platform.

In terms of funds, the cost of building and maintaining practical platforms is high. Purchasing high-performance computing equipment, servers, sensors, and other hardware devices requires a large amount of capital investment. For example, the price of a high-end GPU server can be as high as tens of thousands or even hundreds of thousands of yuan. In terms of software, the license fees for some professional digital intelligence software are also expensive. For instance, the annual authorization fee for certain commercial big data analysis software may reach tens of thousands of yuan. In addition, the maintenance of practical platforms also requires continuous financial support, including the update and replacement of equipment, software upgrades, and the salaries of technical personnel. For some colleges and universities with relatively tight funds, it is difficult to bear such high costs, leading to the lag in the construction of practical platforms and failure to meet students' practical needs.

The challenges in the practice of the Digital Intelligence Micro-Major has been summarized in Table 1.

Table1 Classification and Core Difficulties of Challenges in Digital Intelligence Micro-Major Construction

Challenge Level	Specific Challenge Category	Core Difficulties
Technical Level	1. Contradiction between rapid technological renewal and lagging teaching content	- Teaching materials update cycle (2-3 years) lags behind technological development- Teachers lack time and energy to update knowledge- 20% annual growth of AI papers brings knowledge pressure
	2. Difficulties in building practical platforms and maintaining technologies	- High technical complexity (integration of AI, big data, IoT technologies)- High cost (GPU servers cost tens of thousands of yuan; software licenses are expensive)- Complex debugging of frameworks (TensorFlow, PyTorch)
Education & Teaching Level	1. Insufficient professional quality and teaching ability of teachers	- Only 30% of teachers master mainstream AI technologies- Single knowledge structure (weak math foundation for computer majors; weak programming ability for math majors)- Traditional teaching methods, lack of practical guidance
	2. Mismatch between teaching methods and micro-major characteristics	- Teacher-centered teaching ignores students' practical needs- Slow update of teaching content cannot keep up with technological trends- Difficulty in realizing interdisciplinary teaching (e.g., digital media needs integration of multiple disciplines)
	3. Weakness and ineffectiveness of practical teaching	- Simple practical projects, no participation in the whole project process- Insufficient teacher guidance due to limited quantity and experience- Imperfect evaluation system (only focusing on results)
Student Development Level	1. Large differences in students' foundations and difficult personalized teaching	- 40% of students are from non-computer majors with weak foundations- Difficult to balance teaching content difficulty (too easy for good students; too hard for weak students)- Limited resources for personalized tutoring
	2. Uncertainty in employment and career development	- Low social recognition of micro-majors; enterprises prefer traditional majors- Curriculum lags behind market demand- Narrow professional field, difficult career promotion/transformation
Management & Guarantee Level	1. Imperfect management system and operation mechanism	- Unclear departmental responsibilities (Academic Affairs Office, colleges, Scientific Research Office)- Lack of effective teaching quality monitoring and evaluation
	2. Shortage of practical resources and lack of sharing mechanism	- Insufficient hardware (computers, servers) and software (datasets, professional software)- Low resource sharing rate between colleges/universities and enterprises

5 Optimization paths and policy recommendations

5.1 Deepening the school-enterprise collaboration mechanism

It is recommended to establish a "enterprise demand list-university resource list" docking platform and guide enterprises to deeply participate in curriculum development and practical teaching through policies.

5.2 Strengthening faculty capacity building

Implement a "double-qualified and double-competent" training plan, encourage teachers to participate in enterprise technical research projects, and introduce industry leaders as part-time tutors. Drawing on the experience of Hunan Technology and Business University's "Artificial Intelligence and Art Design" micro-major, enhance teachers' interdisciplinary teaching capabilities through an integrated "learning, application, competition, innovation" training approach.

5.3 Improving the quality assurance system

Construct a diversified evaluation mechanism of "process evaluation + outcome evaluation," and introduce third parties such as enterprises and industry associations to participate in quality monitoring. For example, Nanjing University of Posts and Telecommunications ensures the practicality of micro-majors by regularly reduce outdated courses and updating the real project database.

6 Conclusion

The construction practice of the Digital Intelligence Micro-Major at Jiaxing University shows that local universities need to construct a flexible and efficient micro-major talent training model through paths such as interdisciplinary integration, industry-education integration, and technology empowerment, guided by industrial demands. In the future, it is necessary to further strengthen policy support, optimize resource allocation, and promote micro-majors to become an important means for local universities to serve regional economies and respond to intelligent transformation.

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