

Research on Education Reform and Application Based on Big Data

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Abstract: Education Big Data Has Become a Technical Force and a Method to Promote Educational Reform and Innovation. It Has Also Become a Hot Issue in the Field of Education Technology. However, the Research on Big Data of Education in China is Relatively Scattered and Lack of Systematic Research. in This Study, as an Academic Research Paper, the Content Analysis Methods, Basic Theories, Analysis Models, Main Technologies, Methods, Typical Applications, Etc. of the Academic Papers Published by Cnki from 2010 to 2018 Are Analyzed and Summarized, as Well as the Construction of Large-Scale Data for Educational Research. This Study Shows That the Current Research Mode of Education Data in China is Mainly Model Construction, Lack of Basic Theoretical Research, the Necessity of Breaking the Main Technical Means, Strengthening Application and Empirical Research. in Response to These Problems, the Data of China's Education Development is Urgently to Strengthen the Investigation and Research, Research the Main Technology of Data Fusion, Strengthen Education, Strengthen the Data Analysis of Intensive Knowledge Based on Deep Learning, Normalize the Application of Big Data, and Strengthen the Implementation of Extensive Empirical Research.

1. Introduction

Big Data Says: “Internet +” as a New Engine of Educational Development in the Times, Its Thinking Mode and Technology, Scientific Decision-Making, Intelligent Management, Correct Education and Research, and Individualized Learning of Education Change and Innovation, and Promote a Wide Range of Large-Scale Education. the Information of Experience Education in the Direction of Refinement, Individualization and Knowledge Transformation is the New Opportunity Brought by the Development of Educational Informatization[1]. the Important Support for the Improvement of Educational Decision-Making and Educational Management Ability is the Important Driving Force for the Development of Educational Informatization and the Modernization of Education. However, At Present, the Topics Related to Education Data in China Are Relatively Scattered and Lack of Systematic Modification. for Researchers, the Most Basic Theories, Analysis Models, Major Technical Methods Related to Education Big Data and Other Related Matters Are Difficult. Therefore, Using Content Analysis Method, This Paper Summarizes the Relevant Literature Published in China in Recent Years, and Constructs a Panoramic Framework of Domestic Education Research Data. on This Basis, We Further Analyze the Problems Existing in the Development of Education Big Data in China, and Put Forward Corresponding Countermeasures and Suggestions to Provide Reference for Future Research and Practice.

2. Literature Review on Big Data Research of Chinese Education

2.1 Data Source and Preliminary Analysis

The concept of “big data” can be traced back to the book “the third wave” in 1980[2]. What really came into people's view was the “big data” column that started naturally in September 2008. In 2010, it officially entered the Internet. Industry. Therefore, from January 2010 to June 2018, as the survey object, papers published in CSSCI magazine in China proposed “education big data”,

“education data mining”, “education data analysis” and “learning analysis” as key words. The object retrieval of Chinese HowNet is carried out. Taking education theory, management, computer software, application program, information resource management and other subjects as objects, 227 related documents were searched.

Table 1 4 Scientific Research Formula

Scientific paradigm	Generation period	Model	Example
Empirical paradigm	Before the 18th century	Experimental model	Galileo physics
Theoretical paradigm	Before the 19th century	Mathematical model	Geography and meteorology
Simulation paradigm	Mid-20th century	Computer simulation	Numerical simulation and analysis
Fourth normal form	Early 21st century	Big data mining model	User focus mining

2.2 Determination of Analytical Framework

In order to understand the current research topic of big data for education in China, the document analysis software CiteSpace is used to cluster analyze the obtained documents. The specific process is as follows[3]. The branch method is path discovery, and the visualization method is a static cluster view, which represents the merged network. The resulting knowledge map of keyword co-occurrence is shown in [4]. Easy results mainly include changes in education, research paradigm, personalized learning, intelligent education, analysis model, learning behavior, learning process, learning, perceptual learning data, analysts' analysis, analysis methods, social network analysis, artificial intelligence, data mining, machine learning and other knowledge visualization

3. Research on the Basic Theory of Education Big Data

3.1 Significance of Education Big Data

To make clear the meaning of education big data is the basic work of relevant research. Yang Xiangmin, sun Hongtao, Fang higang and other domestic scholars elaborated the significance of education big data from different perspectives. In a word, education big data has at least three aspects. The original education big data has data attributes. Education big data is a kind of information asset, which has great value. It provides the basis for improving learning performance, optimizes education process, and supports education decision-making[5]. The second education big data has technical characteristics. The whole life cycle of education big data, including collection, storage, analysis, mining and visualization application, needs to rely on special high-performance analysis technology and tools. Third, big data thinking in education. The arrival of the era of big data in education provides the core impetus for the transformation of education mode, the promotion of education equity and quality. Education big data has become the “fourth paradigm” of education science research. From the perspective of the characteristics of education big data, the common characteristics of general big data 4V, coupled with the characteristics of education big data, such as distinction, multi semantics, class, situation, tracking, and other clear domain names. Among them, context refers to the fact that education big data comes from real learning context; the level involves education big data, including human computer interaction layer, question answering layer, conversation layer, student layer, classroom layer, teacher layer and school layer[6]. Tracking involves learners' digital footprints, which can be tracked through education big data; time means that education big data changes with time.

3.2 Four Values of Education Big Data

As the result of the new stage of educational informatization, the big data of education has brought about a destructive change in traditional education, and has made a comprehensive digital reconstruction of learning, guidance, management and educational research.

Education big data provides data support for personalized learning and guides education with the essence of “teaching students according to their aptitude”[7]. Based on the comprehensive and large-scale data collection of learning process for learners, the knowledge state, problem-solving ability, thinking characteristics and the quality of the subjects are correctly measured and

intelligently diagnosed to support the development of individual education.

Table 2 Logical Mapping Of Business Requirements Technology Implementation of Big Data Application

Operation flow	Business needs	Technology realization
Generate data	Data capacity: double every 18 months	A unified big data processing method can realize the rapid processing of Haitong data
Aggregated data	Manage the complexity of big data, classify, synchronize, aggregate and integrate	A platform for data integration and management, supporting various tools, services and management
Analysis data	Current data warehouse and data mining technology promote the analysis of structured data	A real-time prediction and analysis solution, integrating structured data pool
Data utilization	Understand how big data affects business smart action transformation	Centralized sharing and collaboration not limited by time, place and equipment

The education model has changed from the traditional experience perception and calculation support education to the data-driven precision education. Education big data provides data support to help set correct education goals, control education process, select education strategies, evaluate and intervene education.

Education big data provides a scientific basis for improving education management ability and education governance level[8]. Moreover, the change of educational management mode from the original intervention to the original ante rules and regulations promotes the transformation of educational management mode from static management to dynamic management.

From the perspective of research, education big data, as a new perspective of education research, will promote the transformation of research paradigm of Education Science, from hypothesis based testing to data-driven transformation.

3.3 Science after Education Big Data Science

Data science is the science that appears with the emergence of big data. That's the science behind big data. Specific research contents include data generation, acquisition, accumulation, transmission, processing, visualization and utilization [9]. The specific application of data science in the field of education is called Education Data Science (EDS). The research object is the data collected in the educational environment. The purpose of this study is to solve the big problems of education through the big data of education. The research areas of education data science are divided into four areas: learner analysis, learning analysis / education data mining, system analysis, and system education improvement. Learning analysis and education data mining are the main fields of education big data research and application.

4. Research on the Technology and Method of Big Data for Education

Combined with the literature analysis of education big data, the research of technology and method literature includes the whole life cycle of education big data collection, integration, analysis and visualization. Generally speaking, there are integration and sharing of education big data, analysis and mining of education big data, visualization of education big data, etc.

4.1 Integration and Sharing of Education Big Data

The implementation of education big data application depends on a wide range of multi-dimensional, dynamic and complete process data resources. The interoperability between different data sources has become an important factor restricting the development of education big data. At present, some scholars and institutions have made some explorations and researches on the formulation of data standards, the design of data sharing architecture, data storage and sharing strategies.

4.2 Analysis and Mining of Education Big Data

Data is the basis of education big data analysis, and data analysis and data mining methods are

the key to the transformation of information, knowledge and value of resources. Then, the role of large-scale education big data also has a direct impetus. The analysis and mining method of big data in education is a common method in the field of data science, such as basic statistical analysis, data mining / mechanical learning, and deep learning. It includes not only content analysis, social network analysis, absorption and action analysis, but also drawing. research method

Education big data

4.3 Visualization Data

Visualization is the last step to realize the value of education big data. It can intuitively present the morphological characteristics of complex data and convey the value of data in a graphical way. Big data in education is becoming a problem. Now common visualization methods include basic charts, maps, tag clouds, dashboards, and so on. Among them, the visualization of education data mining results based on dashboard has become a new learning support tool in the era of big data that supports students' self cognition, learning reflection and self motivation.

5. Research on the Application of Education Big Data

The core value of education big data lies in its application. Based on the analysis of relevant literature and product research, this study divides the application of education big data into adaptive learning, task response, language learning, problem bank assessment and classroom teaching. Emotional care and others.

6. Conclusion

At present, the research on education big data focuses on the model construction, and the application has not yet entered the stage of normalization and popularization. Empirical research has gradually attracted attention, but the proportion is relatively small. Therefore, in order to optimize the use of big data, the future development of education big data will focus on the strategic teaching process, guide the acceleration method of education big data application empirical promotion project, on the other hand, the effect table of large-scale data It is clear that the exploration of large-scale data and empirical research methods based on sample data, using sample data beyond the existing empirical research, confirm and modify the model transition, for more specific analysis and case study, this is an urgent matter. Thus, the research direction of educational big data will transition from model construction to application practice and its effect research. Quantitative analysis methods such as multi-stage linear model and structural equation model are used to comprehensively and objectively evaluate education big data in the process of promoting individual learning and optimizing teaching. The effectiveness and reliability of the improvement of education quality are verified by the relevance of big data for the adjustment of education decision-making, and the application system of education theory is studied from technology, method and demonstration to complete technology.

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