

Construction of Big Data Major Curriculum System in Local Colleges and Universities under the Background of New Engineering

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Abstract

The big data major is a typical new engineering major, and the curriculum system is the core of the major construction. This paper first analyzes the problems existing in the professional curriculum system, and then according to the requirements of new engineering construction, it explores the construction of big data major curriculum system from three aspects: reforming teaching system, optimizing teaching content, and reconstructing curriculum system. After practice, the curriculum system has a good effect on cultivating big data professionals who meet the needs of the times. The teaching and research results can be promoted and applied to relevant majors in local colleges and universities.

Keywords

Big data major; Professional curriculum system; New engineering construction; Big data professionals.

1. Introduction

In order to actively respond to a new round of technological revolution and industrial transformation, and meet the needs of China's strategic technological and economic development, in 2017, the Ministry of Education issued the "Notice of the Department of Higher Education of the Ministry of Education on the Development of New Engineering Research and Practice", which starts the process of promoting the construction of new engineering. New engineering majors means that they are closely integrated with engineering, such as big data, cloud computing, and artificial intelligence. Their common feature is that they are born for a certain emerging industry [1]. Among these new engineering majors, the big data major is based on mathematics, computer, and statistics, and is integrated with relevant industry knowledge. It is one of the core majors of the new engineering.

Today's society has entered the era of big data, and the application of big data has also penetrated into financial, medical, manufacturing, circulation, and other industrial fields. It enhances the value of traditional industries and promoting the upgrading of traditional industries [2]. The big data major has been listed as an important discipline in China's "Thirteenth Five-Year Plan". As an emerging and interdisciplinary major, it plays a pivotal role in the development of country's informatization and the improvement of comprehensive strength. At the same time, the society's demand for big data professionals is also increasing. Compared with traditional engineering professionals, the big data professionals need strong practical ability, strong innovation ability, and international competitiveness [3]. Therefore, under the background of new engineering, the big data major construction and development is at the right time, and as the core of the major's construction, the construction of curriculum system is critical and urgent.

2. Background

The big data major is a multi-disciplinary cross-integration major based on computer science, mathematics, and statistics, with big data as the research and analysis object. It cultivates compound professionals for big data research and development and application. The demand of enterprises for big data professionals makes the construction of big data major in various colleges and universities in full swing, and the number of schools setting up the big data major has increased rapidly [4]. In 2016, Peking University, University of International Business and Economics, and Central South University were the first batch of universities to pilot the big data major. From 2017 to 2019, 32, 250, and 196 new universities from the second to the fourth batch were approved for the big data major [5]. In 2020, 138 new universities were added in the fifth batch. At present, a total of 619 colleges and universities across the country offer this major, and the number of approved colleges and universities continues to grow [6]. Although some achievements have been made in the construction of big data major, it is still in the exploratory stage. As the core of the major construction, the construction of its curriculum system still has the following problems.

1) Interdisciplinary and difficult teaching. The big data major is interdisciplinary and closely related to basic disciplines such as statistics, mathematics, and computer science. The big data professionals should not only master the basic knowledge of many related disciplines, but also master new development methods and technical system knowledge related to the collection, storage, mining, analysis, and visualization of big data. Therefore, how to meaningfully distribute and integrate multidisciplinary content and knowledge is an existing pedagogical problem.

2) Lack of standard curriculum system. The construction of big data major is still in the process of development: the professional training system has not been perfected, the standard curriculum system has not been formed, and there is a lack of mature cases and experience for reference. According to their characteristics and advantages, local colleges and universities may choose different secondary colleges to offer the major, such as the school of computer science, the school of mathematics, and the school of economics and management, making some differences in the courses offered.

3) Lack of practical teaching environment. Most local colleges and universities lack sufficient hardware equipment support, which makes it impossible to build the cloud computing and big data platform required for big data professional teaching, resulting in the inability to simulate the business scenario in the real environment. Moreover, experimental data, experimental teaching plans, and experimental manuals are insufficient, so it is difficult to carry out big data projects. The above conditions are essential for the construction of big data professional training system.

3. Construction of Curriculum System

According to the requirements of new engineering construction, this paper constructs the curriculum system of big data major from three aspects: reforming teaching system, optimizing teaching content, and reconstructing curriculum system.

1) Reforming Teaching System

This paper firstly takes the technical practice ability as the core to realize the deep integration of theoretical teaching and practical teaching. Relying on the theoretical research of local colleges and universities and the technical practice of enterprises, the comprehensive unification from study and research to practice can be realized. It adheres to the focus on the needs of enterprises, the guidance of student training, and the help of teachers. The second is to focus on technological innovation capabilities. On the flexible modules of the basic credit

system, the technology and scientific system can be deeply integrated and a high degree of teaching and research integration can be obtained based on basic knowledge. We also should strengthen the link between academic mentors, discipline competitions, and innovation fund projects, so that systematically realizing the integration of teachers and students by relying on teaching, learning and research.

2) Optimize Teaching Content

On the basis of the cross-integrated practical teaching system, this paper establishes two practical teaching chains in class and after class. It builds a complete set of practical teaching content on the basis of the cultivation of innovation ability. With technology as the goal, we form a big data application course group, and emphasize the interrelation and cross-integration of course content between theoretical and practical courses, so as to promote students' big data thinking and Internet thinking. The teaching content of the course adopts a modular structure, and the knowledge points are linked hierarchically and gradually. Through the systematic link agreement of "class foundation, practice strengthening, scientific research management" and open training form, a step-by-step connection of two practical teaching chains can be achieved. First, the classroom practice teaching takes the entire life cycle of big data processing as a carrier, forming a practical chain of basic experimental skills training, project simulation design training, and post-professional practice training. This promotes students to integrate theoretical knowledge with practical ability and team coordination. Second, the extracurricular practice guidance takes technology orientation as the carrier, forming a development chain of project-oriented analysis, business education practice, and innovation and entrepreneurship competition, so that students have the ability of cross-border analysis and engineering follow-up research.

3) Reconstructing Curriculum System

The curriculum system of big data major focuses on the four aspects of data collection, processing, storage, and analysis. We set the curriculum according to the requirements of engineering certification. In the first two years, general courses and basic computer courses are mainly offered to ensure that students can master the principles of computer composition, operating systems, database principles, programming capabilities and preliminary big data processing techniques, so as to achieve the goal of "wide caliber". In the first year, students are trained according to the information category, with the purpose of consolidating the foundation and strengthening general education and mathematics knowledge learning. The second year is to develop professional basic abilities, including the study of statistics, big data system construction, and data analysis basic knowledge and methods. The third year is to strengthen professional ability, improve the ability of system development and big data analysis and mining, and strengthen practical teaching such as internship, innovation and entrepreneurship. The fourth year is problem-driven and to develop students' ability to solve complex problems around the entire life cycle of big data. The curriculum system of big data major mainly includes three aspects: the core courses, the elective courses, and the practical session.

1) The core course is an important compulsory course for students of this major, including four kinds: the public basic courses, the subject basic courses, the professional basic courses, and the professional core courses. The depth of the course is gradually advanced, so the order of courses is from public basic courses to professional core courses. The public basic courses and the subject basic courses are offered in the freshman and sophomore years, and the professional basic courses and the professional core courses are offered in the junior and senior years. This course system covers the related technologies of the whole life cycle of big data acquisition, storage, management, mining and visualization.

2) The elective courses are used to expand students' professional abilities. They include "Data Mining Technology Foundation", "Mathematical Modeling", "Big Data Visualization",

"Virtualization Technology", "Geographic Information Big Data Processing Technology", "ETL Technology and Application", "Data Science New Technology", and other courses. Big data technology has been widely used in the Internet of Things, finance and many other fields, and the combination of big data technology and application fields can bring out its value. Therefore, the elective courses in the fields of "geographic information big data processing" and "financial big data" are set up in the curriculum system, so as to train students to analyze, discover and solve field problems in the context of practical application.

3) The practical session is divided into four parts: the professional basic practice, the professional curriculum practice, and the comprehensive training. For important professional courses, independent experimental courses are offered. The professional basic practice is aimed at subject basic courses, and the professional curriculum practice is aimed at professional courses, focusing on training students to build big data platforms and conduct big data analysis. The comprehensive training is a comprehensive practice for industry applications. For the development of the big data platform, a course of "Comprehensive Training of Big Data System Capabilities" is set up, and a course of "Comprehensive Application of Data Mining and Artificial Intelligence" is set up for the analysis of big data.

4. Conclusion

At present, the construction of big data major is still in the exploratory stage. It is necessary to accurately locate the needs of enterprises, implement the integration of production and education, and accumulate experience in teaching practice. Under the background of new engineering, this paper aims at the problems existing in the construction of big data major curriculum system, exploring and practicing the construction of curriculum system from three aspects: reforming teaching system, optimizing teaching content, and reconstructing curriculum system. It is of great practical significance to cultivate big data professionals who meet the needs of the times.

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