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Research on the Construction of Practice Teaching System of Data Science and Big Data Technology

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Abstract

The major of data science and big data technology is a new interdisciplinary major that is still in the early stages of development, and the experience for reference in the talent training system is still very scarce. By analyzing the characteristics and ability requirements of data science and big data technology majors, this paper studies the construction strategies of data science and big data technology practice teaching systems and provides some valuable references for the cultivation of practical ability in data science and big data technology majors.

Keywords

Data Science and Big Data Technology; Practical Teaching; Construction Strategy; Talent Cultivation.

1. Introduction

In 2015, the Public Office of The State Council of China issued the Notice on the Issuance of the Action Program to Promote the Development of Big Data, which pointed out that big data has become a new driving force to promote economic transformation and development, a new opportunity to reshape the country's competitive advantage, and a new way to improve the governance capacity of the government. Colleges and universities are encouraged to set up data science and data engineering-related majors, focusing on training big data professionals such as specialized data engineers. In 2016, the Ministry of Education of China officially approved the establishment of the major of data science and big data technology, which started the prelude of the construction of the major of data science and big data. Comprehensively promoting the application of data science and big data technology development and accelerating the construction of a modern data power has become an important part of the national strategy. From the perspective of domestic and foreign market demand and development situation, the major of data science and big data technology has become one of the most popular emerging majors.

The practical ability cultivation system of data undergraduate majors is the key link to whether the cultivation of data talents meets the needs of actual employing enterprises and units, but at present there is a lack of successful cases that can be learnt from. The construction of the practical teaching system requires a variety of professional knowledge and practical experience, and at the same time follows the corresponding teaching rules. First, ability cultivation needs a formation process, which consists of a series of hierarchical teaching activities. This series of teaching activities cannot be independent of each other, must form a system between each other, from the content, form, level should have a certain degree of completeness, consistency and continuity. Secondly, the course teaching and practice teaching of data science and big Data technology should form a complete system of mutual integration. To explore how to implement

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professional ability training into practical teaching system is an important aspect to improve the training level of Data science and Big Data Technology major.

2. Data Science and Big Data Technology Professional Ability Demand Analysis

With the opening of big data majors in most domestic colleges and universities, the training system for talent capacity in big data majors has gradually formed, and the development of data science and big data technology majors must be oriented to the big data industry, dock with the different industries of big data application. In the process of big data application, big data analysis will be the main area of talent demand, because data analysis forms an important way to reflect the value of data, so the majority of traditional industries will first focus on the field of big data analysis. Talent demand in the field of big data analysis will also lead to talent demand in the fields of big data operation and big data development.

Of course, the development of big data will also lead to the development of the Internet of Things. Early big data education mainly focuses on training big data technology, including the construction of big data platforms, big data development, algorithm design, results presentation, etc. In the future, as the combination of big data and traditional industries continues to deepen, big data education will further combine specific industry characteristics. Big data talents with industry background knowledge will be welcomed by enterprises, because industry knowledge will be an important part of the application of big data on the ground. Big data and IoT and other technologies will also be further integrated. With the landing of the 5G communication standard, the future of the Internet of Things, mobile Internet, big data, and traditional industries will be deeply integrated, and these technologies will serve the traditional industry together as an important part of the industrial Internet, so for practitioners in the big data industry, they should enrich their own knowledge structure and understand the Internet of Things and other related technologies.

Based on the above analysis, data science and big data technology professionals need to have three directions of theoretical ability, practical ability and applied ability in this field, in which the theoretical ability demand requires students to be able to master the understanding and application of various models and algorithms in data science, and in the professional teaching, the teacher needs to complete the introduction of theoretical content in accordance with the requirements of the curriculum standards in the teaching plan, so that the students are able to master the advanced technology and theory of big data, and master the theoretical and technical basis of big data platform. In terms of practical ability and application ability requirements, students can deal with actual data in relevant work scenarios, achieve data acquisition, data storage, data management, data analysis and mining, and data visualization, and complete solutions for different industry applications, and enable students to master tools and platforms related to big data analysis. In the training of big data professionals, the cultivation of practical skills and application processing ability should be highlighted, focusing on cultivating students' ability to handle actual data and the ability to solve practical problems of different industry applications in real work.

3. The Construction Strategy of the Practical Teaching System of the Data Science and Big Data Technology

Data science and big data technology majors emphasize the cultivation of multidisciplinary, cross-competitive talents. Through previous analysis, it can be seen that this major requires strong logical thinking ability and the ability to master comprehensive practical skills in computer data processing. As part of the goal of training talents in institutions of higher

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education, students in this major should possess the ability to complete actual work, as the demand for skills is an important aspect throughout the teaching process. Big data application technology itself relies on computer technology to carry out comprehensive operations and analysis of data. In analyzing the demand for professional competence, practical ability serves as a crucial link between theoretical competence and applied competence. Therefore, the core focus of cultivating talent in the field of big data should be on developing students' practical and application abilities based on real projects and enterprise cases, while also ensuring a solid grasp of fundamental theoretical knowledge. To achieve this, the practical teaching system of this major can be constructed from the following perspectives, considering the characteristics and demand for skills in data science and big data technology.

3.1. Improve the Curriculum System and Strengthen the Construction of Practical Courses

Through school-enterprise cooperation, we jointly promote the updating of curriculum content, improve the curriculum system and strengthen the construction of practical courses. Continuously strengthen the theoretical lectures and project practice teaching to achieve a seamless connection between theory and practice, and effectively improve students' theoretical cultivation and engineering practice ability. Through in-depth cooperation between schools and enterprises and schools and factories, integration of industry and education, we jointly formulate the curriculum system and course content, establish a distinctive, dynamically adjusted and reasonably structured curriculum system, so that the content of the curriculum follows the needs of the society, highlights the relevance and practicability, and establishes a professional curriculum system that consists of a theoretical teaching system that focuses on the transmission of knowledge and a practical teaching system that focuses on technology and skills training.

3.2. Enhance the Construction of Dual-teacher Teaching Staff Team

The implementation of the practical teaching system requires the support of a high-quality faculty, and schools should pay attention to the construction of dual-teacher faculty. Firstly, the teachers of big data majors are regularly sent to participate in various big data teaching seminars and practical skills training so that the practice teaching teachers can join the front line of enterprises to participate in the production and management work, learn the design and application of engineering projects, and improve the theoretical level of big data full-time teachers and the practical ability of big data projects after going to the enterprises for training in phases and batches. Secondly, we actively introduce relevant senior talents to society-enterprise engineers, technicians, and other personnel with rich project development experience-as external teachers of the college's practical teaching to instruct students so that they can become an important practical teaching faculty. Thirdly, teachers who can't go to cooperative enterprises for long-term training can rely on the "integration of industry and education" scientific research project to enter enterprises, gradually understand the situation of enterprises in the process of scientific research, master the production and management processes of enterprises, and gradually become qualified teachers for practical teaching.

3.3. Innovative Practical Teaching Methods, Focusing on the Practical Teaching of Industry Projects

Teachers appropriately use diverse practical teaching methods, such as case teaching, experimental teaching, and project teaching, in the process of practical teaching. In case teaching and experimental teaching, teachers should explain the specific background of cases and experiments in detail so that students can understand the application conditions and relevant background of the corresponding big data analysis methods. At the same time, relying on platforms such as on-campus professional laboratories and on-campus and off-campus

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practice teaching bases, a teaching mode combining theoretical teaching and extracurricular practice is established to guide students to discover, analyze, and solve problems, with a focus on training students to analyze and deal with existing data, the selection and use of methods, and the operation of software. Through implementation, it helps to cultivate students' big data technology thinking and subjective initiative and improve the quality of talent training.

The project teaching method is a teaching activity carried out by teachers and students through the joint implementation of a complete and specific project, which is manifested as the main line of the project, the teacher as the guide, and the students as the main body, and is characterized by practicality, comprehensiveness, and openness. Students, under the guidance of teachers, design and complete the work of data collection and integration, storage and computing, analysis and mining, etc. All the links are completed by the students themselves independently or collaboratively, and in the whole process of practice, the students' ability to develop hands-on skills, analytical skills, communication skills, and teamwork will be improved.

3.4. Strengthen the Construction of On-campus and Off-campus Practice Bases

The construction of practice bases is an important guarantee for the cultivation of applied talents. In order to achieve the goal of cultivating new applied talents, it is necessary to support the corresponding practical training and internship bases to provide students with infrastructure and places for technical application, repeated practice and on-site internship. Practice bases mainly include experimental training rooms, on-campus training bases and off-campus internship training bases. Firstly, we strive for various kinds of funds at all levels to build big data laboratories to meet the needs of professional experiments, to ensure that the experiments of professional courses are completed in quality and quantity, and to grasp the foundation of practical teaching. Secondly, through the integration of on-campus resources and the coordination of faculty relations, establish school-led on-campus practical training teaching bases, and point to the actual needs of social enterprises to carry out complete job experience and skills training for students. Thirdly, we should grasp the construction of off-campus practice bases, make full use of social resources for practice teaching, focus on finding the enterprises related to big data in the industrial clusters to carry out in-depth cooperation, and solve the problem of students' practice teaching platform, at the same time, the off-campus practice bases have their own reserve of engineering project resources and equipment resources that are suitable for professional practice teaching, which can provide students with a comprehensive and real practice teaching platform. The off-campus practice base can provide students with a comprehensive and real practical teaching platform.

3.5. Deepen University-enterprise Cooperation, Integration of Industry and Education, and Building a Multi-level Practical Teaching Platform

The use of enterprise resources and the establishment of experimental training bases for the integration of industry and education is an important initiative for institutions of higher education to improve the level of practical teaching. According to the principle of school-enterprise co-construction, co-management and sharing, schools should adopt the research and development mode of industry-teaching fusion, the co-construction mode of industry-teaching fusion, the project traction mode, and the talent training and exchange mode, etc., to establish on-campus and off-campus training and experimental platforms, and to form the experimental training base construction pattern with diversified main bodies and diversified forms of co-operation, so as to satisfy the needs of students' experimental and practical training.

The off-campus practical training platform can timely transform the new technology, new equipment and new specifications of the industry and enterprises into the content and requirements of practical teaching, cultivate students' vocational ability through the real working environment and business process, realize the pattern of ‘double main body’

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education of school and enterprises, and ultimately realize the sharing of resources between the school and enterprises, complement each other's strengths, mutual development, cooperation and win-win cooperation. In the process of school-enterprise cooperation and integration of production and education, enterprises with the conditions for integration of production and education are encouraged and supported to jointly develop 'certificate-type' practical courses with schools, so as to promote students' application ability, knowledge and literacy to reach the corresponding level and sustainable development.

3.6. Enhance Students' Innovative and Entrepreneurial Abilities Through the Platform of Discipline Competitions

Discipline competition is an important platform to improve students' learning practice and innovation ability. At present, subject competitions for big data majors mainly include various competitions such as Mathematical Modelling Competition, National Student Data Mining Challenge, Internet+ Innovation and Entrepreneurship Competition, Alibaba Big Data Competition and so on. Through the development of discipline competitions, it can improve students' practical hands-on and strengthen the ability of solidarity and collaboration. Mathematical modelling ability is a way to transform mathematical knowledge into practical application, and strengthening mathematical modelling ability is of great significance to cultivate students' practical and innovative ability.

Through mathematical modelling, students come out from the passive process of learning mathematics, and shift from the ready-made conclusions and theories in books, which they passively accept, to the rich and vivid thinking activities and application process in which they are personally involved in, which is a process of innovative practice. Mathematical modelling competition is also a good platform for big data students to improve their practice. Data Mining Competition is an important disciplinary competition that combines applied big data knowledge with practical problems and tests students' use of big data technology to solve practical problems. Through these disciplinary competitions, students not only exercise their hands-on ability and analytical ability, but also cultivate their communication ability and teamwork and other abilities.

Improving the practical ability and innovation ability of students majoring in data science and big data technology is not only the requirement of economic and social development on the quality of talents, but also a realistic need for students' self-development and enhancing the competitiveness of employment. This paper provides some valuable references for the cultivation of practical ability of big data talents through the useful exploration and practice of the practical ability cultivation system of data science and big data technology majors.

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