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Exploration of project-based teaching mode for business courses empowered by digital technology

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Abstract: *Universities are building a digital collaborative education platform, integrating school enterprise projects and human resources, and promoting interdisciplinary and project-based teaching models. Especially in the business courses of private universities, project-based teaching mode, with its unique advantages and the application of digital technology, provides students with richer practical opportunities and innovative ability cultivation, promoting the integration of industry and education to achieve high-quality development. This article aims to explore how digital technology can empower the project-based teaching mode of business courses in private universities, promote the deep integration and interaction of teachers, enterprises, and students in the project-based teaching of business courses in private universities, and provide reference for the reform of the teaching mode of business courses in private universities.*

Keywords: *Digitalization; Integration of industry and education; Practical teaching; Project based teaching*

1. Introduction

With the rapid development of new generation digital technologies represented by artificial intelligence and big data, business courses in private universities also need to keep up with the times, actively reform and innovate teaching models, pay more attention to cultivating students' digital technology application abilities, and cultivate excellent vocational and technical talents with self-learning and superb skills. This article will explore the teaching mode of business courses in private universities from several aspects, and take the innovation of project-based teaching mode in the "Data Structures and Algorithms" course of the Big Data Management and Application major empowered by digital technology as an example to explore: including innovative course design ideas, establishing project-based teaching mode based on digital technology and network platforms, and constructing teaching resources that match the new curriculum system. Practice oriented teaching and interdisciplinary integration should gradually shift from the traditional teacher led teaching mode to an inquiry based teaching mode where teachers, enterprises, and students participate in course teaching, with students as the main participants. Through methods such as project driven and case analysis, students' learning interest and creativity should be stimulated, their problem-solving ability and teamwork spirit should be cultivated, and a good foundation should be laid for cultivating outstanding talents who are versatile, innovative, and practical.

2. Problem posing

2.1. Empowered by digital technology

Empowering higher education with digital technology refers to the process of utilizing modern digital technologies and tools to enhance teaching, research, management, and service efficiency, improve educational quality, and enhance student experience.

Johnson et al. delved into the potential of artificial intelligence (AI) in project-based teaching of business. The introduction of this technology has greatly improved the quality and efficiency of teaching[1]. In addition, some well-known foreign universities have begun to practice project-based teaching models that empower business courses with digital technology. For example, Harvard Business School utilizes big data analysis technology to monitor students' performance in projects in real time and provide immediate feedback to help teachers adjust teaching strategies based on data. Stanford University, on the other hand, has utilized cloud computing platforms to achieve the sharing

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and collaboration of project-based teaching resources in business, further promoting communication and interaction between teachers and students. Catyanadika et al. conducted an in-depth study on the impact of psychological safety and social presence on knowledge sharing behavior in higher education online learning environments. They explored how these factors shape students' willingness to interact, thereby promoting or hindering knowledge exchange and sharing on online learning platforms[2].

Although the research on project-based teaching models for business courses empowered by digital technology started relatively late in China, significant progress has been made in recent years. Li Hua et al. argue that big data technology can provide valuable data support for teachers to more accurately understand students' learning needs and conditions, thereby achieving precise teaching[3]. Wang Gang et al.'s research focuses on the application prospects of mobile learning in project-based teaching of business[4]. In terms of practical exploration, many domestic universities have begun to integrate digital technology into project-based teaching of business courses. The School of Economics and Management at Tsinghua University has successfully achieved remote teaching and collaborative learning of business project-based teaching through advanced online teaching platforms, providing students with a broader learning space. Peking University has also actively introduced digital teaching resources, which not only enrich the content and form of project-based teaching in business, but also improve the quality of teaching and students' learning experience. These two practical cases fully demonstrate the potential and value of digital technology in the field of business education.

From the current research status, most of them focus on the operation mechanism, teaching diagnosis, teaching context construction, and exploring the teaching mode empowered by digital technology from the perspective of university disciplines. However, there is still insufficient research on how digital technology can promote the deep integration of teachers, enterprises, and students in project-based teaching of business courses in private universities. This article aims to explore in depth how digital technology can build closer connections among these three parties, promote deep interaction and collaboration among them, and optimize the effectiveness of project-based teaching in business courses at private universities.

2.2. Analysis of the Implementation Status of Data Structures and Algorithms Course Practice

The course of Data Structures and Algorithms is a core course in the major of Big Data and Applications, which requires high demands on students' algorithmic thinking and programming practical abilities. Students often find it difficult to find a starting point during the learning process, which not only leads to the accumulation of frustration but also affects the overall learning effectiveness. In depth analysis can be attributed to the following reasons:

2.2.1. High difficulty in interdisciplinary integration teaching

The Big Data Management and Application major integrates multiple fields such as data science, information technology, and business management. Interdisciplinary teaching requires the teaching team to strengthen communication and collaboration. To ensure the organic integration of knowledge and provide students with comprehensive education, teams need to overcome collaboration barriers, promote knowledge integration, and ensure teaching quality and effectiveness.

2.2.2. Lack of real case studies in the practical stage

On campus course practice projects are often virtualized, and students majoring in big data management and application may lack opportunities to participate in actual large-scale data processing projects. To enhance combat experience, teaching should deepen school enterprise cooperation, integrate real project cases into practical courses, and ensure that students can accumulate skills and experience in a real practical environment.

2.2.3. The practical mode is monotonous and lacking

In traditional teaching models, practical teaching is often limited to the classroom, adopting the form of "one person, one group" or "multiple people, one group" within the class, which greatly limits the diversity of learning experiences. The practical training content often follows an independent programming path from basics to completion, lacking opportunities for change and in-depth exploration. The training process is relatively closed, and there is a lack of effective interaction and cooperation among students from different majors, making it difficult to form sparks of knowledge sharing and thinking collision. Meanwhile, the scarcity of extracurricular resources makes it difficult for students to access reference materials other than textbooks, limiting their learning horizons and preventing them from fully expanding their knowledge boundaries. This situation not only limits the cultivation of students' innovative thinking, but also fails to effectively promote the comprehensive improvement of their key abilities such as self-directed learning and collaborative problem-solving.

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2.2.4. Inadequate evaluation and feedback mechanism

The current evaluation method may overly focus on the completion of a single programming assignment, neglecting the comprehensive consideration of students' key abilities such as algorithm design and efficiency optimization. In addition, the imperfect feedback mechanism is also a prominent problem, as feedback may not provide specific guidance and assistance to students due to untimely or overly general content. The limitations of this evaluation and feedback seriously restrict the accurate tracking of students' learning progress and the full exploration of their growth potential, making it difficult for students to effectively identify their own shortcomings and make targeted improvements, thereby limiting their overall ability improvement and development.

3. The Goal and Approach of Innovative Project based Teaching Mode in Business Major Courses

3.1. Goal

Based on the core concepts of "cultivating virtue and educating people through practice", adhering to the OBE concept, and actively responding to the needs of the new business talent cultivation era, the teaching mode of the "Data Structures and Algorithms" course in the Big Data Management [Application Major] is reformed according to the following goals and ideas. One is to turn the classroom into a "life classroom" and enable students to meet the demands of the industrial economy; Secondly, putting students at the center and strengthening practice and innovation; The third is the close integration of theory and practice; Fourth, promote interdisciplinary integration and broaden horizons; The fifth is to deepen the integration of industry and education, and achieve collaborative education.

3.2. Approach

A project-based teaching model based on digital technology and network platforms has been constructed, as shown in Figure 1.

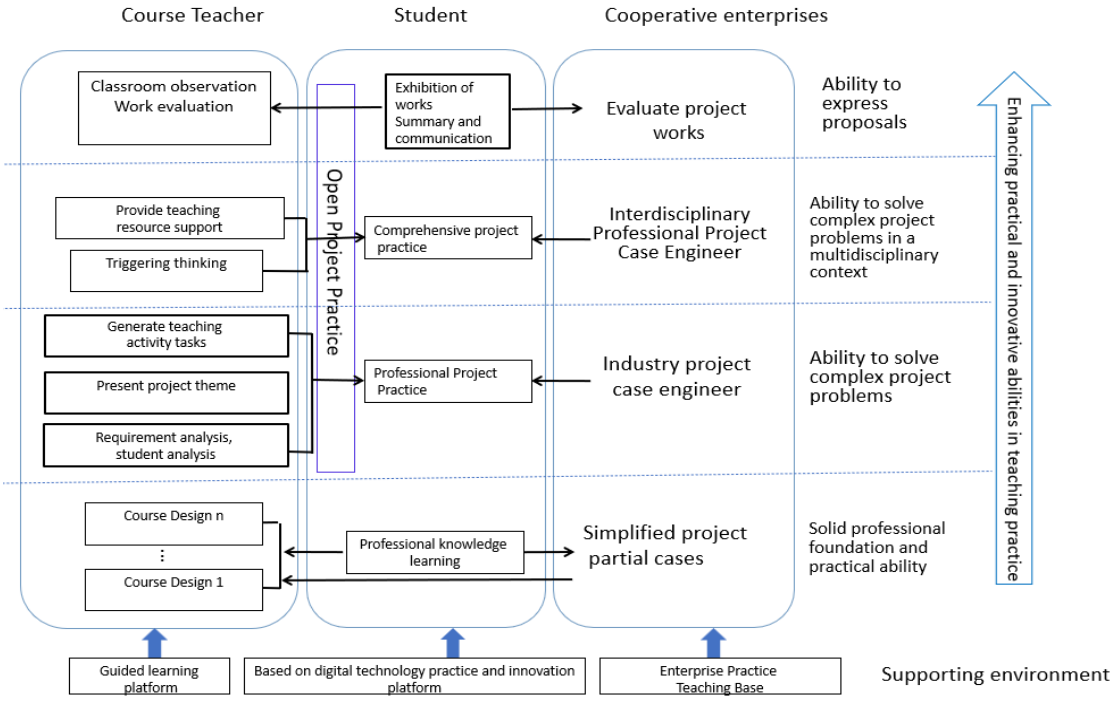

Figure 1: Project based teaching mode based on digital technology and network platform

3.2.1. Course Design

In the course design phase, the course teacher selects real project cases from the industry chain, closely follows the knowledge field of the course, and creates challenging innovative practice project partial cases. Under the guidance of professional course teachers on campus, students conduct in-depth analysis of cases, construct problem models, and design solutions. The course design integrates the

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talent cultivation plan and course objectives of big data management and application majors, strengthens the practical application of basic professional knowledge, and stimulates innovative consciousness.

3.2.2. Professional project practice

In the practical stage of "professional project practice", real project cases related to the professional courses in the industry chain are deeply integrated, emphasizing "gender equality": high-level, innovative, and challenging. The project practice is jointly guided by enterprise engineers and on campus teachers. Students are free to form teams, analyze cases in depth, construct problem models, solve complex business problems, explore using scientific methods, propose and evaluate innovative solutions, while considering ethics, law, culture, and sustainable development. This project practice not only hones students' ability and innovative spirit to solve complex business problems, but also strengthens teamwork and social responsibility, comprehensively enhancing professional competence.

3.2.3. Comprehensive project practice

In the "Comprehensive Project Practice" practical session, students participate in interdisciplinary enterprise projects, which are jointly guided by senior engineers from the enterprise and teachers on campus. Utilizing digital technology sharing platforms to simulate real business environments, students from different majors form teams to collaboratively apply multidisciplinary knowledge and solve complex business challenges in the digital field. The project emphasizes knowledge integration, innovative practices, team collaboration, and evaluates the social, health, safety, and cultural impacts of the proposed solutions. Intended to enhance students' comprehensive abilities, cultivate their innovative and practical abilities, teamwork spirit, and sense of social responsibility in the information age.

3.2.4. Exhibition and summary communication of works

Based on the effectiveness of project implementation and professional ethics and skills, a "product" self-evaluation model is constructed, which verifies the quality of talents through actual results and realizes a talent evaluation system with multi-party participation and multi-dimensional evaluation. School enterprise dual teachers work together to implement collaborative supervision and precise monitoring, gathering strength to ensure the quality of education. In this process, the evaluation data and results are fed back to the teaching resource library, driving the ecological mechanism of "data output - 'work' evaluation - data recycling", solving the problem of single evaluation information, accelerating the dual improvement of talent cultivation efficiency and quality, accurately matching talent portraits with job requirements, and achieving efficient matching.

The evaluation system relies on the online project implementation system to build a cooperation framework for data exchange, talent joint education, and project co construction. It promotes a multi-party mutual evaluation and examination system between schools and enterprises, breaks through the limitations of time and space, and quickly identifies and responds to challenges. Colleges and universities use this opportunity to introduce cutting-edge technologies from enterprises and strengthen the effectiveness of talent cultivation; Enterprises utilize the abundant human resources and educational advantages of universities to accelerate project progress and promote industrial upgrading. This mechanism deepens school enterprise cooperation, seeks common development, achieves a win-win situation, and promotes the deep integration of education and industry.

In summary, this practical teaching model demonstrates a gradual path of ability development, which not only enables students to transition from basic unit project practical skills to comprehensive large-scale project practical abilities, but also promotes their ability to tackle simple basic projects and solve complex business challenges. At the same time, this model also emphasizes the transformation from simple application of knowledge from a single professional course to deep integration and comprehensive application of interdisciplinary knowledge, ultimately promoting students to upgrade from practical operation ability to a higher level of innovative thinking and problem-solving ability. This reflects the educational law of progressive ability and comprehensive development.

4. The supporting conditions and guarantee mechanism of project-based teaching mode in courses

4.1. Supporting conditions

The successful implementation of the project-based teaching model in this practical course relies on three platforms: the enterprise practice teaching base jointly built by schools and enterprises, the integration of the industry chain, the utilization of enterprise resources, and the support of internships

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and project case teaching; Digital technology practice and innovation platform, integrating software, big data analysis and other development resources; And the guidance platform helps personalize teaching. The three platforms independently support course practice and can also integrate cross disciplinary comprehensive practice and open innovation, comprehensively improve teaching quality, assist internships, project-based teaching and personalized learning needs, and achieve deep integration of theory and practice.

4.2. Guarantee mechanism

Despite the establishment of practice bases by schools and enterprises, cooperation often remains superficial due to differences in social benefits and economic goals, lacking depth and sustainability. Building a collaborative education mechanism between schools and enterprises: 1. Absorbing enterprise experts for teaching guidance, jointly discussing talent development plans, ensuring that education closely meets industry needs, and achieving seamless integration. 2. Establish a part-time teacher system to motivate engineers to engage in education and enhance the vitality of teaching practice. 3. Collaborate to develop educational resources, integrate the advantages of schools and enterprises, design project-based teaching models, transform enterprise projects into teaching cases, and share achievements. 4. Promote "customized" talent cultivation to meet the needs of enterprises and accelerate the integration of graduates into the workplace. 5. Establish a youth teacher enterprise training program to enhance teachers' practical abilities, while teachers use scientific research to assist enterprises in solving technical problems, achieving a win-win situation. This model aims to deepen school enterprise cooperation, promote effective connection between the education chain, talent chain, and industry chain, and enhance the effectiveness of education.

5. Conclusion

The above-mentioned business courses implement project-based teaching, integrating practical orientation, interdisciplinary cooperation, and the participation of teachers, enterprises, and students to stimulate students' interest and creativity, strengthen their comprehensive abilities and innovative spirit, and enhance their ability to solve complex business problems. By closely collaborating with industry chain enterprises, we aim to enhance the social adaptability of talent cultivation. The collaborative education mechanism between professional groups and enterprises in private universities urgently needs to be further reformed and optimized. We will continue to optimize the teaching mode of business major courses in the following aspects, including: (1) refining the teaching project library based on graduation standards and future needs; (2)Comprehensively digitize the learning trajectory of courses to improve management efficiency; (3)Thoroughly analyze the elements of innovation capability, optimize the evaluation system, promote continuous progress in teaching, and cultivate more composite business talents that meet social expectations.

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