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CONSTRUCTION OF ARTIFICIAL INTELLIGENCE CURRICULUM SYSTEM FOR MULTIDISCIPLINARY

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Abstract: With the rapid development of artificial intelligence (AI) technology, its applications in various fields have become increasingly widespread, making it a key force in promoting social progress and industrial upgrading. China has listed AI technology as an important field of new infrastructure, aiming to promote the domestic large cycle through technological innovation. As a major economic province in China, Shandong has also taken AI as one of the "Top Ten Industries" and actively promoted the development of related industries. However, the contradiction between supply and demand of talents in the field of AI is increasingly prominent, especially in the cultivation of interdisciplinary talents. To solve this problem, this paper proposes to construct an AI curriculum system for multidisciplinary, through school-enterprise cooperation to build integrated software and hardware supporting facilities for teaching, practice, scientific research and employment, and use AI and big data technologies to achieve intelligent teaching. The purpose of this study is to construct an AI public teaching platform suitable for multiple disciplines and directions, promote the integration of various disciplines, students and teachers, and provide new ideas for solving the contradiction between supply and demand of AI talents.
Keywords: Artificial intelligence; Multidisciplinary integration; Public teaching platform

1 INTRODUCTION

As the core driving force of a new round of scientific and technological revolution and industrial transformation, artificial intelligence (AI) is profoundly changing all aspects of the social economy. From intelligent manufacturing to intelligent transportation, from intelligent healthcare to intelligent finance, the application scenarios of AI are becoming increasingly diverse, and its role in promoting economic and social development is becoming increasingly significant. The Chinese government attaches great importance to the development of AI technology and has listed it as an important area of new infrastructure, aiming to promote the domestic economic cycle and drive high-quality economic development through technological innovation. As a major economic province in China, Shandong actively responds to the national call, regards AI as one of the "Top Ten Industries", increases investment, and actively promotes the development of related industries. However, with the rapid development of AI technology, the contradiction between the supply and demand of talents in the field of AI has become increasingly prominent, especially in the cultivation of interdisciplinary talents [1]. Therefore, how to break down disciplinary barriers and construct an AI curriculum system for multidisciplinary has become an urgent problem to be solved in the field of education.

2 CONSTRUCTION OF AI DISCIPLINE AND CURRENT SITUATION OF TALENT CULTIVATION

2.1 Current Situation of Undergraduate AI Education at Home and Abroad

In recent years, with the rapid development of artificial intelligence (AI) technology, foreign universities have successively established AI majors or directions to meet the social demand for AI talents. As the birthplace of AI technology, the United States is in a leading position in AI education. World-renowned universities such as Stanford University, the Massachusetts Institute of Technology (MIT), and the University of California, Berkeley have established AI laboratories and related majors, cultivating a large number of outstanding AI talents. The AI curriculum systems of these universities cover multiple directions such as machine learning, natural language processing, and computer vision, emphasizing the combination of theory and practice to cultivate students' innovative and practical abilities. In addition, foreign universities provide students with rich practical opportunities and broad development spaces through school-enterprise cooperation, international exchanges, and other means.

European countries have also made remarkable progress in AI education. Many universities in European countries such as the United Kingdom, Germany, and France have established AI majors or directions, focusing on cultivating students' interdisciplinary capabilities and innovative spirit. The AI curriculum systems of these universities not only cover the basic knowledge of computer science but also involve multiple disciplinary fields such as mathematics, statistics, and psychology, providing students with a comprehensive knowledge background. Meanwhile, European universities establish training bases and joint laboratories through cooperation with internationally renowned enterprises to offer students practical and employment opportunities.

Undergraduate AI education in China started relatively late but has developed rapidly in recent years. In 2019, the Ministry of Education officially approved the establishment of undergraduate majors in artificial intelligence, marking a new stage of AI education in China [2]. At present, many universities across the country have set up AI majors or

directions, covering multiple disciplines such as computer science and technology, software engineering, and automation. The AI curriculum systems of these universities mainly include courses such as principles of artificial intelligence, machine learning, deep learning, natural language processing, and computer vision, focusing on cultivating students' theoretical foundations and practical abilities. In addition, domestic universities enhance the internationalization level and research strength of AI education through cooperation with internationally renowned universities and carrying out scientific research projects.

2.2 Analysis of the Contradiction between Supply and Demand of AI Talents

With the extensive application and rapid development of artificial intelligence (AI) technology, the social demand for AI talents has been increasing. According to relevant institutions' predictions, the global shortage of AI talents will reach millions in the next few years. In China, with the rapid development of the AI industry, the demand for AI talents is becoming increasingly urgent, especially in fields such as intelligent manufacturing, intelligent transportation, and intelligent healthcare, where the demand for talents with AI technology application capabilities is particularly prominent. In addition, with the continuous innovation and upgrading of AI technology, the demand for AI talents with innovative spirit and interdisciplinary capabilities is also growing.

At present, the cultivation of AI talents in China is mainly carried out through multiple channels such as universities, vocational colleges, and training institutions. As the main front for talent cultivation, universities have cultivated a large number of talents with AI theoretical foundations and practical abilities by setting up AI majors or directions and offering related courses. Vocational colleges focus on cultivating students' vocational skills and practical abilities, providing students with practical and employment opportunities through cooperation with enterprises to build training bases and carry out school-enterprise cooperation projects. Training institutions meet the learning needs of learners at different levels and with different requirements by offering short-term training courses and providing online learning resources.

However, there are still some problems in the current cultivation of AI talents. On the one hand, as AI involves multiple disciplinary fields, curriculum settings and teaching contents are difficult to meet the needs of different majors and directions, resulting in uneven quality of talent cultivation. On the other hand, due to the rapid development of AI technology, new knowledge and technologies are constantly emerging, making it difficult for the traditional talent cultivation model to adapt to such rapidly changing needs [3]. In addition, domestic universities still have deficiencies in AI practical teaching, lacking training bases and joint laboratories co-constructed with enterprises, which makes it difficult to meet the needs of cultivating students' practical and innovative abilities.

3 INNOVATIVE STRATEGIES FOR AI EDUCATION

3.1 Construction of an AI Curriculum System for Multidisciplinary

3.1.1 Design principles of the curriculum system

To construct an AI curriculum system for multidisciplinary, the following principles should be adhered to: First, the principle of interdisciplinarity. Since AI involves multiple disciplinary fields, the curriculum system should cover basic knowledge from various disciplines such as computer science, mathematics, statistics, and psychology to meet the needs of different majors and directions. Second, the principle of integrating theory with practice. The curriculum system should emphasize the combination of theory and practice, cultivating students' practical and innovative abilities through case analysis, project-based practices, etc. Third, the modular principle. The curriculum system should adopt modular design, flexibly combining relevant courses according to the needs of different majors and directions to satisfy personalized learning requirements. Fourth, the internationalization principle. The curriculum system should draw on international advanced experiences, introduce high-quality course resources from internationally renowned universities, and enhance the internationalization level of talent cultivation.

3.1.2 Construction methods of the curriculum system

To construct an AI curriculum system for multidisciplinary, the following methods should be adopted: First, needs analysis. Conduct in-depth analysis of talent demands in different majors and directions to clarify the required knowledge and skills, providing a basis for curriculum system design. Second, curriculum design. Based on the results of needs analysis, design relevant courses, including course names, objectives, contents, and teaching methods. Third, resource integration. Integrate high-quality course resources both inside and outside the school, including textbooks, courseware, cases, experiments, etc., to form a complete curriculum system. Fourth, evaluation and feedback. Evaluate and collect feedback on the curriculum system, and adjust and optimize it according to the evaluation results to improve the quality of talent cultivation, see Figure 1.

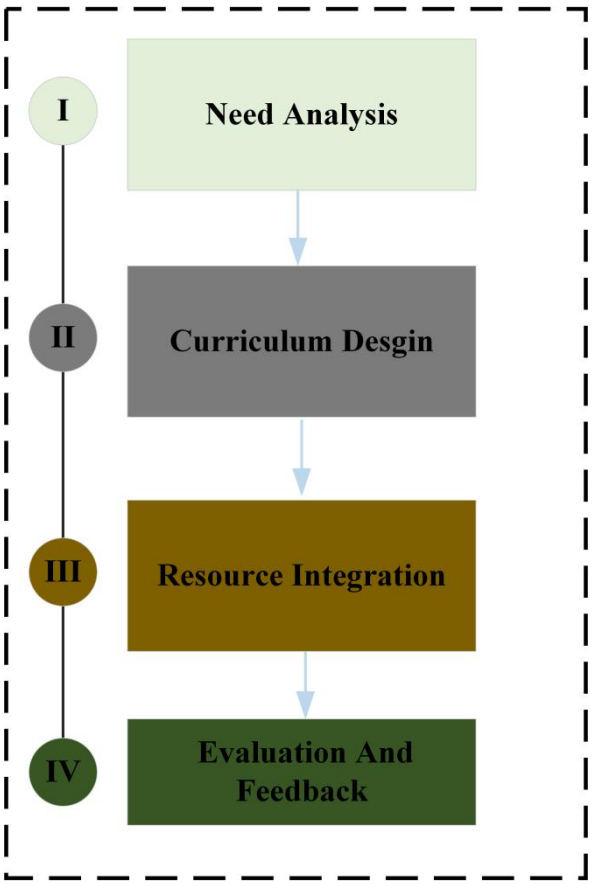

Figure 1 Schematic Diagram of the Construction Method of the Curriculum System

3.1.3 Construction of the "AI+X" curriculum system

The "AI+X" curriculum system refers to the integration of AI technology with different disciplinary fields, forming an interdisciplinary AI curriculum system. Here, "X" represents various disciplinary fields, such as intelligent manufacturing, intelligent transportation, intelligent healthcare, etc. [4]. In the "AI+X" curriculum system, AI courses serve as foundational courses, providing technical support and methodologies for different disciplinary fields. Meanwhile, according to the needs of different disciplines, corresponding professional and practical courses are offered to cultivate students' professional and practical abilities. Through the construction of the "AI+X" curriculum system, deep integration of AI technology with different disciplines can be achieved, fostering AI talents with interdisciplinary capabilities and innovative spirit [5].

3.2 Exploring School-Enterprise Cooperation Models for Constructing AI Software and Hardware Platforms

3.2.1 Analysis of school-enterprise cooperation models

School-enterprise cooperation is one of the effective ways to construct AI software and hardware platforms [6]. Through school-enterprise cooperation, resource sharing and complementary advantages can be achieved, jointly promoting the development of AI education. Currently, school-enterprise cooperation models mainly include the following types: First, co-constructing training bases. Schools and enterprises collaborate to build training bases, providing students with practical opportunities and training environments. Second, joint cultivation. Schools and enterprises cooperate in joint cultivation projects, jointly formulating talent cultivation plans and teaching programs to achieve in-depth integration of industry, academia, and research. Third, scientific research cooperation. Schools and enterprises collaborate on scientific research projects, jointly tackling technical problems and promoting technological innovation. Fourth, employment cooperation. Schools establish employment cooperation relationships with enterprises, providing students with job opportunities and career development platforms.

3.2.2 Construction plan for software and hardware platforms

Constructing AI software and hardware platforms requires comprehensive consideration of the needs of teaching, practice, scientific research, and employment. The specific plan is as follows: First, constructing an AI teaching platform. Utilize technologies such as cloud computing and big data to build an AI teaching platform, providing students with online learning resources and interactive communication platforms [7]. Second, constructing an AI experimental platform. Build corresponding AI experimental platforms according to the needs of different disciplinary fields, providing students with experimental environments and equipment. Third, constructing an AI scientific research platform. Relying on the scientific research capabilities of schools and enterprises, build an AI scientific research platform to promote technological innovation and achievement transformation. Fourth, constructing an AI employment platform. Establish employment cooperation relationships with well-known enterprises, providing students with job

opportunities and career development platforms, see Figure 2.

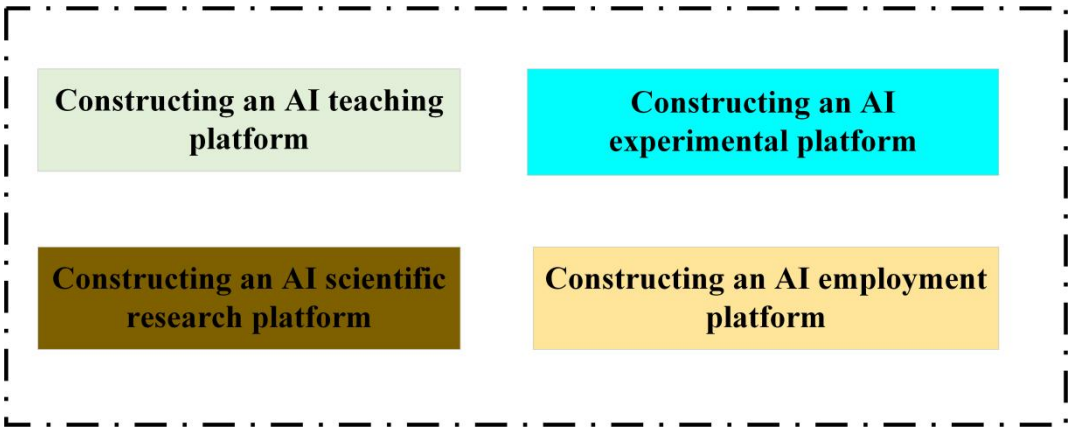

Figure 2 Schematic Diagram of the Construction Plan for the Software and Hardware Platform

3.2.3 Case Analysis of School-Enterprise Cooperation

Taking the cooperation between Wuhan University and Xiaomi as an example, the two parties jointly constructed an AI training base and a joint laboratory. The training base provided students with abundant practical opportunities and training environments, including project practices in multiple directions such as machine learning, natural language processing, and computer vision. The joint laboratory, relying on the enterprise's scientific research capabilities and technical advantages, carried out a series of innovative and practical scientific research projects, achieving remarkable results. Through school-enterprise cooperation, not only have students' practical and innovative abilities been enhanced, but also the common development of schools and enterprises has been promoted.

3.3 Achieving Intelligent Teaching through Artificial Intelligence and Big Data Technologies

3.3.1 Design of the intelligent teaching platform

The intelligent teaching platform refers to a teaching platform constructed using artificial intelligence and big data technologies, aiming to enhance teaching effectiveness and the learning experience. This platform should have the following functions: First, an intelligent recommendation system. By analyzing students' learning behaviors and interest preferences, it provides personalized course recommendations and learning path planning for students. Second, an intelligent course scheduling system. Based on teachers' teaching arrangements and students' learning needs, it automatically generates the optimal class schedule, improving scheduling efficiency. Third, an intelligent assessment system. Through big data analysis and machine learning technologies, it conducts intelligent assessments of students' learning outcomes, providing teachers with precise teaching feedback. Fourth, an intelligent tutoring system. Utilizing technologies such as natural language processing and knowledge graphs, it offers students online tutoring and Q&A services, enhancing learning efficiency.

3.3.2 Development of intelligent teaching resources

Intelligent teaching resources refer to teaching resources developed using artificial intelligence and big data technologies with intelligent features. These resources should have the following characteristics: First, interactivity. Through technologies such as virtual reality and augmented reality, it provides students with immersive learning experiences. Second, adaptability. According to students' learning progress and ability levels, it dynamically adjusts teaching content and difficulty, achieving personalized teaching. Third, sharing. Using cloud computing and big data technologies, it enables the sharing and interconnection of teaching resources, promoting the balanced development of high-quality educational resources [8].

3.3.3 Case analysis of intelligent teaching practice

Taking Shandong Jianzhu University as an example, the university constructed an intelligent teaching platform and developed corresponding intelligent teaching resources using artificial intelligence and big data technologies. Through this platform, students can enjoy personalized course recommendations and learning path planning, improving their learning efficiency and satisfaction. Meanwhile, teachers can also use the intelligent assessment system to conduct precise evaluations of students' learning outcomes, providing strong support for teaching improvement.

4 EXPLORATION OF THE IMPLEMENTATION PATH OF THE AI CURRICULUM SYSTEM

4.1 Implementation Path of Curriculum System Construction

4.1.1 Curriculum design and optimization

When constructing an AI curriculum system for multidisciplinary, curriculum design and optimization should be carried out first. This involves determining curriculum objectives, contents, teaching methods, etc. According to the characteristics and requirements of different disciplinary fields, corresponding professional and practical courses can be designed to form an interdisciplinary AI curriculum system. Meanwhile, continuous optimization of courses is required,

adjusting and improving them based on teaching feedback and industry demands to ensure the timeliness and practicality of the curriculum system.

4.1.2 Integration and sharing of teaching resources

To construct a complete AI curriculum system, teaching resources both inside and outside the school need to be integrated, including textbooks, courseware, cases, experiments, etc. By building teaching resource databases and sharing platforms, the sharing and interconnection of teaching resources can be achieved, promoting the balanced development of high-quality educational resources. In addition, Internet and big data technologies can be utilized to develop online learning resources and interactive communication platforms, providing students with more convenient and efficient learning methods.

4.1.3 Construction and training of teaching staff

Teachers are crucial to the implementation of the curriculum system. To build a high-quality AI curriculum system, it is necessary to strengthen the construction of the teaching staff and improve teachers' professional qualities and teaching abilities. This can be achieved by introducing high-level talents, conducting teacher training, encouraging teachers to participate in scientific research projects, etc. [9]. Meanwhile, an incentive mechanism should be established to encourage teachers to actively participate in curriculum system construction and teaching reform, promoting the sustainable development of AI education.

4.2 Implementation Path of School-Enterprise Cooperation Model

4.2.1 Establishment of cooperation mechanisms and platforms

To promote the implementation of the school-enterprise cooperation model, corresponding cooperation mechanisms and platforms need to be established [10]. This includes formulating cooperation policies, signing cooperation agreements, and establishing cooperation institutions. At the same time, it is also necessary to build a school-enterprise cooperation platform, providing opportunities for information exchange, resource sharing, and cooperation projects for both parties. Through the establishment of cooperation mechanisms and platforms, in-depth cooperation between schools and enterprises can be promoted, jointly driving the development of AI education.

4.2.2 Co-construction of training bases and joint laboratories

Training bases and joint laboratories are important carriers of school-enterprise cooperation. Through the co-construction of training bases and joint laboratories, practical opportunities and training environments can be provided for students, enhancing their practical and innovative abilities. Meanwhile, leveraging the technical and resource advantages of enterprises, scientific research projects can be carried out, and achievements can be transformed, promoting technological innovation and industrial upgrading. During the co-construction process, it is necessary to focus on the balance and sharing of interests between both parties to ensure the stability and sustainability of cooperation.

4.2.3 Promotion of in-depth integration of industry, academia, and research

In-depth integration of industry, academia, and research is one of the important goals of school-enterprise cooperation [11]. By promoting this integration, an organic combination of knowledge innovation and technology transfer can be achieved, facilitating the coordinated development of talent cultivation and industrial upgrading. In the process of promoting in-depth integration, attention should be paid to interdisciplinary intersections and integrations, strengthening interdisciplinary research and cooperation, and promoting the application and development of AI technology in various fields. Additionally, cooperation and exchanges with internationally renowned enterprises and research institutions should be enhanced to improve the internationalization level and competitiveness of AI education.

4.3 Implementation Path of Intelligent Teaching

4.3.1 Construction of the intelligent teaching platform

The intelligent teaching platform serves as the foundation for realizing intelligent teaching. By building such a platform, personalized learning path planning and recommendation services can be provided to students, enhancing learning efficiency and satisfaction [12]. Meanwhile, it can also offer teachers precise teaching feedback and data analysis support, assisting them in optimizing teaching methods and strategies. During the construction of the intelligent teaching platform, attention should be paid to its usability and security, ensuring that students can use the platform conveniently and that their personal information and data security are protected.

4.3.2 Development of intelligent teaching resources

Intelligent teaching resources are one of the important means to achieve intelligent teaching. Through the development of such resources, students can be provided with more abundant and diverse learning contents and interactive methods. This includes developing immersive learning resources and experimental environments using technologies such as virtual reality and augmented reality, and creating intelligent tutoring and Q&A systems with natural language processing and knowledge graph technologies. When developing intelligent teaching resources, emphasis should be placed on their practicality and innovation to ensure that they can meet students' learning needs and interest preferences.

4.3.3 Promotion of the intelligent teaching model

Promoting the intelligent teaching model is the key to realizing intelligent teaching. By promoting this model, the transformation and innovation of traditional teaching models can be advanced, improving teaching effectiveness and the learning experience. This involves using intelligent recommendation systems to provide students with personalized

course recommendations and learning path planning, and employing intelligent assessment systems to conduct accurate evaluations of students' learning outcomes. During the promotion of the intelligent teaching model, it is necessary to focus on the acceptance and adaptability of teachers and students. Training and guidance should be provided to help them become familiar with and master the usage methods and techniques of the intelligent teaching model.

5 CONCLUSION

With the rapid development and widespread application of artificial intelligence (AI) technology, constructing an AI curriculum system for multidisciplinary has become one of the important tasks in the current field of education. By establishing a complete curriculum system, exploring school-enterprise cooperation models, and realizing intelligent teaching through AI and big data technologies, it is possible to cultivate AI talents with interdisciplinary capabilities and innovative spirit, meeting the social demand for such professionals. However, during implementation, several challenges and issues remain, such as insufficient teaching staff, scarce teaching resources, and imperfect school-enterprise cooperation mechanisms. Therefore, joint efforts from the government, schools, enterprises, and all sectors of society are required. Strengthening cooperation and communication will drive the sustainable development of AI education. In the future, as technology continues to advance and application fields expand, AI education will embrace broader development prospects and opportunities.

COMPETING INTERESTS

The authors have no relevant financial or non-financial interests to disclose.

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