

Research on the Construction of an AI+X Industry-Education Integration Experimental Center in Application-Oriented Undergraduate Universities

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Abstract: Over the past few years, as the field of artificial intelligence (AI) technologies rapidly develops and are extensively applied to various industries (X), the development of AI+X interdisciplinary applied talents has become one of the priorities of the teaching reform of application-oriented undergraduate universities. The establishment of industry-education integration experimental centers is a key to the development of such talents, which is significant in improving the practical skills of students and facilitating the upgrading of the industry in the region. The paper suggests a system of construction principles and a hierarchical target system based on the following: industry-education integration, school-enterprise collaboration, AI empowerment, and open sharing. It logically expounds the particular content and working mechanisms of the experimental center building, such as the design of functional modules, the development of the operational system, the mechanisms of social service and openness, and the structure of funding guarantees. Using the example of the “AI Technology Comprehensive Experimental Center” at Yango University, this paper outlines its construction design and assesses the efficacy of the scenario-based teaching methods, as well as examines the main issues faced in the course of operation. The purpose is to offer reference and insights to application-oriented universities in China that would like to establish high-quality and unique AI+X industry-education integration experimental centers.

Keywords: applied undergraduate; AI+X; industry-education integration; experimental center construction; talent cultivation

1. Research Background and Significance

Over the past years, the new wave of technological revolution spearheaded by artificial intelligence (AI) has significantly transformed the industrial ecosystems and social structures. It has propelled the profound penetration of AI technologies into industries like healthcare, environmental protection, education, and manufacturing, and has become a major strategic direction in the development of AI in China. Consistent with the policy frameworks, including the Outline of the Plan to Build China into an Education Powerhouse (2024–2035) [1], the Opinions on the In-depth Implementation of the AI Plus Initiative [2], and the Opinions on Accelerating the Digitalization of Education [3], released by the corresponding ministries and commissions under the CPC Central Committee and the State Council, the main responsibility of application-oriented undergraduate universities is to produce high-quality professionals with good practical skills and innovative abilities to work in the frontline jobs in production, management and service [4–7]. Their training programs give special attention to practical aspects like experiments,

skills training and internships [8]. Being the biggest part of the undergraduate higher education system in China, these institutions consider the development of AI+X interdisciplinary applied talents as one of the key goals of the teaching reform. In this regard, the experimental centers of industry-education integration construction offers a critical basis of talent development, which greatly improves the practical skills of students, and also helps in the industrial upgrading and economic transformation of the region [9,10].

Nevertheless, most application-oriented universities in China continue to follow the traditional models of laboratory construction and have to struggle with a variety of problems in the framework of AI-based interdisciplinary integration. These are the lagging updates of the experimental equipment concerning the technological progress, the poor correspondence between the teaching situations and the industrial practice, and the absence of the platforms of interdisciplinary practical training [11–13]. These issues make it difficult to meet the demand for cultivating AI+X interdisciplinary applied talents. Clearly, in the case of application-oriented undergraduate institutions, the creation of an AI+X industry-education integration experimental center (hereinafter referred to as the Experimental Center) that combines production, learning, research, and competition is of great practical importance. Not only does such a platform allow students to work with the latest technologies and engage in the authentic project-based practice, thus improving their skills to solve complex engineering problems and become the drivers of technological change, but it also introduces the latest industrial needs, technical standards, and real-life project cases into the overall teaching process through enhanced school-enterprise cooperation. This strategy facilitates an accurate match between the goals of talent development and the requirements of industrial development, thus offering effective talent support and intellectual resources to the transformation, modernization, and sustainable development of the local digital economy [14].

2. Construction Ideas and Planning

2.1. Construction Ideas

(1) Enhance the industry-education integration mechanism. The experimental center should be constructed in such a way that it breaks the traditional barriers between universities, disciplines, and industries, and follows the principles of co-construction, co-governance, sharing, and mutual benefit. The construction plan must be founded on the adequate research and feasibility analysis, but it is necessary to pay special attention to the integration of the insights and practical experience of the industry and enterprise partners. Moreover, real-world projects and common application cases in enterprises should be given priority in experimental teaching cases so that teaching content is kept in line with the current trends in industrial technology.

(2) Develop a joint education system between universities and businesses. University-enterprise cooperation should be established as a long-term mechanism to enable the two-way mobility of enterprise engineers and university faculty, and the joint development of curriculum resources. This is possible by co-establishing industry colleges, joint laboratories, order-based classes, and micro-specializations thus making sure that there is good alignment between student internships, practical training and employment opportunities.

(3) Pay attention to the empowerment of industries with the help of AI technologies. The deep integration of AI technologies in the fields of healthcare, environmental protection, education, and manufacturing should be the main strength of the experimental center. It must be geared towards solving practical industrial problems, including financial risk management and control with large language models, industrial quality inspection with computer vision, and intelligent agricultural management with predictive analytics, and not be overly focused on purely theoretical teaching or basic research.

(4) Promote the openness and sharing of teaching platforms. An integrated resource management system must be created to facilitate cross-disciplinary access to teachers and students throughout the university and, therefore, promote interdisciplinary cooperation and innovative practice. In the right place and at the right time, access to the chosen resources and training services can be gradually opened to external learners, which will further increase the social value and the role of the platform as a public service.

2.2. Construction Planning

The experimental center should be built based on the principles of industry-education integration, gradual development, and the right scale. A three-stage development plan that includes the initial, intermediate, and long-term stages is suggested.

(1). Initial Stage: Lay a Solid Foundation and Explore Operational Models

The project approval procedures for the experimental center should be completed, and a preliminary framework for school–enterprise collaboration should be established. In cooperation with high-quality local enterprises, joint laboratories should be developed, funding sources for construction should be diversified, and the physical site development as well as the deployment of basic computing hardware facilities should be finalized. At the same time, universities and enterprises should collaboratively develop experimental courses and design a series of AI+X characteristic experimental projects aligned with local leading industries, such as AI+ intelligent manufacturing, AI+smart finance, and AI+smart agriculture.

(2). Intermediate Stage: Enhance the Teaching System and Boost Service Capabilities

In collaboration with relevant strong disciplines within the university, an AI+X experimental case repository and curriculum system should be developed, covering the institution’s core academic programs. In addition, a range of high-quality teaching practice projects integrating virtual simulation and virtual reality technologies should be constructed. By combining talent recruitment with faculty development, a “dual-qualified and dual-competent” teaching team should be established, significantly enhancing service capacity for both internal faculty and students as well as external learners. Ultimately, the experimental center should be developed into a locally influential training and certification base for AI application technologies.

(3). Long-Term Stage: Foster Industrial Ecosystems and Build Institutional Brands

The experimental center aims to evolve into a key hub for local AI+X technological innovation and applied practical training, establish a replicable and scalable model for building an industry–education integration community, enhance the employment competitiveness and industry recognition of its graduates, and further strengthen the university’s visibility and influence in applied AI talent cultivation.

3. Construction Content and Operation Mechanism

3.1. Functional Area Planning

The physical layout of the experimental center can be divided into four main functional areas, namely, the Computing Power Support and Data Service Area, the AI Public Teaching and Experimental Area, the AI+X Industry-Education Integration Project research and development (R&D) Area, and the Innovation Achievement Display and Experience Area. Simultaneously, the software systems are designed to support the work, such as a Basic Resource Management and Control Platform and an Experimental Teaching Cloud Platform, to allow managing and scheduling various data, software, and hardware resources in the center. All these systems offer a strong infrastructure to deliver online courses and experimental training.

(1). Computing Power Support and Data Service Area

The basis of AI teaching and research activities is computing power and data resources. This area should be planned and developed in accordance with the actual needs of the university and its partner enterprises. The basic infrastructure is made up of high-performance computing servers with multiple GPU (Graphics Processing Unit) or NPU (Neural Processing Unit) modules, data servers with high-speed read-write performance and high-capacity storage, and a base resource management platform to schedule and allocate software and hardware resources in a virtualized manner.

(2). AI Public Teaching and Experimental Area

The teaching of AI general education courses, professional core courses, and skills training programs to both internal and external participants is mainly supported in this area, and the focus is on the balance between theoretical teaching and practical application. The teaching services are provided in a flexible manner by combining offline physical laboratories and an online teaching cloud platform of experimental teaching.

(3). AI+X Industry-Education Integration Project R&D Area

To support the introduction of school-enterprise collaborative projects, several specialized R&D zones can be created, each of which is backed by at least one R&D team and one current research project. Teams usually include 3–4 faculty members of the university and one enterprise mentor, and about 10 students. The R&D projects that students participate in can be successfully combined with academic competitions, college student innovation and entrepreneurship programs, graduation design projects, and other similar practical training projects, thus providing continuity and coherence in applied talent development.

(4). Innovation Achievement Display and Experience Area

It is a centralized exhibition area where the various accomplishments of the experimental center in AI+X industry-education integration are displayed. These achievements include school – enterprise collaborative research projects, student innovation and entrepreneurship outcomes, award-winning entries from academic competitions, and cases of social training services, among others. Besides display capabilities, the space will be used to promote interactive learning. Moreover, it should be developed into a frequently open exhibition hall to the population, and a major venue of AI research and learning practice activities of primary and secondary schools, which will facilitate the exchange and collaboration of educational institutions and businesses.

3.2. Construction of Operation Management System

The experimental center suggests that it should adopt a director responsibility system, where the center director will be in charge of day-to-day operation and management. It will have a management committee, which will be composed of the leaders of the affiliated secondary college, the functional departments of the university, and the representatives of partner enterprises to make decisions and coordinate resources on major issues. The center will also enhance its management system by setting up a set of institutional regulations, such as the Management Measures of the Use and Maintenance of Instruments and Equipment, the Rules of Open Resource Sharing, the Regulations of Industry-University-Research Collaboration Projects, and the Organization and Implementation Plan of Research Activities, which will guarantee the efficient, standardized, and safe functioning.

3.3. Social Services and Open Sharing Mechanism

The experimental center must also be proactive in enhancing its social service activities in order to develop a feedback system that will improve the quality of teaching. In particular, it can offer AI vocational skills training and certification services to the population, offer AI popular science education and research-oriented courses in primary and secondary schools, and provide paid services, including computing power leasing and technical consulting, to local start-ups and research teams. These initiatives not only help supplement operational funding but also enhance the center's social impact and visibility. Moreover, the experimental center is to create an online reservation and management system to provide clear distribution of resources and effective use of teaching and research resources.

3.4. Operational Funds Guarantee System

The experimental center will create a sustainable funding system that is typified by diversified investment and self-sufficiency. In the first construction stage, it will also actively request the assistance of local government special funds and matching funds of the university. After the center goes into full operation, its

funding sources will be further diversified to involve joint investments by universities and enterprises, revenues produced by social services, and funding of research projects, creating a model of collaborative and mutually beneficial development.

4. Construction Cases and Effectiveness Analysis

Using the example of Yango University, an application-oriented undergraduate university, its AI Technology Comprehensive Experimental Center, which has been completed and operational since 2025, has become a successful example of promoting the construction of local AI+X industry-education integration experimental centers. It has been visited several times by leaders of local government departments and enterprises to investigate and inspect it, and its construction success has been well known.

4.1. Construction Overview and Core Features

The Yango AI Experimental Center was approved for establishment by the Fuzhou Municipal Education Bureau in 2025. The original construction budget was based on government financial resources (in particular, the Special Fund of the Development of the Private Higher Education in Fuzhou) and self-funded university funds, and the actual investment amounted to about 4 million yuan. The next stage of development will be to diversify the sources of funds to incorporate enterprise investment, social service revenues, and grants on research projects. Currently, the center mainly conducts AI general education experimental teaching, core AI professional course experiments, interdisciplinary AI+X industry-education integration R&D projects, AI vocational skills certification training, research and outreach services to primary and secondary education, among other social service activities. The center occupies a space of about 1000 square meters, and the instruments and equipment are worth more than 3.5 million yuan. It includes four functional areas: the Computing Power and Data Support Area, the AI Public Teaching Area, the AI+X Project R&D Area, and the Achievement Exhibition and Experience Area. The supporting experimental teaching management cloud platform allows scheduling and allocation of software and hardware resources in one place, as well as offering online open courses and a complete experimental teaching environment. The Yango AI Experimental Center is not just a technical laboratory but a combined industry-education platform that enables various industrial situations with the help of AI technologies. Its main mission is AI empowerment and scenario-driven development. Closely aligned with regional economic and social development needs, the center has established five key practical teaching scenarios: AI+education, AI+community governance, AI+agriculture, AI+environmental protection, and AI+surveying and mapping. These situations use practical industrial examples to develop the skills of students in the field of AI implementation and innovation.

4.2. Operation Mode and School-Enterprise Cooperation

The Yango AI Experimental Center has formed a management committee that includes representatives of secondary colleges (the School of AI), administrative departments (the Academic Affairs Office, the Research Office, and the Asset Management Office), and partner enterprises, and a director is in charge of the daily activities of the center. The center has strongly incorporated industry-education cooperation and has formed stable cooperation with various high-quality local businesses and research institutions, such as Techfish Technology Co., Ltd., Fujian Aolai Information Technology Co., Ltd., Fuzhou Academy of Environmental Sciences, Shared Data (Fujian) Technology Co., Ltd., Fuzhou Banyun Technology Co., Ltd., Fujian Hongxiang Fubang Technology Co., Ltd., and Fuj The collaboration mechanisms involve joint laboratory development, sharing of software and hardware resources, co-application and co-development of research and applied projects, enterprise experts as on-campus mentors, faculty members taking temporary industry appointments to develop professionally, and students taking enterprise-based internships. This profound integration guarantees the ongoing and coordinated modernization of the teaching resources as well as industrial technologies.

4.3. Construction of Computing Power and Data Center

The construction of computing power and data centers adopts a “cloud – edge – end” collaborative architecture. Three high-performance GPU servers (with a theoretical FP32 single-precision computing capacity of about 2 PFLOPS each) and one storage server (with 20 TB of solid-state storage and 200 TB of mechanical hard disk storage) are installed in parallel in the central data room to support cloud-based computing. Of these resources, about two-thirds are dedicated to scientific research work, such as large-scale inference, lightweight model training, and other highly parallelizable computing workloads. The remaining third is mainly utilized to serve an experimental teaching cloud platform, which is capable of serving about 100 simultaneous users in online course-based experiments. Moreover, edge computing nodes are also deployed close to experimental devices to satisfy real-time inference needs. The experimental teaching cloud platform can be easily accessed by students through cloud desktops or web interfaces to access the necessary computing and data resources.

4.4. Main Experimental and Practical Teaching Tasks

(1) AI General Education Course Experiments: These experiments are designed for all students across the university and cover foundational AI programming, data preprocessing and annotation, as well as visualized demonstrations of machine learning algorithms, among other content.

(2) AI Major Core Course Experiments: This category includes core professional course experiments and “AI+X” comprehensive experimental modules designed for students majoring in AI-related disciplines. The former primarily consists of supporting laboratory activities for courses such as computer vision, machine learning, neural networks and deep learning, natural language processing and text analysis, as well as large language model technologies and their applications.

(3) AI+X Training Practices: These primarily involve skills training for AI-related professional roles both within and outside the university, such as AI trainers, algorithm engineers, and data annotators, as well as applied AI skills training in industry-specific domains. Such domains include the application of large models and intelligent agents in sectors such as finance, manufacturing, agriculture, forestry, and education. The training is mainly delivered through centralized short- to medium-term experimental courses or intensive practical training programs.

(4) “Industry-university-research Competition” Integrated Practices: The experimental center focuses on five “AI+X” application scenarios, namely AI+environmental protection, AI+agriculture, AI+education, AI+community governance, and AI+surveying and mapping. Since its official launch, the center has jointly developed and implemented 20 scientific research and application-oriented projects through school–enterprise collaboration. For example, within the “AI+Environmental Protection” scenario, AI algorithms were integrated with UAV-based remote sensing water quality inversion technology to jointly develop a “Water Environment Quality Mapping” system for selected areas in Fuzhou. In the “AI+Community” scenario, teachers, students, and enterprise partners collaboratively developed an intelligent community governance system based on AI algorithms and digital twin technology. In the “AI+Agriculture” scenario, an intelligent tobacco planting monitoring system was co-developed using deep learning and remote sensing big data. In the “AI+Education” scenario, a campus AI assistant system built on large language model technology was jointly developed. In the “AI+Surveying and Mapping” scenario, the secondary development of the Unitree GO2 robot dog was carried out collaboratively, resulting in a mobile intelligent patrol platform powered by AI algorithms. Students participate in the entire project lifecycle through academic competitions, college student innovation and entrepreneurship programs, internships, and related activities, enabling them to strengthen their practical competencies within a highly simulated industrial environment.

4.5. Implementation Effect

Since the “AI Technology Comprehensive Experimental Center” at Yango University commenced operation, it has provided strong support for high-quality practical teaching across multiple related disciplines. Through participation in real-world projects, students have significantly enhanced their engineering practice and

innovation capabilities, achieving notable success in various academic competitions. Consequently, their employability and employment quality have improved simultaneously. In addition, the center has effectively promoted the development of “dual-qualified” faculty within the college, strengthening teachers’ capacity for industry engagement and social service, and generating a strong social demonstration effect. The experience of Yango University indicates that the secret of creating an experimental training center of AI+X industry-education integration is to create an open, shared, and constantly changing practical teaching ecosystem. The real-life industrial situations should be the engine of such a system and constantly reinforced by the profound school-enterprise cooperation.

5. Problem Reflection and Countermeasure Suggestions

Although the construction of the “AI+X” industry–education integration experimental training center holds promising prospects, it still faces several common challenges in practice, including difficulties in establishing an interdisciplinary curriculum system, the lack of well-defined evaluation criteria, and the need to further improve sustainable operational mechanisms. To address these issues, it is first recommended to establish a cross-college and cross-disciplinary curriculum development team. This team should design course modules in a project-oriented manner and collaborate with enterprises to jointly develop a repository of training cases and “AI+X” virtual simulation experimental courses, thereby reducing the complexity of interdisciplinary curriculum development. Secondly, a scientific and rational evaluation index system should be established, incorporating indicators such as the enhancement of students’ practical and innovative capabilities, the conversion rate of outcomes from school–enterprise collaborative projects, and stakeholder satisfaction in social services as core evaluation dimensions. Finally, it is essential to strengthen the center’s self-sustaining capacity by encouraging all stakeholders to jointly expand non-governmental funding sources, such as social service initiatives and the commercialization of research outputs, thereby diversifying income streams and enhancing the long-term sustainability of the experimental center’s operations.

6. Conclusions

The establishment of an AI+X Industry–Education Integration Experimental Center is a critical initiative for application-oriented universities to cultivate interdisciplinary, practice-oriented talents, deepen practical teaching reform, and enhance students’ comprehensive competencies. Based on the national policies and the needs of the industry, this paper suggests a series of construction principles and a hierarchical goal system that focuses on the integration of industry and education, school and enterprise cooperation, AI empowerment, and open sharing. Based on this, a detailed framework is created to direct the whole construction process, including functional design, institutional protection, social services, and financial assistance. Using the case study of the AI Technology Comprehensive Experimental Center at Yango University, this study confirms the efficiency of a model of construction that is described as a scenario-based education combined with a deep school-enterprise cooperation. Moreover, the research finds that there are a number of issues in the development of such experimental centers, such as the inability to design interdisciplinary curricula, the lack of appropriate evaluation measures, and the lack of sustainability in the capacity of operations. Solutions are also suggested to solve these problems. Looking forward, application-oriented universities should fully leverage their institutional positioning and regional advantages to transform the AI+X Industry–Education Integration Experimental Center into a key platform for cultivating interdisciplinary talents and a driving force for industry–academia–research–application collaboration, thereby contributing to China’s broader goal of becoming an education and technology powerhouse.

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