Research on the Reform of Computer Software Teaching in Higher Vocational Education under the Background of Big Data

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Abstract: ***With the rapid development of big data technology, the demand for computer software talents in society is increasing day by day, and higher requirements are also put forward for their professional abilities and comprehensive qualities. As an important way to cultivate applied technical talents, vocational computer software teaching faces new challenges and opportunities. In the context of big data, how to carry out teaching reform, improve teaching quality, and cultivate high-quality computer software talents that meet market demand has become an urgent problem to be solved in higher vocational education. This article aims to explore the reform direction and strategies of computer software teaching in higher vocational education under the background of big data, and provide useful references for promoting the development of computer software teaching in higher vocational education.***

Keywords: Big data background; Teaching computer software in vocational colleges; Reform in education; Practical ability.

1. INTRODUCTION

In today's information age, the application of big data technology is becoming increasingly widespread and has had a profound impact on various fields. As an important support for big data technology, the cultivation of professional talents in computer software is crucial. The teaching of computer software in vocational colleges bears the mission of delivering practical technical talents to society. In the context of big data, traditional teaching models are no longer able to meet the market's demand for talents. Therefore, exploring how to carry out teaching reform to improve students' comprehensive quality and practical ability has become an urgent task. This article will focus on the reform of computer software teaching in vocational colleges under the background of big data, hoping to provide some useful ideas and suggestions for the development of this field.

2. THE DEMAND FOR COMPUTER SOFTWARE TALENTS IN VOCATIONAL COLLEGES UNDER THE BACKGROUND OF BIG DATA

2.1 Development Trends of Big Data Technology

Big data technology is developing at an unprecedented speed and has become an important force driving changes in various industries. In today's explosive growth of data volume, big data technology can not only help enterprises extract valuable information from massive amounts of data, but also provide scientific basis for enterprise decision-making through data analysis and prediction. With the continuous advancement of technology, the processing speed, accuracy, and application scope of big data are constantly improving. For example, the emergence of distributed computing frameworks and big data processing platforms has made real-time processing and large-scale analysis of data possible. The integration and application of artificial intelligence technologies such as machine learning and deep learning make big data processing more intelligent and automated. In the future, big data technology will continue to penetrate into a wider range of fields, such as the Internet of Things, smart cities, healthcare, etc., bringing revolutionary changes to these areas. Therefore, for vocational computer software talents, mastering big data technology and becoming professional talents with big data processing and analysis capabilities will have broad employment prospects and development space. Song (2025) demonstrated how intelligent demand forecasting and inventory visualization significantly enhance user experience [1], while in a subsequent study, the same author highlighted how AI-integrated internal tools can improve operational efficiency [5]. Urban systems have similarly benefited from AI applications, as shown by Wang (2025)'s work on Bayesian optimization for adaptive reconfiguration of urban delivery networks [2], complemented by Li et al. (2025)'s research on named entity recognition for smart city data streams, which enables more effective visualization and interaction [3]. Financial markets have also embraced machine learning, with Yang (2025) successfully applying LightGBM to analyze the Chinese stock market [4]. In computational infrastructure, Wu (2024) investigated cloud

solutions for large-scale parallel computing in genetic disease research [6], while Chen (2025) explored scalable cloud architectures for autonomous driving data lakes and real-time decision making [7]. Legal aspects of technology adoption were examined by Wang (2024), who analyzed the balance between prior rights and enterprise naming rights [8]. Advanced machine learning techniques have enabled breakthroughs in diverse technical fields. Lin et al. (2025) developed transfer learning-enhanced models for analyzing annular aperture arrays and nanohole arrays [9], while Gong et al. (2024) proposed an ensemble machine learning approach to optimize enterprise risk decision support systems [10].

2.2 Requirements of related industries for talent knowledge structure

In the context of big data, related industries have put forward higher requirements for the knowledge structure of vocational computer software talents. On the one hand, talents need to have a solid foundation in computer knowledge, including data structures, algorithm design, operating systems, database principles, etc. These knowledge are the foundation for understanding and applying big data technology. On the other hand, talents also need to master professional knowledge related to big data technology, such as big data processing frameworks (such as Hadoop, Spark), big data analysis tools (such as Python, R language), data mining techniques, etc. With the integration of big data, cloud computing, artificial intelligence and other technologies, talents also need to understand cutting-edge technologies such as cloud computing platforms and machine learning algorithms. In addition to professional knowledge, talents also need to have interdisciplinary knowledge backgrounds, such as statistics, mathematics, management, etc., to better understand and apply big data.

2.3 Demand for practical and innovative abilities of talents

In the context of big data, related industries have put forward higher requirements for the practical and innovative abilities of vocational computer software talents. Practical ability refers to the ability of talents to apply their learned knowledge to solve practical problems. In the field of big data, talents need to possess practical abilities such as data processing, data analysis, and data mining, and be able to independently complete the development and implementation of big data projects. In order to enhance practical abilities, talents need to actively participate in project practice, internship and training activities, and accumulate experience through practical operations. Innovation ability refers to the ability of talents to propose new ideas and methods when solving problems. In the field of big data, talents need to possess innovative abilities such as data modeling and algorithm optimization, and be able to propose effective solutions to specific problems. In order to cultivate innovation ability, talents need to focus on self-learning, teamwork, and academic exchange, constantly expanding their horizons and thinking.

3. CURRENT SITUATION OF COMPUTER SOFTWARE TEACHING IN HIGHER VOCATIONAL EDUCATION

3.1 The gap between teaching content and actual needs

With the rapid development of big data technology, there is an increasing demand in the market for talents with the ability to process, analyze, and apply big data. However, the current teaching content of computer software majors in vocational colleges often focuses on traditional computer fundamentals such as programming languages, data structures, algorithm design, etc., and the coverage of big data technology is not comprehensive and in-depth enough. This makes it difficult for students to quickly adapt to the job requirements in the field of big data after graduation, requiring a lot of supplementary learning in practical work.

The disconnect between teaching content and cutting-edge technology in the industry is also a problem. Big data technology is advancing rapidly, with new processing frameworks, analysis tools, and algorithms constantly emerging. However, the updating speed of the teaching syllabus and textbooks for computer software majors in vocational colleges is relatively slow, making it difficult to keep up with the pace of technological development. This often results in students being exposed to outdated knowledge during the learning process, making it difficult to meet the industry's demand for the latest technology. In order to narrow this gap, vocational computer software majors need to closely monitor industry development trends, adjust teaching content in a timely manner, add courses related to big data technology, and ensure that students can master the most cutting-edge technical knowledge.

3.2 The singularity of teaching methods

The teaching methods for computer software majors in vocational colleges are generally relatively single, mainly relying on teacher lectures, lacking diverse teaching methods and interactive elements. This traditional teaching method often leads to students passively receiving knowledge and lacking the ability to think actively and solve problems. In the context of big data, students need to have stronger self-learning abilities and innovative thinking, and a single teaching method is difficult to cultivate these abilities in students.

In addition, the singularity of teaching methods is also reflected in the lack of practice oriented teaching. The learning of big data technology requires a lot of practical operation and case analysis, but current teaching often has too much theoretical explanation and insufficient practical operation. This makes it difficult for students to apply their knowledge to practical situations after theoretical learning, which affects their learning effectiveness and employment competitiveness. In order to change this situation, vocational computer software majors need to explore diversified teaching methods, such as project-based teaching, case teaching, flipped classroom, etc., to stimulate students' learning interest and initiative, and cultivate their self-learning and practical abilities.

3.3 Shortcomings in the practical teaching process

Practical teaching is an indispensable part of the teaching of computer software majors in vocational colleges, but there are obvious shortcomings in current teaching. On the one hand, the practical teaching content is disconnected from industry demands. Many practical teaching projects are too theoretical and lack close connection with actual work scenarios, making it difficult for students to gain real work experience in practice. On the other hand, practical teaching resources are limited. Due to limitations in funding, equipment, and other aspects, many vocational colleges are unable to provide students with sufficient practical opportunities and high-quality practical environments. This often limits students to simple operational tasks during the practical process, making it difficult for them to gain a deep understanding and mastery of the core principles and application methods of big data technology.

In order to improve the shortcomings of practical teaching, the computer software major in vocational colleges needs to strengthen cooperation with enterprises, jointly develop practical teaching projects, and ensure that the practical content is consistent with industry needs. The college still needs to increase investment, improve practical teaching conditions, and provide students with more high-quality practical opportunities and resources. By strengthening practical teaching, the computer software major in vocational colleges can better cultivate students' practical and innovative abilities, and enhance their employment competitiveness.

4. MEASURES FOR THE REFORM OF COMPUTER SOFTWARE TEACHING IN HIGHER VOCATIONAL EDUCATION UNDER THE BACKGROUND OF BIG DATA

4.1 Optimize teaching content and integrate knowledge related to big data

In the context of big data, the teaching content of computer software majors in vocational colleges urgently needs to be optimized to better adapt to industry demands and technological developments. Big data related knowledge should be integrated into the existing curriculum system to form a complete knowledge system. For example, adding content related to big data processing in courses such as data structures and algorithm design allows students to understand the basic principles and methods of big data processing while learning traditional computer knowledge. Offering specialized courses on big data technology, such as big data storage and management, big data analysis techniques, big data visualization, etc., to help students systematically master big data technology.

In addition, the teaching content should keep up with the forefront of technology, constantly update and expand. With the rapid development of big data technology, new processing frameworks, algorithms, and tools continue to emerge. Therefore, the teaching content of computer software major in vocational colleges needs to be regularly updated to ensure that students learn the latest technical knowledge. This can be achieved by inviting industry experts to give lectures, organizing technical exchange meetings, etc., so that students can timely understand industry trends and technological developments. Encourage teachers to participate in scientific research projects, transform the latest research results into teaching content, and enhance the timeliness and practicality of teaching.

4.2 Innovative teaching methods to enhance teaching effectiveness

Innovation in teaching methods is the key to improving teaching effectiveness. In the context of big data, vocational computer software majors should explore diverse teaching methods to meet the learning needs and characteristics of students. Project based teaching method can be adopted to simulate real big data projects, allowing students to learn and apply big data technology in practice. This method can stimulate students' interest and motivation in learning, and cultivate their ability to solve practical problems. Project based teaching method can also strengthen the cultivation of teamwork and communication skills, laying a foundation for students' future career development.

Modern teaching methods such as flipped classroom can be introduced, allowing students to independently learn theoretical knowledge through videos, reading materials, and other means before class. In class, group discussions, practical operations, and other activities can be conducted to deepen their understanding and application of knowledge. This method can improve students' self-learning ability and participation, while reducing teachers' teaching burden and enhancing teaching effectiveness. Digital teaching resources such as online learning platforms and virtual laboratories can also be utilized to provide students with more flexible and convenient learning methods.

4.3 Strengthen practical teaching and cultivate students' practical operation ability

Practical teaching is an indispensable part of the teaching of computer software majors in higher vocational education. In the context of big data, strengthening practical teaching is crucial for cultivating students' practical operational abilities. A comprehensive practical teaching system should be established, including experimental courses, internships, and graduation projects. In the experimental course, experimental projects related to big data processing and analysis are set up to enable students to master the operation methods and application skills of big data technology in practice. Encourage students to participate in internship and training projects, apply their learned knowledge to practical work, and accumulate practical experience.

We should strengthen cooperation with enterprises and jointly carry out practical teaching activities. By collaborating with enterprises to establish training bases and jointly carrying out scientific research projects, we provide students with more practical opportunities and resources. Invite enterprise experts to participate in practical teaching activities, provide professional guidance and advice to students, and help them better adapt to industry needs and work environments. By strengthening practical teaching, the computer software major in vocational colleges can cultivate students' practical operation ability and innovative spirit, and improve their employment competitiveness.

5. GUARANTEE MECHANISM FOR THE REFORM OF COMPUTER SOFTWARE TEACHING IN HIGHER VOCATIONAL EDUCATION

5.1 Strengthen the construction of the teaching staff and improve the professional level of teachers

In the context of big data, the reform of computer software teaching in vocational colleges cannot be separated from a high-quality and specialized teaching staff. In order to enhance the professional level of teachers, a series of measures need to be taken. Strengthen the continuing education and training of teachers. Regularly organize teachers to participate in seminars, training courses, and academic exchange activities related to big data technology, so that they can continuously update their knowledge structure, master the latest technological trends, and teaching methods. Encourage teachers to participate in scientific research projects and enhance their professional competence and innovation ability through practical research. Industry experts and scholars can also be invited to give lectures or serve as guest professors at the school, to exchange and cooperate with the teachers and jointly improve the teaching level.

Optimize the structure of the teaching staff and introduce teachers with big data background and rich practical experience. Through the talent introduction plan, attract teachers with high-level big data technology capabilities and teaching experience to join, injecting new vitality into the teaching team. Establish a reasonable teacher incentive mechanism, encourage teachers to actively participate in teaching reform and scientific research activities, and improve teaching quality and effectiveness. We can also strengthen inter school cooperation, share high-quality teacher resources with other universities, and jointly promote the development of computer software teaching in vocational colleges.

5.2 Improve teaching facilities and provide a good teaching environment

Teaching facilities are an important foundation for ensuring the smooth progress of computer software teaching reform in higher vocational education. In order to provide a good teaching environment, it is necessary to continuously improve teaching facilities. Strengthen laboratory construction and equip with advanced big data processing and analysis equipment. According to teaching needs, purchase high-performance computers, big data processing platforms, data analysis software, etc., to provide students with sufficient practical opportunities and resources. Establish digital teaching platforms such as cloud laboratories and virtual simulation laboratories, breaking the limitations of time and space, allowing students to practice and learn anytime, anywhere.

Improve the facilities and conditions of learning places such as classrooms and libraries. Equipped with modern teaching equipment and multimedia teaching resources, such as intelligent blackboards, projectors, sound systems, etc., to enhance the interactivity and fun of classroom teaching. Enrich the library's collection resources, increase books, journals, and electronic resources related to big data technology, and provide students with a good learning environment and resource guarantee. We can also strengthen the construction of campus networks, provide high-speed and stable network services, and facilitate students' online learning and communication.

5.3 Establish a scientific teaching evaluation system to promote the improvement of teaching quality

A scientific teaching evaluation system is an important means to ensure the effectiveness of computer software teaching reform in higher vocational education. In order to promote the improvement of teaching quality, it is necessary to establish a comprehensive, objective, and fair teaching evaluation system. Improve the course assessment and evaluation mechanism. Based on teaching objectives and course content, develop scientific and reasonable assessment standards and evaluation methods, focusing on the comprehensive assessment of students' knowledge mastery, practical ability, and innovation ability. Establish diversified evaluation methods, such as homework, lab reports, project presentations, classroom performance, etc., to comprehensively reflect students' learning situation.

Strengthen the monitoring and feedback mechanism of teaching quality. Establish a regular teaching inspection and evaluation system to monitor and evaluate teachers' teaching process, students' learning outcomes, and teaching quality in real time. Collect problems and feedback during the teaching process through student evaluation, peer evaluation, expert evaluation, etc., and adjust teaching strategies and methods in a timely manner. Establish a mechanism for improving teaching quality, develop targeted improvement measures and plans for the problems and deficiencies identified in the evaluation results, and continuously improve teaching quality and effectiveness. Through a scientific teaching evaluation system, vocational computer software teaching can be continuously optimized and improved to better adapt to industry demands and technological developments in the context of big data.

6. CONCLUSION

In the era of big data, the reform of computer software teaching in vocational colleges is an inevitable choice to meet the needs of social development and improve the quality of talent cultivation. Through the analysis of the demand for computer software talents in higher vocational education under the background of big data, and the exploration of the current teaching situation, this article proposes a series of teaching reform measures and guarantee mechanisms. Optimizing teaching content, innovating teaching methods, and strengthening practical teaching can enhance students' professional competence and practical abilities; Strengthening the construction of teaching staff, improving teaching facilities, and establishing a scientific teaching evaluation system can provide strong support for teaching reform.

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