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Realizing the Visualization of Middle School Curriculum Design by Using Big Data Analysis Tools

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Abstract: With the development of society, using big data analysis tools to realize the visualization of middle school curriculum design has become an important content to cultivate compound talents and build new disciplines. From the perspective of big data, visualization challenges and opportunities coexist in middle school curriculum design. This paper analyzes how to make full use of big data analysis tools to realize the visualization of middle school curriculum design. Through the analysis of a large number of statistical data, it can provide scientific basis for the development of targeted, interfering and individual education, improve the pertinence and accuracy of curriculum design, and explore new breakthroughs of curriculum design.

1. Introduction

Big data is an important symbol of human progress and a powerful tool for social development. Big data technology can perform some functions in scientific learning, decision making, advanced management, information-based learning and so on. Using big data analysis tools can realize the visualization of course design. Big data analysis tools mainly include data mining, data statistics, database technology, etc. Applying case studies to the curriculum design of related subjects can realize visual teaching by using real data [2]. In the process of using big data analysis tools to realize the visualization of middle school curriculum design, we should fully understand the meaning and characteristics of visual big data, and constantly improve the intelligence and humanization level of visualization according to the needs and requirements of curriculum design. Before combining big data with curriculum design, the staff should strengthen the research and understanding of relevant user needs, so as to make big data plays its due role, value and effect in the visualization of curriculum design.

2. Overview of Big Data in Visualization of Middle School Curriculum Design

In September 2008, the journal Nature published a cover story titled Big Data, describing its prospect in mathematics, physics, and biology. With the arrival of big data, we begin to discuss how to develop and implement middle school curriculum design according to the development of information technology. The visualization of middle school curriculum design is an important part of middle school education, which is particularly critical for the correct development of students.

The arrival of big data also brings new opportunities for the visualization of middle school curriculum design. Therefore, if the visualizer of middle school curriculum design can effectively use big data to search, analyze and solve problems, the effect of curriculum design will be significantly improved. Therefore, big data provides a large number of data resources for the visualization of middle school curriculum design, which are characterized by wide sources, diverse types and large amount of data. For example, the campus big data analysis tools used by students on a daily basis will generate a large amount of data, including network links, audio, video, images, emails, etc., including personality traits, hobbies, emotional tendencies, thoughts, etc. Traditional data analysis methods are difficult to effectively use these information, while big data information fusion technology can extract and analyze the previously unquantifiable information, such as feelings, emotions, students' attitudes, etc. For example, by collecting and analyzing data, we can identify each student's living habits, hobbies and other information, and even their experience and feelings can be quantified, so that curriculum designers can make differences according to different students[3].

The application of big data in the field of education provides a new idea for the visualization of middle school curriculum design to solve new problems. The sources of big data are many and complex. Through the systematic and scientific analysis on the large amount of data from the students' daily learning, life, work and so on, the students' personality characteristics, hobbies, emotional tendencies, world outlook, behavioral dynamics and other information can be analyzed, so as to predict their future thoughts and behaviors. It plays an important role in students' curriculum design. It plays an important role in promoting teachers to better adopt educational methods that students are willing to accept. In addition, in the traditional curriculum design, the effect of curriculum evaluation is to collect students' educational data through regular examinations, conversation observation, large-scale surveys and other ways. This kind of assessment method can sometimes cause students' rebellious psychology. Based on big data, the effect of course design can be more accurately evaluated and the pertinence and level of course design can be improved. (Figure 1 shows the visualization effect of big data course design).

Figure 1: Visualization effect of middle school curriculum design realized by big data analysis tools

3. Challenges Brought by Big Data to Middle School Curriculum Design

Although big data has the obvious characteristics of wide data sources, multiple types and large volume, there are also some problems such as uncertain information value and differences among students with different personalities. For example, big data analysis of student behavior provides a solid database for targeted and effective curriculum design. However, there are still many challenges to give full play to the role of big data in course design: (1) there is a large amount of information. The original big data is in a chaotic state, and people who process data usually spend 80% of their energy on processing data. Due to the large number of channels, large amount of data and large amount of information dissemination, the interference to curriculum design is inevitable. (2) Insecurity risk: Big data analysis should collect all kinds of data and information in time and guide students' behavior through various channels. However, the protection of students' personal information is inadequate and the problem of privacy leakage is serious. Therefore, schools must also constantly improve security technology during the process of using big data. (3) In order to effectively use big data in visualization of middle school curriculum design, it is necessary for the visualization team of middle school curriculum design to have strong data collection, verification, synthesis, analysis and other capabilities, which is a big problem for young teachers, and it is difficult to have teachers who can skillfully use big data [4]. (4) The investment in big data platform construction, data mining personnel and data analysis technology is far from enough. Big data is characterized by its wide range of sources, diverse types, large amount of data and fuzzy value distribution. It is also characterized by rapid data growth and continuous data collection, which requires middle schools to invest a lot of manpower, material resources and financial resources, build data acquisition platforms, hire professional data scientists, purchase equipment and technology, etc. These factors are related to whether big data can be effectively applied to the visualization of middle school curriculum design.

4. Realizing the Visualization of Middle School Curriculum Design by Using Big Data Analysis Tools

4.1 Big Data Analysis Tools Commonly Used in Visualization of Middle School Curriculum Design

Big data has brought new thinking, new perspective, new technology and new methods to the research of curriculum design. Its application significance mainly lies in innovating educational ideas and thinking and implementing personalized learning. There are many kinds of big data technologies, among which database technology is the core and plays an important role in the integration and utilization of information and data. With the development of economy and society, the status of big data technology in various social fields is getting higher and higher [1]. On this background, the competition between countries began to transform into the competition of information resources. The visual design of the curriculum design is based on reclassification, filtering and organization, and is targeted design of courses according to students' needs and tasks and the amount of data collected and different types of data (Table 1 shows the data sources of big data analysis tools). The ability of effective analysis using traditional relational methods can be performed or a large number of analysis tools are needed to achieve the amount of data, collection, or present speed and efficient data processing . The analysis tools are as follows:

(1) Data mining tools: Data mining tools are indispensable for the effective use of big data and the good acquisition, analysis and use of data in course design. At present, Data Mining adopts a combination of theory and practice. Python programs are used to collect and preprocess Data, and then Data Mining algorithm is used to analyze and sort out the learning content. Data Collection

provides three modules: Transformers, Model Models, and Pipelines to demonstrate the use of preprocessing, algorithmic Models. Data mining courses are designed to help you understand the value of data and organize what you learn. Especially in the face of complex cases, the sample data acquisition, preprocessing, modeling and model optimization are implemented by Python programming language, and the support vector machine (SVM) is used for face recognition to achieve targeted teaching. (Figure 2 shows the data mining process)

Table 1: Data sources for big data analysis tools

Dimension (weight)	**indicators**
Learning Overview (0.15)	Total learner population
	Total learning resources
	Total learning outcomes
System Construction (0.2)	TV university education system
	Community education system
	Education system for the Elderly
	Credit banking system
Information Infrastructure (0.15)	Network resources
	Computing resources
Digital Learning Resources (0.15)	The resource classification
	Number of resources
Website Visits (0.1)	Access time
	visits times
Learner User Profile (0.1)	Age distribution
	The degree distribution
Enrollment and Training (0.15)	Open education enrollment
	Community education and Training
	Education and Training for the elderly

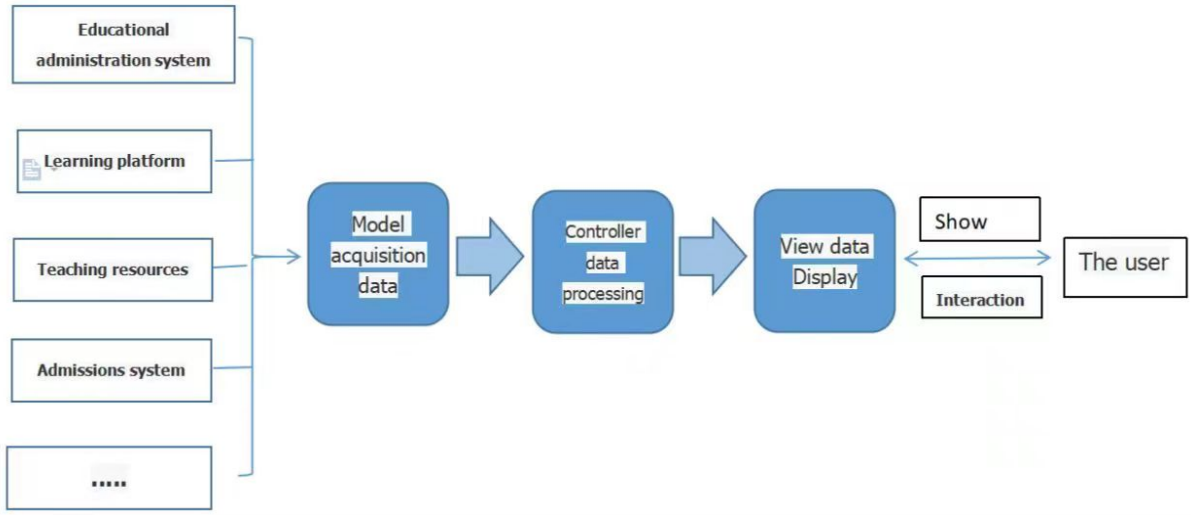

Figure 2: Data mining process

Decision tree tool: Students can be classified and predicted by using the CART in the decision tree. In addition to classification and prediction, decision tree can also be used to discover key factors of management organization behavior. It retains interpretability of the algorithm and focuses on feature engineering. It can provide a good basis for students' personalized curriculum design and teaching and solve many problems such as unscientific management system, so that students can focus on their studies.

(3) Database tools: Database tools can be used for the daily management of middle school education. By analyzing the information in the database, we can obtain the information of students, classes and teachers in detail, which can be used to prepare teaching plans. When we enter the class number, we can find the class information, such as the class schedule, number of weeks and so on. As you can see, the location of educational resources is obvious.

4.2 Visual Teaching Process of Middle School Curriculum Design

In the visualization of curriculum design, it is divided into the following parts: pre-class resources preparation: First, teachers need to analyze the learning content deeply to ensure the quality of teaching, and prepare students' pre-class materials and self-study tests. Second, big data analysis of the students: teachers will design the classroom learning procedures according the big data. Then, classroom teaching design: teachers first analyze students' common problems before class, guide students to conduct independent research in class, teach students to summarize, and then do the classroom tests to analyze teaching effect and unlearned knowledge through big data. Finally, after-class self-consolidation training[5].

(1) Pre-class resources preparation: For the visual implementation of curriculum design, teachers first make in-depth analysis of what they have learned, and prepare micro-class and pre-class guided learning plans in advance, which are used as classroom resources for students to learn before class. In order to test the learning effect, teachers make pre-class questions, in-class questions, and after-class questions, so that they can reflect on their own learning.

(2)Big data analysis of the students : Through the pre-class examination questions, some learning problems of the students are found and then the teaching process is targeted to design.

(3) Classroom teaching design: According to the general questions asked in the discussion area of micro-class before class, the teaching process should be targeted. In the visual implementation of

curriculum design, the learning method of group cooperative experiment and inquiry is mainly adopted. According to the general questions raised, teachers guide students to conduct experimental exploration, guide students to draw conclusions, and summarize the main knowledge content in class.

(4) After-class self-consolidation training: Students realize their own defects and problems according to the test results of teachers, and then consolidate exercises according to the content they have not mastered.

5. Conclusion

Big data transfers the visualization of middle school curriculum design from macro groups to micro individuals, realizing the individuation of curriculum design. Facing the changing educational situation, we must prevent possible problems, give full play to the positive role of big data analysis tools in curriculum design and know how to count, filter, use and protect data, so as to ensure the objectivity of samples analysis, and help teachers accurately understand the dynamic of students in all aspects. Big data is used to identify correlations through relational thinking, so as to provide reliable information for curriculum designers and improve pertinence and efficiency.

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