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Innovation and Practice of Teaching Reform Model of Big Data Specialty Driven by Integration of Production and Teaching

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Abstract: Based on the analysis of the current problems faced by application-oriented undergraduate teaching of big data, this paper puts forward a "four-integration, three-level, one-center" application-oriented talent training model of production-education integration. After several years of in-depth cooperation between university and enterprise and the integration of production and education, the quality of talent training, student employment rate and teachers' engineering practice ability of big data major in our school have been greatly improved, and the results of the teaching model have been well promoted and applied inside and outside the school.

Keywords: Integration of industry and education; Application-oriented talent training; Deep integration of schools and enterprises

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1. Introduction

In recent years, the state has exerted great importance on the integration of industry and education and has introduced a series of policies and measures to encourage and support in-depth cooperation between universities and enterprises. It has given strong support to the construction of application-oriented undergraduate courses and universities with industrial characteristics, focused on the needs of industries, strengthened practical teaching, and improved the training system for application-oriented talents [1].

The development momentum of big data and artificial intelligence in Guizhou is rapid, and big data and artificial intelligence have become an important force to promote the economic and social development of Guizhou. From the perspective of industry development drivers, the rapid development of big data and artificial intelligence in Guizhou is the main driving force for the growth of talent demand. The expansion of the industry scale has also put forward higher requirements for the number of talents to support the development of enterprises' businesses and the upgrading of technologies. However, the current supply of talent in the field of big data and artificial intelligence in Guizhou is not yet able to meet the industry demand.

The talent training system needs to be further improved, including the curriculum, teachers and practical teaching. According to the industry development and market demand forecast, there is a large talent gap in the field of big data and artificial intelligence in Guizhou.

2. Major pain points and reform problems in big data teaching

2.1. Lack of teaching staff and structural imbalance

There are problems such as a mismatch of professional backgrounds and lack of practical experience among the existing teachers, which makes it difficult to form a scientific and reasonable teaching team structure and affects the teaching quality and effect. Compared with public colleges and universities, private colleges and universities often face greater challenges in the introduction of teachers, resulting in a shortage of teachers and difficulty in meeting the growing teaching demand.

2.2. Limited teaching resources

The major of big data and artificial intelligence needs a large number of experimental equipment and practical training platforms to support practical teaching, but private colleges and universities are often difficult to equip with complete experimental equipment due to the limitations of funds and venues, which affects the cultivation of students' practical ability and innovation ability.

2.3. The curriculum of the major is unreasonable and the course content is seriously lagging behind

Some private colleges and universities have some unreasonable places in the curriculum of big data and artificial intelligence, such as paying too much attention to the teaching of theoretical knowledge and neglecting the training of practical skills, or the connection between courses are not close enough. There is a lag in the updating of curriculum content in private colleges. For example, new algorithms, tools or platforms have been widely used in the market, but the school curriculum still teaches more traditional or basic knowledge.

2.4. Limited practice opportunities and single practice projects

Due to the lack of experimental equipment, teaching resources and other reasons, private colleges and universities cannot provide enough practice opportunities and platforms in practice teaching, which affects the cultivation of students' practical ability and problem-solving abilities [2]. When arranging practical projects, they rely too much on traditional course design and simulation experiments, and lack opportunities to cooperate with real enterprises, resulting in a single type of practical project for students, which is difficult to cover application scenarios in the field of big data and artificial intelligence.

3. Innovation of teaching mode

3.1. Construction of teaching model

Guided by the needs of Guizhou's economic development and industrial technology innovation, this achievement aims to cultivate applied talents of big data and artificial intelligence and establishes the innovation and practice of application-oriented talent training mode integrating production and education with

"four integration, three levels and one center" [3].

(1) Four integration

Comprehensively improve the quality of talent training through curriculum integration, teaching integration, teacher integration and evaluation integration.

(2) Three-level curriculum system

To build the basic course level, professional course level and comprehensive practice level with the concept of "circular iteration and spiral progress", to realize the gradual improvement of students from basic knowledge to professional skills and then to comprehensive ability [4].

(3) One center

With the core goal of cultivating applied talents, it integrates all resources through the guarantee platform of an industrial college to deliver big data and artificial intelligence professionals to the society.

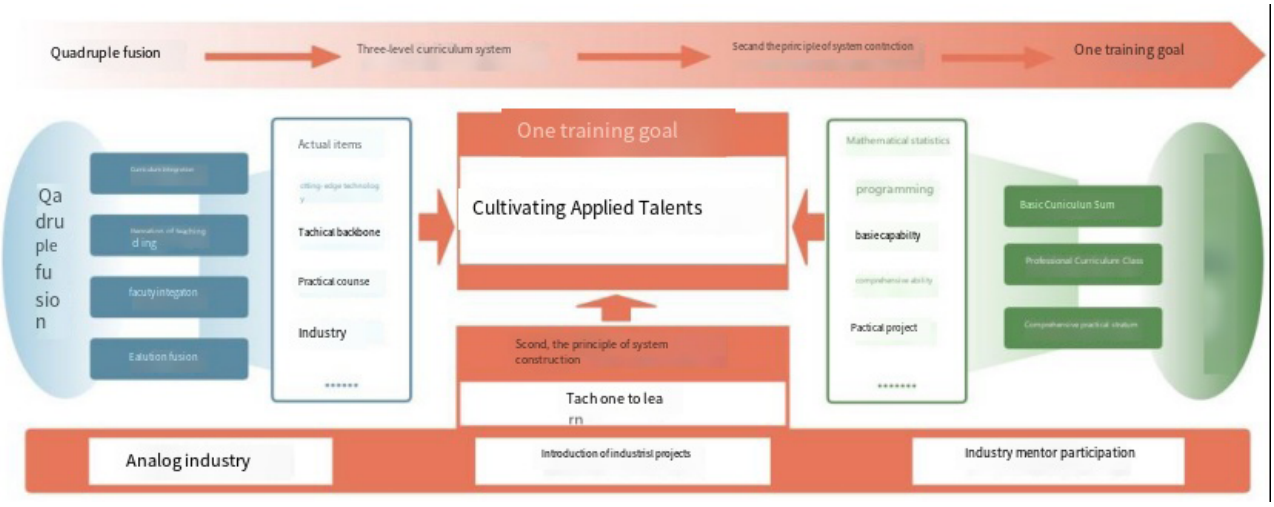

Figure 1. Applied talents training model.

3.2. Main teaching problems solved by the results

The update of course content for application-oriented undergraduate talent training is out of sync with technological development and change, resulting in the lagging of course content behind the development of industrial technology. The lack of continuous ability to provide real industrial scenarios and real project content leads to insufficient practical training of students, which cannot meet the needs of the industry for talent.

There are two problems of cooperation caused by the different starting points of school-enterprise cooperation, which cannot support the implementation of application-oriented and industry-oriented personnel training. The lack of practical experience of the school teachers, the lack of understanding of the industry development trend, technology application scenarios, etc., resulted in a disconnect between the teaching content and the industry demand.

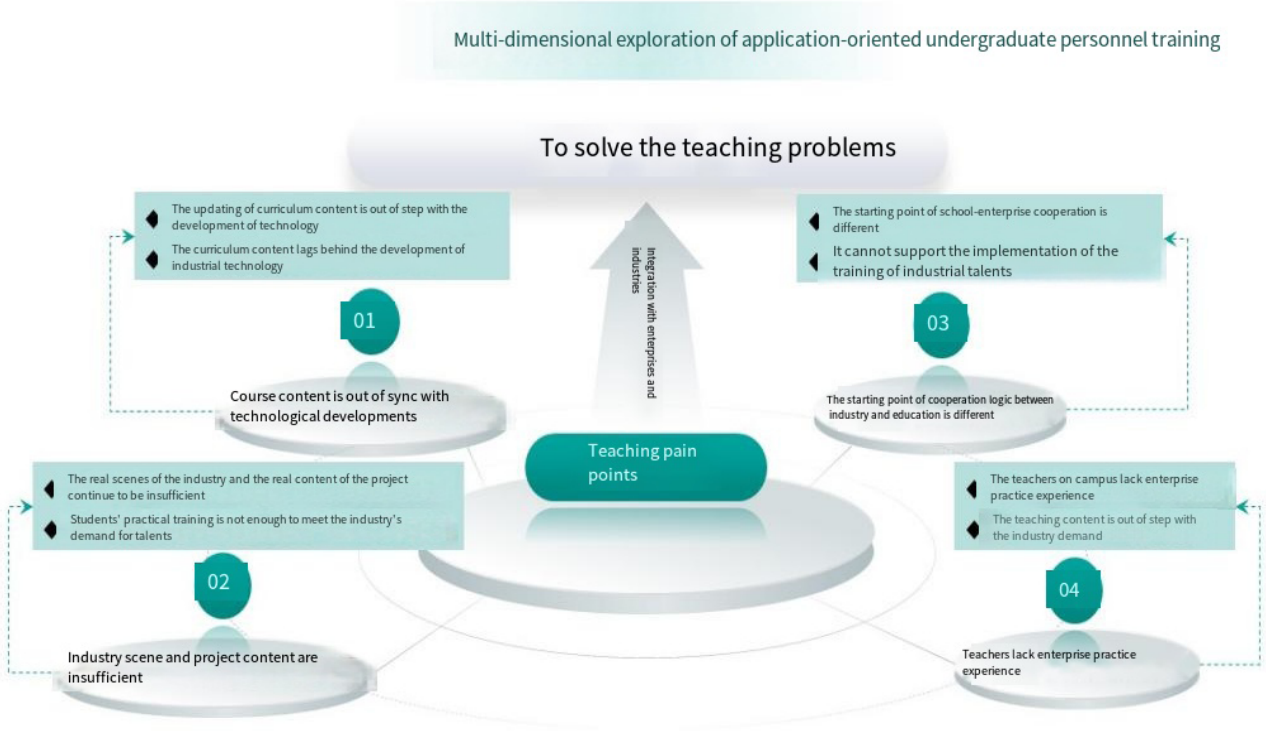

Figure 2. Multi-dimensional application of talent training mode.

4. Approach to problem solving

4.1. Comprehensively improve the quality of talent training with four integrations as the guidance

(1) Course integration

The actual project cases, cutting-edge technologies and industry standards of the enterprise are organically integrated into the course teaching content. Through cooperation with enterprises, practical teaching links such as internships and practical training are jointly designed to provide students with real project experience and practical opportunities [5]. The enterprises provide practice places and project resources, and school teachers cooperate with enterprise mentors to guide students in practice so that students can improve their professional skills and problem-solving ability in practice.

(2) Teaching integration

Diversified teaching methods, such as case teaching and project-driven teaching, are adopted to carry out teaching closely to the actual problems of enterprises [6]. Enterprise tutors actively participate in classroom teaching, share rich practical work experience and problem-solving ideas and methods, enrich teaching forms, and stimulate students' learning interest and participation. At the same time, the teaching resources of the school and the enterprise are integrated, including the laboratory, the training base, the production line of the enterprise, etc., to realize the sharing of resources and create a superior learning and practice environment for the students.

(3) Teacher integration

Invite enterprise technical backbone, management personnel, etc. as enterprise mentors into the classroom, to teach practical courses for students, and to carry out special lectures. They bring the

latest industry trends and practical work experience, broaden students' horizons and enhance students' professional quality. School teachers also regularly go to enterprises for temporary training, participate in the research and development of enterprise projects and other activities to enhance teachers' practical ability, and promote teachers to better combine theory with practice to improve the quality of teaching.

(4) Evaluation integration

Establish a diversified evaluation system, and combine school evaluation with enterprise evaluation. Schools evaluate students in terms of theoretical knowledge mastery and learning ability, while enterprises evaluate students in terms of practical ability, professional quality and teamwork. Through the integration of evaluation, students' comprehensive quality and ability level can be comprehensively and objectively reflected, and more targeted guidance can be provided for students' development [7].

4.2. Course content keeps pace with the era

Aiming at the problem that the update of course content is not synchronized with the development of technology in the training of application-oriented undergraduate talents, the actual project cases of enterprises, cutting-edge technologies, and industry standards are integrated into the course teaching content. Through cooperation with enterprises, practical teaching links are designed to ensure that courses closely follow the development of industrial technology, provide students with the latest knowledge and skills, and avoid lagging course content.

4.3. Strengthen the cultivation of practical ability

To solve the problem of insufficient practical training of students, the industrial environment is set up as the principle of the "teaching and learning" system [8]. On the one hand, big data and artificial intelligence laboratories, student workshops and enterprise studios are built to simulate real industrial environments, so that students can feel the enterprise atmosphere in advance. On the other hand, real industry projects are introduced so that students can participate in the whole process of the project, improve their professional skills and professionalism in practice, and meet the needs of the industry for talents [9].

4.4. Solve the problem of school-enterprise cooperation

In view of the "two skins" problem caused by the different starting points of school-enterprise cooperation, innovation should be carried out in various aspects. First of all, the four integrations as the guidance, to achieve curriculum integration, teaching integration, teacher integration and evaluation integration [10]. Curriculum integration provides students with real project experience and practical opportunities. Teaching integration adopts diversified teaching methods and integrates teaching resources. The integration of teachers invites enterprise tutors into the classroom and arranges for teachers to take temporary positions in enterprises. Evaluation integration combines the evaluation of schools and enterprises to fully reflect the comprehensive quality of students [11]. Secondly, build a "teaching-learning" system based on the industrial environment to achieve in-depth cooperation between schools and enterprises, and provide support for the implementation and implementation of industrial talent training.

4.5. Innovative curriculum system construction concept

Take "cycle iteration, spiral progress" as the three-level curriculum system construction concept [12]. The basic curriculum level lays a solid foundation of big data and artificial intelligence knowledge. Professional curriculum level keeps up with the pace of industry development through project-driven teaching to improve professional skills. The comprehensive practice level cultivates students' comprehensive practical ability and innovative thinking and participates in actual industrial projects under the guidance of teachers and enterprise mentors through practical projects combining work with study and graduation design to realize the circular iteration and spiral progression of theory and practice.

5. Application and effect of the results

Over the past five years, the cooperation has actively carried out the exploration, implementation, accumulation and practice of the results, as follows.

5.1. School-enterprise talent training program

Guided by market demand, a curriculum system covering basic knowledge, professional skills and practical application should be established. The curriculum should cover multiple subject areas such as mathematics, computer science and statistics to form a systematic knowledge system [13].

School teachers are responsible for teaching basic theoretical knowledge and academic literacy courses, while enterprise experts teach professional practice courses and application cases for students based on their own practical experience and industry development trends, and guide students to carry out practical training and graduation design of work-study combined projects and PBL projects. According to the cooperation mode, there are 12 practical courses for Big Data and Artificial Intelligence majors in school, which are taught by enterprise tutors. Students' professional quality, discipline competition ability and practical ability have been significantly improved and enhanced [14].

5.2. Training base jointly built by schools and enterprises

Guiyang College of Humanities and Technology, Jinshanyun and Huike actively integrate resources to build a model of industry-school-enterprise joint construction, focusing on professional practical skills training and empowering students. It consisted of three training platforms, Linglu Experiment digital platform, Candelu teaching and research digital platform, the Deer operation digital platform, six kinds of spatial big data and artificial intelligence training rooms, enterprise exhibition halls, intelligent meeting rooms, smart classrooms, and enterprise studios + student workshops. More than 50 companies were introduced to make the project land in the base [3].

5.3. Production-teaching-learning-combining project

The output of 100+ combined work and learning projects comes from 25 companies, including 30+ production-oriented projects, 70+ projects have been completed by enterprises, and 23 soft articles have been published. In the process, students are allowed to manage the whole process of project development, from the whole process of project demand, design, testing, online deployment, use and operation to carry out comprehensive planning, control and management. Project division is carried out in the implementation process and a project summary system is adopted in the process. Report from weekly report, monthly report

and summary report respectively, and formulate a perfect implementation project process schedule to ensure that the project can be delivered on time and with quality.

5.4. The achievements of teaching reform were recognized

A mixed online and offline teaching mode for Data Science and Big Data Technology majors has been established, which includes three parts: pre-class preview, classroom teaching and after-class expansion, fully reflecting the teaching concept of "student-centered and teacher-led". "Big Data Analysis and Visualization" won the provincial-level gold course project in 2022, leading the faculty to develop gold courses, and "Applied Statistics" was recognized as a provincial-level gold course in 2023.

5.5. Teachers' ability improvement

Through school-enterprise cooperation, teachers' professional quality and practical ability have been significantly improved. They are not only better able to impart theoretical knowledge but also guide students to carry out practical operations and solve practical problems [15]. The "double professional" training of school-enterprise cooperation has promoted the deep integration of schools and enterprises as well as the integration of industry and education. By jointly cultivating talents and carrying out teaching and research activities, schools and enterprises have realized the sharing of resources and complementary advantages, and promoted the common development of both sides. At present, the teachers of Daxin College have obtained more than 40 professional qualification certificates of big data and artificial intelligence and published 2 textbooks, which have enhanced the practical teaching ability of the teachers in the school.

5.6. Student employment

The number of graduates majoring in data science and big Data technology in the 2019 class of the first cooperation is 258, with an initial employment rate of 85.27% and a year-end employment rate of 91.09%. 82.22% of the graduates had a starting monthly salary of more than 3,500 yuan. Among them, the number of graduates with a monthly salary range between 3,500 yuan and 6,000 yuan is the largest, accounting for 62.22%. The monthly salary of 6000–8000 yuan accounted for 11.56%. More than 8,000 yuan accounted for 8.44%. The average salary is 4,867 yuan/month, and the highest is 13,000 yuan/month.

6. Summary

Driven by the integration of production and education, the applied talent training model of "four integration, three levels and one center" should be built. Through several years of teaching practice, the Big Data major has achieved good results, and the results have been extended to other application-oriented undergraduate colleges. Through co-operating with universities and enterprises, cooperative relations were established with relevant enterprises to provide students with internship and training opportunities, so that students can exercise and improve their ability in practical work. Encourage students to participate in industry-related project research and practice, and cultivate students' teamwork ability and innovation ability through project cooperation. An innovation and entrepreneurship incubation platform will be established to provide entrepreneurial guidance and financial support for students, and students will be encouraged to translate their knowledge and skills into actual products and services. It helps the integration of production and education to interact with industrial technological innovation, forming a teaching community of enterprise engineers,

college teachers and students, enabling students to obtain diversified learning and practical experience in accordance with engineering logic, and the construction of "double-qualified" teachers has taken root. In the next step, an industrial college will be established in the school to fully implement the innovation path and accelerate the transformation of teaching results.

Disclosure statement

The author declares no conflict of interest.

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