

Research on Teaching Reform of Big Data Modeling and Application Course Based on Cooperative Learning

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Abstract: In order to improve the learning effect of the Big Data Modeling and Application course, this paper discusses the teaching method of the Big Data Modeling and Application course based on cooperative learning. It will set up excellent student answerers, encourage students to participate in competitions and projects, teacher-student role reversal, etc. into teaching activities. It has effectively promoted the enthusiasm of students to study and participate in the competition, improved their performance, and won a lot of awards. The teaching reform of the course Big Data Modeling and Application based on cooperative learning has improved students' ability to solve complex problems and improved the learning effect.

Keywords: Cooperative learning, Big data, Curriculum, Teaching reform.

1. Introduction

With the increase in Internet usage, data has exploded, doubling in size approximately every two years. In 2015, the State Council issued the Outline of Action for Promoting the Development of Big Data. In order to meet the demand for talents, the Ministry of Education has opened the undergraduate major of Data Science and Big Data Technology since 2016. As an interdisciplinary major supported by mathematics, statistics, and computer science, the core course Big Data Modeling and Application is highly valued by various colleges and universities. This course involves big data mining, big data cleaning and processing, big data modeling, etc. It needs to introduce mainstream big data products and technologies such as Hadoop, HDFS, MapReduce, HBase, Hive, Spark, MySQL, MongoDB, and Redis. The combined use of various software and languages makes students have many difficulties in learning. Often, they cannot understand the code or make mistakes in experiments, which not only affects the learning progress, but also easily makes students anxious.

Faced with these problems, Oludipe, Daniel, and Joanthan O. AWOKOYA found that the cooperative learning teaching method can effectively reduce students' anxiety by comparing the cooperative group and the traditional group in the survey, so teachers are encouraged to incorporate cooperative learning into the teaching method [1].

So what is cooperative learning? Guskey pointed out that cooperative learning refers to the learning tasks assigned by teachers in groups of 2-6 students during the course learning. Students in each group engage in a variety of learning activities, often requiring collaboration and mutual support [2].

Educator Dewey also actively advocated cooperative learning. He believed that students' intelligence can be improved by learning through interaction. In addition, Kalaian, Sema A., and R. M. Kasim also found in their research that cooperative learning methods support the effectiveness of group learning methods in improving students' academic performance, and the use of group learning methods in statistics classrooms can improve college

students' performance [3]. Cooperative learning creates positive peer relationships among students, and this relationship has a positive and far-reaching impact on students' learning [4]. Therefore, this paper discusses the teaching of the course Big Data Modeling and Application based on cooperative learning, in order to reduce students' learning anxiety and improve their learning effect.

2. The Necessity of Curriculum Reform of Big Data Modeling and Application

Big data modeling and application is one of the core courses of big data major, with 64 class hours and 4 credits. Compulsory courses include Java programming, data structure, Linux operating system, etc. The textbook adopts "principles and applications of big data technology" edited by Lin and "basic programming, experiment and case course of big data" as reference books for students' experiments.

This course focuses on big data analysis. By explaining data collection, data storage and management, data processing and analysis, data visualization, etc., students can master the basic theory and technology of big data and become familiar with the typical application scenarios of big data. Master how to collect and analyze big data to solve problems and complete related research methods.

In order to achieve the above teaching purposes, at the beginning of the semester, course description materials including students' teaching objectives, teaching content, students' individual tasks and group tasks, final assessment methods and standards, etc. will be sent to students, so that students can clarify the course requirements and procedures. In addition, information such as micro-lectures and online tests will be sent to students on a regular basis according to the progress of the course. At the same time, the software monitors the participation of students in the whole process, such as test scores, video learning progress, etc., and communicates with students who have problems in a timely manner. A series of challenges is provided to students step by step, so that students can actively meet the challenges and discover the joy of learning.

Big Data Modeling and Application, students are required to master a lot of basic knowledge, such as Java, Linux, MySQL, etc. There are also many software involved in the learning process, such as Hadoop, HBase, Redis, MongoDB, Eclipse, Hive, MySQL, Spark, Flink, Scala, Kafka, R, etc. It is difficult for students to complete so many software and software independently. Language learning, so the cooperative learning method is a necessary condition for learning this course well.

3. Integration Points of Big Data Modeling and Application Course and Cooperative Learning

course integrates cooperative learning from the aspects of encouraging students to help each other, encouraging students to form teams to participate in the competition, and actively participating in local projects. Make sure that the implementation methods and bonus standards are clearly announced at the beginning of the semester, so that students can actively participate in these activities according to the assessment standards and their own arrangements.

3.1. Establish the Best Panelists

Establish a course QQ group at the beginning of the semester to form a cooperative environment. Students who have problems in their studies can ask questions in the QQ

group, and other students help to answer them, forming a cooperative atmosphere. At the end of the semester, students anonymously voted to select "excellent answerers", and selected students were awarded 5 additional course points to form a catalyst for cooperation. It not only encourages the good atmosphere of unity and cooperation in the whole class, but also can quickly answer the questions of the students. For example, in the process of building a Hadoop cluster, students are involved in the use of multiple software, and various problems often arise. Teachers or teaching assistants cannot answer all students' doubts in time, which affects students' learning progress. Encouraging students to help each other can solve more than 80% of the questions of the whole class, which not only guarantees the students to successfully complete the cluster construction, but also reduces the workload of teachers.

In this collaborative learning style of rewarding the best answerers, the teacher only needs to help the top 3-8 students who have improved the most because they only have questions to ask the teacher. As for other students' questions, these 3-8 students will actively guide them. Below are the survey questionnaires and results for the selection of the best respondents, published online by the Learning Council at the end of the semester. Each student nominates 3 people, and the top 8 with the most votes (1/9 of the class) will get 5 points. For privacy reasons, the image only shows the student's last name.

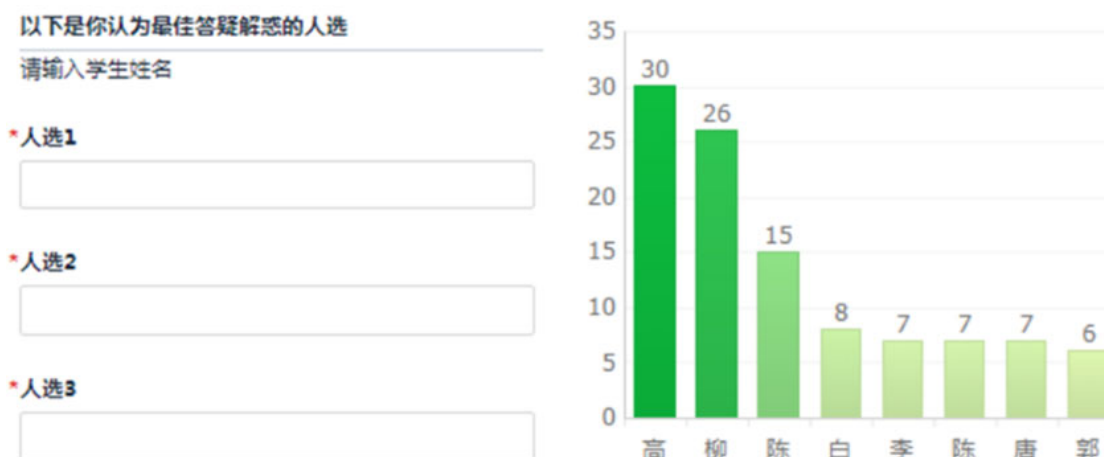


Figure 1. Online polling questionnaire and results for the best respondents

3.2. Encourage Students to Participate in Various Competitions

Students are encouraged to form teams to compete, and bonus points will be awarded to the winning students in the course grades. Taking our school as an example, students participated in various big data-related competitions such as the National Market Research and Analysis Competition, the "Teddy Cup" Data Mining Challenge, and the Fan Ruan data analysis challenges.

The way of bonus points stimulates the motivation of students to participate in the competition. Students often take the initiative to find teachers to guide the competition and ask about relevant knowledge, which improves the enthusiasm for course learning, and the hands-on ability has also been improved in the competition. A large number of awards have also enhanced the confidence of the students.

3.3. The Role Exchange Between Teachers and Students

In the course of Modeling and Application of Big Data, students are required to master a large number of software operations. The way teachers demonstrate on the course is restricted by various conditions such as software and hardware, and various unforeseen problems are prone to occur. There are many steps, and it is difficult for students to remember them one by one. Therefore, a video of the operation of each chapter is recorded and distributed to students, which not only saves students time, but also allows students to repeat learning and viewing.

The operation method is to group the whole class at the beginning of the semester, publish the course task list, and let the students in each group cooperate to record the operation video of the specified chapter, and publish it to the QQ group at the specified time, and explain the operation steps and precautions of the chapter to the students. Each chapter is

completed by two groups of students, and at the end of the term, students are asked to rate. This way of changing the roles of teachers and students is not only convenient for students to learn repeatedly, but also can stimulate students'

sense of competition in the two groups of competitions, and make the video as good as possible. In order to give students time to adapt, the videos made by 1-5 are recorded by the teacher.



Figure 2. Voting and evaluation of each chapter and group at the end of the term

It should be noted that the form of group work is prone to "free-rider" phenomenon. How to solve this problem? American economist Mansel Olsen points out in *The Logic of Collective Action* that while "free-riding" may make things successful, events of such magnitude make each member cautious and bear the actual cost of the action. If the psychological cost of inaction is greater than that of inaction, people will voluntarily "not hitchhike" [5]. Therefore, to reduce free-riding, students rated videos from two groups of students, and the group with more votes generally scored higher. By increasing the importance of events, students are urged to cooperate in completing tasks.

3.4. Participate in Social Projects

Jiang Qingrong pointed out that the combination of course teaching content and course project activities enables students to train practical operation ability while learning theory [6]. The school cooperates with local enterprises and institutions to improve students' practical ability while serving local industries. Our school has been actively cooperating with Yongchuan District Bureau of Statistics, Yongchuan Survey Team of National Bureau of Statistics, Lixin Market Research and other units, allowing students to participate in a number of field surveys such as the census, Yongchuan public opinion survey, and shopping mall customer satisfaction. By participating in these practical projects, students become familiar with the project process and improve their ability to execute projects. At the same time, they also learn to build teams in projects, and through team discussions and problem solving, students develop their sense of cooperation.

4. Conclusion

the method based on cooperative learning was applied in the course *Modeling and Application of Big Data*, the learning effect of students has been significantly improved. With the mutual help of classmates, the number of students who can successfully complete all the experiments of the whole course has increased by 15% compared with the

traditional method. above. The establishment of the best answerer helps students solve more than 80% of the operational obstacles in the learning process, improves the completion of students' experiments and reduces the workload of teachers. Students participate in a large number of professional-related competitions, which promotes the organic integration of theory and practice, and the awards in various competitions also enhance students' self-confidence. During the completion of local projects, students improve their coordination ability, which lays a solid foundation for them to better complete follow-up courses and other projects, and go to work.

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