Research and Practice on Ideological and Political Teaching of '*Big Data System and Technology*' Course

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Abstract. Curriculum ideology is an important measure for colleges and universities to implement the fundamental task of cultivating people through virtue. Curriculum ideology plays an important role in improving the effect of 'three comprehensive education' and promoting the all-round development of students. Taking '*Big Data System and Technology*' as an example, this paper first introduces the course objectives. Course objectives include cognitive objectives, ability objectives and ideological and political objectives; Then combined with the teaching content of the course, deeply excavated the ideological and political elements contained in the course and the specific ideological and political teaching design is given. Among them, the ideological and political elements include four levels: speculative, personal, engineering, and national; Finally, the specific practice of curriculum ideology and politics is expounded. The specific practice includes the improvement of teachers' curriculum ideological and political teaching ability, the reform of curriculum ideological and political mixed teaching, and the evaluation of the implementation effect of curriculum ideological and political.

Keywords: Blended Teaching · Big Data System and Technology · Curriculum Ideological and Political Goals · Ideological and Political Elements Mining · Curriculum Ideological and Political Evaluation

1 Introduction

Curriculum ideological and political education is to give full play to the education consciousness and responsibility of the subject of educating people and to tap the ideological and political education elements of various professional courses. With the help of traditional and modern resource means and rich carriers, the course ideological and political education integrates elements of ideological and political education, including theoretical knowledge, values, and spiritual pursuits, into various professional courses. This can have a subtle and positive impact on students' ideological understanding, values, and behavior [1]. Curriculum ideology and politics is an important measure and approach for colleges and universities to practice the concept of 'full personnel education in the whole process and in an all-round way'. Its purpose is to realize the same direction of

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various courses and ideological and political theory courses, and to realize collaborative education and morality [2]. The ideological and political curriculum has gone through a process of exploration, clear proposal, continuous deepening and in-depth development in colleges and universities. Its connotation, concept, practical logic, teaching system and implementation mechanism have been studied in depth [3], and practiced and explored in professional courses, accumulating a lot of beneficial experience.

In the era of big data, big data has developed into an independent industrial form. Big data plays an important role in innovating industrial development models, promoting the agglomeration of related industries, and driving regional economic development. The healthy development of the big data industry is inseparable from the support of talents, and degree education is an important way to cultivate big data talents. In order to meet the social demand for big data talents, universities have opened courses related to big data in the curriculum system, and carried out the research and practice of big data curriculum ideological and political thinking. For example, Y. R. Mu [4] put forward reform measures for the ideological and political teaching of the basic course of big data on the basis of analyzing the bottleneck of integrating the ideological and political course into the basic teaching of big data; X. G. Zhao [5] and others explored the ideological and political teaching path of the principles and applications of big data technology; Y. Li [6] and others conducted research and practice on the ideological and political teaching approach of the basic course of big data technology; L. Luo [7] integrated Hadoop development technology course teaching with course ideological and political elements, cultivating students' new spirit of reform and innovation, technological innovation; X. F. Qian [8] constructed the evaluation system of ideological and political teaching quality for the course of 'Big Data Management'. Overall, some achievements have been made in the ideological and political aspects of big data courses. However, there are still problems such as insufficient exploration of ideological and political elements, and inability to deeply integrate professional knowledge and ideological and political education.

'*Big Data System and Technology*' is a basic course of big data offered by Chengdu University of Information Technology for software engineering, data science and big data technology. This course took Hadoop as the carrier to explain the basic concepts of big data, distributed storage, distributed processing and the basic knowledge of big data analysis, which laid a good foundation for students to engage in professional engineering work. After several years of construction, this course has carried out a lot of research and practice in blended teaching, project-driven teaching, curriculum ideology and politics, and accumulated relevant experience. This paper introduces the curriculum objectives of '*Big Data System and Technology*', expounds the teaching design scheme of curriculum ideology and politics, and gives the concrete practice of curriculum ideology and politics.

2 Objectives of the Course '*Big Data System and Technology*'

The ideological and political teaching of the course should first set the goal of the ideological and political education of the course, so as to determine the specific teaching content. Then, according to the ideological and political content, the ideological and political resources of the course are excavated from multiple angles, and then the ideological and political resources are put into the practice of ideological and political

teaching of the course with a more targeted approach. Finally, the ideological and political education goal of the new engineering curriculum will be realized [9]. According to the training goals and graduation requirements of professional talents, the cognitive goals, ability goals and ideological and political goals of the '*Big Data System and Technology*' course are determined as follows:

1. Cognitive goals

The course '*Big Data System and Technology*' enables students to master the core skills of data collection, analysis, processing, and visualization through the explanation of the Hadoop ecosystem. Specifically, it includes: understanding the technical background and basic concepts of big data; Mastering the deployment of Hadoop operating environment; Mastering the principle and shell operation of Hadoop distributed file system HDFS and accessing it through JavaAPI; Mastering the storage of big data files in HDFS; Having the ability to modify the specific source code of HDFS; Mastering the principle architecture of MapReduce, the operating principle of the resource scheduling framework YARN, and the application development method of MapReduce; Analyzing the specific process of MapReduce execution from the perspective of code and having the ability to develop MapReduce code; Having the ability to master how Hadoop converts HDFS files into Key-Value for Map calls; Having the ability to master the internal operation and implementation details of MapReduce and transform MapReduce; Having the ability to build and manage Hadoop clusters; Combining machine learning and using Naive Bayesian classifiers to realize the programming implementation of emotional analysis of large data sets; Understanding the Hadoop framework ecosystem and its basic concepts, typical application scenarios, and learning to treat big data with innovative thinking.

2. Ability goals

Through the study of '*Big Data System and Technology*', students can develop the thinking mode and habit of logical thinking and systematic thinking of engineers, and cultivate the ability to analyze and solve problems. It also helps students develop the ability to communicate well with team members and develop the consciousness of independent learning and lifelong learning.

3. Ideological and political goals

The ideological and political elements contained in different courses are not exactly the same, and the specific ideological and political goals of the courses also have their own emphasis. According to the course content of '*Big Data System and Technology*', as well as the cognitive goals and ability goals of the course, the ideological and political goals of the course are determined. At the speculative level, it aims to let students understand the law of quantitative change and qualitative change, science and technology is the primary productive force, and the scientific development concept. And philosophical principles such as the inevitability of the new over the old; At the individual level, it aims to cultivate students' craftsman spirit and innovative consciousness; At the engineering level, it aims to cultivate students' engineering thinking and professional ethics; At the national level, it aims to cultivate students' scientific spirit and family and country feelings.

3 Mining of Ideological and Political Elements in the Course of '*Big Data System and Technology*'

According to the syllabus, the course '*Big Data System and Technology*' mainly includes an overview of big data technology, Hadoop basic environment configuration, Hadoop design ideas and basic architecture, distributed storage HDFS, computing framework MapReduce, YARN framework, and big data combat. The course needs to complete three experiments of Hadoop development environment configuration, HDFS file access and emotion discrimination based on Naïve Bayes classifier. Finally, complete a comprehensive project in the form of a team, including data acquisition, data processing, data storage and data analysis functions. According to the course objectives, the ideological and political elements of the course are excavated from the course content shown as follows.

Chapter 1 is an overview of the big data technology, mainly explaining the generation, application and development strategy of big data. The generation of big data contains the process of the quantitative and qualitative changes. Changes in the way data is generated have ushered in the era of big Data. The size, variety and rate of the data production are extrinsic properties, which are quantitative changes. With the accumulation of quantity, when the equivalent reaches a certain level, the traditional technology cannot handle it, and big data technology is produced, that is, the qualitative change. This chapter should tell students that the form of development of things begins with a quantitative change, ends with a qualitative change, and opens a new quantitative change. The application of big data relates to ideological and political elements such as homophobia and the primary productive force of science and technology. In our country, big data is widely used in all walks of life including finance, automobiles, retail, catering, telecommunications, energy, government affairs, medical care, sports, entertainment and so on. Through the promotion effect on the development of various industries, the students will be explained that once the science and technology penetrate and act on the production process, it will become a real and direct productivity. Through the application of big data in epidemic prevention and control, the country's efforts and the contribution of lots ordinary people in epidemic prevention and control are emphasized, therefore students' patriotic passion and feelings of home and country could be inspired. Chinese big data development strategy involves the scientific development concept. A series of big data development strategies and plans issued by government lead to the scientific development concept. It is pointed out that the development of science and technology is also the requirement of the scientific outlook on development, and it is a key measure to fully implement the scientific development concept, related industry, and promote the construction of socialist harmonious society with scientific and technological innovation.

Chapter 2 is the basic environment configuration of Hadoop, which main content is the development environment configuration experiment. In the experiment, ideological and political elements are respect for intellectual property rights. The Hadoop development environment requires a large number of software. It is suitable here to guide students to understand the copyright law, intellectual property law and the patent law from the perspective of software selection, and cultivate students' awareness of respecting intellectual property rights and abiding by laws and regulations. The configuration of the development environment involves many details.

Chapter 3 is the design idea and the basic architecture of Hadoop, which mainly includes the brief history and the ecosystem of Hadoop. The brief history reflects the scientists quality of perseverance and hard work. Taking the experience of Doug Cutting, the founder of Hadoop, tells students that they should not give up even in difficult situations. They should persevere, work hard and strive for strength. On the other hand, the Hadoop ecosystem is a performance of national confidence and pride. By explaining the contributions of Chinese enterprises such as Huawei, Tencent and Alibaba in Hadoop, the development achievements of Chinese science and technology in recent years are introduced to enhance students' national confidence and pride.

Chapter 4 is about the distributed storage of HDFS, mainly introduces the basic working principle of HDFS and the HDFS file access experiment. The working principle of HDFS reflects the relationship between individuals and groups. In the HDFS, a large-scale file can be divided into several file blocks, and different file blocks can be distributed to different nodes. Therefore, the size of a file is not limited by the storage capacity of a single node, and can be much larger than the storage capacity of any node in the network. This introduces the relationship between individuals and groups. The individual depends on the collective, the individual also affects the collective. They both are inseparable, complement each other. In order to achieve positive interaction between individuals and groups, we must truly make individuals and groups been each other's goals and means to achieve common development and progress. Corresponding experiments can reflect the elements of professional ethics. There is value in data. The file access experiment could help students to establish the concept of data privacy and data security awareness, and develop good professional ethics for students.

Chapter 5 is about the distributed computing framework of MapReduce, which core content is the MapReduce model. MapReduce model adopts idea of 'divide and rule'. A large data set stored in a distributed file system can be split into a number of independent fragments. These fragments can be processed in parallel by multiple Map tasks. Students should know the idea of 'divide and rule'. When they encounter relatively complex problems and if the global optimal solution cannot be found yet, they can consider splitting the original problem into several small problems, seeking the optimal solution of each small problem respectively, and then stacking these local optimal solutions as the optimal solution of the whole problem.

Chapter 6 is YARN framework, which mainly contains the new features of Hadoop. By analyzing the deficiencies of Hadoop1.0 and the improvement of Hadoop2.x, the inevitability of new things overcoming old things is introduced. Pointing out that everything is in constant motion, change and development. The whole world is a material world with infinite change and eternal development. Development is the process by which the new replaces the old. New things are born in the womb of old things. It absorbs the reasonable and positive factors in the old ones, adds the new content that the old things cannot contain, and abandons and overcomes the outdated, decadent and negative factors, so it has the incomparable superiority of the old things.

Chapter 7 is big data practice, which mainly includes emotion discrimination experiments and comprehensive projects based on Naïve Bayes classifiers. Practical activities can reflect craftsman spirit, innovation consciousness, engineering thinking and so on. Both the emotion discrimination experiment and the final project are comprehensive

projects, which require students to complete in team and collaboration. Through the project practice, students are cultivated with a craftsman spirit of dedication, excellence, meticulousness and pursuit of excellence, and with the willingness to innovate and explore, and also with the engineering thinking that creatively uses scientific principles and systematically to solve various problems.

4 Ideological and Political Teaching Practice of the Course '*Big Data System and Technology*'

4.1 Improving Teachers' Curriculum Ideological and Political Teaching Ability

Imparting knowledge and cultivating people is the basic responsibility of teachers, and teaching personal example as well as verbal instruction is an important teaching method for teachers [10]. The ideological and political construction of curriculum cannot be separated from the active work of teachers of specialized courses. Curriculum ideological and political construction needs teachers to actively implement curriculum ideological and political awareness and ability. Teachers are required to integrate ideological and political elements into professional knowledge effectively and unify the three aspects of value building, knowledge imparting and ability cultivation. Therefore, for teachers to teach professional courses, they need to have excellent professional knowledge and relatively high ideological and political education ability. The course group of '*Big Data System and Technology*' mainly improves the teachers' ideological and political teaching ability from three aspects: First, the teachers of the course group reach an ideological consensus and fully realize the necessity and importance of offering courses on ideological and political. Teachers are willing to actively spend time and energy on the research and practice of curriculum ideology and politics; Second, teachers actively participate in relevant training on ideological and political courses, improve political literacy, and strive to improve ideological and political awareness and level of courses. The third is that the course group regularly organizes teaching and research activities, collective lesson preparation, problem discussion, and project research. The course group excavates the ideological and political elements of the course, designs ideological and political implementation cases, summarizes the ideological and political implementation experience, and condenses the ideological and political teaching methods. In order to solve the problems existing in the ideological and political practice of the course in a timely manner.

4.2 Exploring the Ideological and Political Blended Teaching Mode of the Course

With the development of information technology, online and offline hybrid teaching has become an important research direction of teaching reform in colleges and universities. Blended teaching combines the advantages of traditional teaching methods with those of online teaching, and gives full play to the leading role of teachers in the teaching process. Blended teaching also gives full play to the advantages of information technology in the student-centered 'online + offline' teaching [11], which fully embodies the 'student-centered' concept. The blended teaching model has been implemented in the big data-related courses of many colleges and universities, and achieved good results. Therefore,

it is of great significance to explore the integration of ideological and political content into all aspects of blended teaching.

In practice, the course of '*Big Data System and Technology*' mainly explores the blended ideological and political teaching mode of the course from the following aspects: First, the teacher clarifies the cognitive objectives, ability objectives and ideological and political objectives of each lecture in the pre-class stage. Teachers should carefully evaluate the real situation of students, reasonably design ideological and political content, determine the integration method of ideological and political elements and professional knowledge, and publish course-related resources online; The second is that teachers focus on explaining the knowledge points that students have not mastered through various methods such as offline lectures, classroom demonstrations, group discussions, case analysis, and situational teaching during the class stage. Teachers can also make full use of the flipped classroom to enhance students' awareness of participating in the classroom, especially organize students to discuss the ideological and political points of the designed course, and teachers make comments and summaries on the spot; The third is that the teacher evaluates the teaching effect after class, observes whether the students have reached the expected ideological and political goals of the course, and at the same time conducts teaching reflection, sums up experience and lessons, and lays a solid foundation for the next lecture.

4.3 Evaluate the Effect of Course Ideological and Political Implementation

The evaluation of curriculum ideology and politics plays an important role in reflecting the effect of curriculum ideology and politics, finding the problems in curriculum ideology and politics, optimizing the implementation strategy of curriculum ideology and politics, and promoting curriculum ideology and politics to achieve a higher level of development in the spiral. The course of '*Big Data System and Technology*' takes teachers, students and peer experts as the evaluation subjects, forming a preliminary and complete curriculum ideological and political evaluation system. To be specific, the implementation effect of the course is evaluated and tested from three aspects after the end of the course. First, after the end of the course, students are taken as the evaluation subject, and questionnaires are adopted to understand students' satisfaction with ideological and political teaching and the degree of achievement of ideological and political objectives of the course. Each question in the questionnaire includes 5 answers (very satisfied, satisfied, general, dissatisfied, very dissatisfied), and the achievement degree of the goal is calculated according to the score of 5, 4, 2, 1, 0. Second, the teacher is the evaluation subject, and the process evaluation is combined with the result. The process evaluation includes attendance, discussion, experiment, practice, homework and flipped classroom performance. The result assessment is to complete a comprehensive project in a team way and make a summary. The teacher will give quantitative scores according to the completion of the project, team division of labor and cooperation, project defense and project summary. Third, peer experts are the evaluation subject. Through the supervision group's lectures and peers' lectures, ideological and political related items are set in the class records, which are evaluated by peer experts. By constructing a three-dimensional integrated evaluation system, the ideological and political education effect of the course '*Big Data System and Technology*' has been improved.

5 Conclusion

Ideological and political education in the curriculum will penetrate the elements of moral education into professional knowledge, so that students can develop correct world outlook, outlook on life and values in the process of learning professional courses. According to the steps of setting ideological and political goals, determining teaching content, mining ideological and political elements, and putting them into teaching practice, the ideological and political research and practice of the course '*Big Data System and Technology*' was carried out. The ideological and political course of '*Big Data System and Technology*' mentioned the laws of quantitative change and qualitative change, science and technology are the primary productive forces, the scientific outlook on development, and the inevitability of new things defeating old things and other philosophical principles. It also puts forward the curriculum ideological and political goals of cultivating students' craftsman spirit, innovation consciousness, engineering thinking, professional ethics, scientific spirit and family and country feelings. Guided by the course objectives, it excavates the ideological and political elements of four levels: speculative, personal, engineering, and national from the course content, and gives a specific ideological and political teaching design. Finally, it expounds the specific methods of how to practice curriculum ideology and politics in three aspects: the improvement of teachers' ideological and political ability, the reform of curriculum ideological and political mixed teaching methods, and the evaluation of ideological and political teaching effects. The teaching of '*Big Data System and Technology*' integrated into the ideological and political course has initially achieved the expected goal, and the next step will be to carry out more research and practice in the continuous improvement of the ideological and political course.

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