# Research on Teaching Methods of Big Data Major Courses Under the Background of "Four New Disciplines" Construction

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**Abstract.** The core curriculum of big data major involves the integration of multiple disciplines, which requires both theory and practice. At the same time, new technologies are rapidly evolving. Traditional teaching methods can no longer meet the social needs in the era of big data. The "Four New Disciplines" construction is an important measure to comprehensively revitalize undergraduate education and build a "quality China" of higher education. Among them, the construction of new engineering pays special attention to majors related to emerging industries, such as artificial intelligence, intelligent manufacturing, robotics, cloud computing, etc., and also includes the upgrading and transformation of traditional engineering majors. As an important part of new engineering, the construction and development of big data major is particularly important under the background of "Four New Disciplines" construction. Through an in-depth understanding of the "Four New Disciplines" and guided by this, this paper puts forward the exploration of teaching methods that integrate scientific research content into case-based teaching and constantly integrate new knowledge, which has certain positive significance for the cultivation of big data talents.

**Keywords:** Big Data Major, Four New Disciplines, Teaching Methods, Scientific Research.

## 1    Introduction

The arrival of the era of big data has changed the original structure of the knowledge system and brought transformative influence to the production activities of scientific knowledge. There are many applications of big data in foreign universities. Harvard University and MIT put courses on online platforms with "big data" as the background to collect more students' learning behavior data in order to better develop online education. Domestic colleges and universities attach great importance to the construction of big data majors, and many colleges and universities have set up big data and data

science majors to meet the country's demand for new technologies. How to better develop this major, cultivate more talents for the country, and then serve various fields is the challenge faced by this major. In 2018, the Ministry of Education issued a document proposing to comprehensively promote the construction of new engineering, new medicine, new agriculture and new liberal arts (referred to as the "Four New Disciplines" construction) [1]. Traditional teaching methods can neither meet the professional needs of big data major, nor can they meet the talent training program under the national "Four New Disciplines " background. Therefore, putting forward a set of effective teaching methods is of great significance for further promoting the construction of "Four New Disciplines" and strengthening the training of talents in big data major. The construction of "Four New Disciplines" is to comprehensively promote big data and artificial intelligence technology to other fields and disciplines from a scientific perspective. Gao Yipeng and others have made in-depth thoughts on the construction of first-class disciplines under the Four New Disciplines backgrounds [2].

## 2    "Four New Disciplines" Construction Gives Big Data Major Significance

The curriculum system of big data major basically includes new technologies such as machine learning and data mining [3,4], artificial intelligence algorithms [5], cloud computing, etc., and at the same time takes into account many courses in computing disciplines, which makes it difficult to train students. As we all know, the traditional construction of engineering majors has a very formed teaching system and perfect teaching methods. However, due to the late emergence of new engineering disciplines represented by artificial intelligence and Internet of Things, colleges and universities are in the exploratory stage. How to match the national construction, integrate with the technology of universities in the world, create their own professional characteristics [6], and meet the needs of all sectors of society at the same time, this is the mission entrusted to universities by the state. The construction of new engineering provides a new opportunity for the construction of big data major.

## 3    Characteristics and Trends of Big Data Major Construction

### 3.1    Characteristics of Construction

### 3.1.1 Industry-oriented Applications.
The big data major pays more attention to industry-oriented applications and cultivates senior professionals who can solve complex engineering problems. This requires professional curriculum to closely combine with the needs of the industry and pay attention to the cultivation of practical ability and innovative ability.

### 3.1.2 Interdisciplinary Integration.

Big data major involves computer science, mathematics, statistics and other disciplines, so it is necessary to pay attention to interdisciplinary integration in the construction process [7,8]. By introducing knowledge and methods of related disciplines, students' comprehensive quality and innovative ability can be improved.

### 3.1.3 Strengthening Practical Teaching.

Practical teaching is an indispensable part of the construction of big data major. Through the construction of laboratories, training bases and other practical teaching platforms, we can provide students with rich practical opportunities and enhance their practical ability and problem-solving ability [9].

### 3.1.4 Pay attention to the Cultivation of Innovation Ability.

Big data major needs to pay attention to cultivating students' innovative ability. By offering innovative courses and organizing innovative competitions, students' innovative consciousness and ability can be stimulated, and more senior professionals with innovative spirit and practical ability can be cultivated for the development of industry and society.

## 3.2      Trends in Construction

### 3.2.1 Technology Convergence Trend.

With the continuous development of big data technology, its integration trend with emerging technologies such as cloud computing, artificial intelligence, and Internet of Things has become increasingly obvious. Therefore, students trained by big data major should keep up with the technological development trend, strengthen the integrated teaching of related technologies and fields, and improve students' comprehensive application ability.

### 3.2.2 Industry Application Expansion.

The application of big data and artificial intelligence technology in other fields has been fully launched, and has been widely used in many fields such as finance, medical care, and smart cities. Big data major needs to continuously expand industry application fields, strengthen cooperation and exchanges with related industries, and provide students with more practical opportunities and employment channels.

### 3.2.3 Learning Theoretical Knowledge.

The major of data science and big data includes many courses in artificial intelligence, such as data mining and machine learning. The development of artificial intelligence technology can be said to be changing with each passing day. Many innovative algorithms and systems continue to emerge, especially the emergence of large models, which completely subverts the scope of use of traditional models. However, this innovative algorithm and system needs a solid mathematical foundation, which undoubtedly

increases the difficulty of students' learning. How to effectively impart theoretical knowledge to students is the core construction content of big data major.

According to the above, the curriculum reform method for big data major should focus on several goals:

(1) Improve teaching methods and modes to improve students' interest in learning.

(2) Combine theory with practice and strive to lower the threshold of theoretical knowledge.

(3) In line with the principle of "problem orientation", ask questions first, and everyone will discuss and solve them.

(4) How to combine traditional professional teaching with innovation and entrepreneurship education is in line with the construction of new engineering.

# 4 Exploration of Curriculum System and Renewal of Methods

## 4.1 Schemes and Methods

The curriculum system is the core element in cultivating both professional and innovative talent, and teaching methods and means determine the cultivation of talent quality [10]. Up to now, the big data major has built all professional courses on the Chaoxing platform. Students can learn the course content at any time in the platform, which complements the teaching content of teachers in class and completes a virtuous circle between and after class. Blended teaching is the starting point. According to the goal of concern, professional teachers reasonably formulate the curriculum system, and formulate teaching plans under this system. Multiple courses can be correlated and radiated. Generally speaking, it can be summarized as follows: taking online and offline mixed teaching as the starting point, taking professional backbone courses as the core, student associations as the auxiliary, and data competition as the driving force, we will deeply explore the teaching methods and means of courses, carry out discussions among teachers, and promote the development of diversified teaching modes. Diagram of professional training (see Fig. 1).
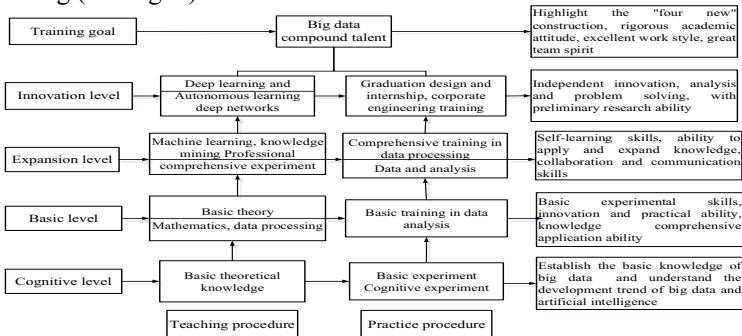


**Fig. 1.** Diagram of professional training.

According to the teaching and training objectives set up, we should adopt a certain way of combining measures in class with auxiliary after class (see Fig. 2).

In order to accomplish the goal put forward by the curriculum construction, the following ways are adopted to complete the teaching of the curriculum.

(1) Heuristic teaching. The model asks questions, so that students can naturally enter the thinking mode, and then stimulate students' enthusiasm for learning.

(2) Case teaching. Select cases that are closely related to the course content, and ensure that the cases are representative, practical and operable. For example, taking data mining and machine learning as examples, cases can involve various fields in machine learning, such as classification, regression, clustering, recommendation systems, etc. Through the explanation of these examples, students can understand the application of mathematical knowledge.

(3) Competition mechanism. By participating in competitions, they can not only encourage students to condense new thinking and ideas in a short time, but also make them realize their own shortcomings through competitions, and learn the good thinking of other students.

(4) Community mechanism. Through students' spontaneous organization of associations, with professional teachers as tutors, the establishment of associations can enable students to communicate more fully and share what they have learned.

(5) Platform assistance. Make full use of the online teaching platform to build professional courses, so that students can not only review what they have learned after class, but also conduct in-depth study on the basis of courses.
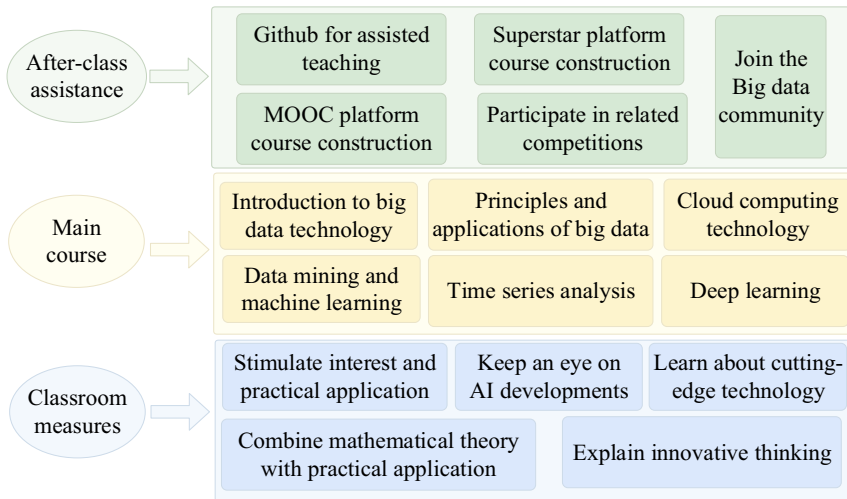


**Fig. 2.** Big data course implementation model diagram.

## 4.2   Effect Analysis

Based on the above methods and schemes, some courses of three cohorts of students were tracked. Students' enthusiasm for learning and innovation ability have been

greatly improved. Students gradually develop the habit of independent learning, and can actively preview, review and expand their learning content. At the same time, students can use what they have learned to think deeply and put forward insightful views when analyzing and solving problems. In addition, students' innovative ability has also been improved, and they have begun to try innovative learning methods and ways of thinking. For example, a questionnaire is conducted to students, and it is found that students are very interested in letting them crawl data from the Internet themselves, and then using various models to analyze the data. In addition, the establishment of student associations has greatly encouraged students' spirit of exploration. At the same time, clubs help students set up interest groups, broaden their horizons and help other students learn. In the questionnaire of students, the traditional teaching methods, blended teaching, flipped classroom teaching and project case teaching were investigated, and the students gave their satisfaction degree respectively (see below Fig. 3).
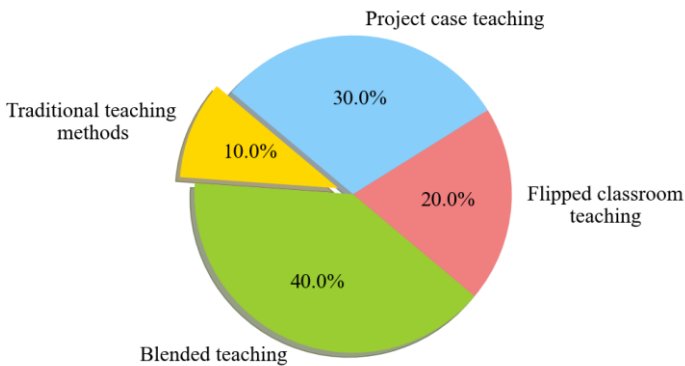
**Fig. 3.** Questionnaire on Teaching Methods.

Through the questionnaire, it can be found that students have the highest satisfaction with mixed teaching, which can greatly stimulate students' enthusiasm for autonomous learning, and at the same time, they are satisfied with project case teaching. Through this method, they can better understand theoretical knowledge.

## 5     Conclusion

Due to the rapid update speed of big data technology, the curriculum system will naturally change accordingly. Only by constantly perfecting and improving teaching methods and means, and constantly integrating new information technologies, can higher-quality talents be cultivated. In the future course construction, we will build our own private cloud platform, and combine the online platform with our own private cloud platform. Constantly improve the evaluation mechanism of students' achievements, so as to investigate students more comprehensively.

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