

Discussion on the Construction of Regional Education Data Network and Key Issues in the Big Data Era

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Keywords: Regional Education Informatization; Intelligent Education; Big Data of Education; Educational Data Network

Abstract: Big data had infinite potential in helping to solve many problems such as unbalanced development of regional education, monotonous mode of education and perceptual selection of schools. In the research and analysis, the educational data network was constructed, and the overall structure was carried out with the educational data center as the core link, following the four-step construction strategy: "setting standards, building platforms", "gathering data, grasping management", "gathering data, grasping teaching", "using data to promote change". Five key issues involved in the construction process were proposed, namely, the collection mechanism of educational data, the integration and sharing of educational data, the open operation of educational data, the security protection of educational data and the quality management of educational data. Finally, some suggestions were put forward for the construction and development of education data at the regional and school levels.

1. Introduction

The big data of education can be divided into broad sense and narrow sense. Broad education data generally refers to all human behavior data derived from daily educational activities. In a narrow sense, big data in education refers to learner behavior data, which mainly comes from student management system, online learning platform and curriculum management platform. The most basic function of education is to influence economic development. Education has a tremendous impact on people's ideological and spiritual state, and regional network construction in the era of big data can promote the implementation of education and facilitate human access to education [1]. 2015 is the first year of China's big data on education. In this year, the policy documents to promote the development of big data in education were formally issued (such as the "Platform for Action to Promote the Development of Big Data" clearly put forward the construction of "big data in education culture"), which established the strategic position of big data in promoting education reform and development. China Institute of Educational Big Data and Jiangsu Key Laboratory of Educational Big Data Science and Engineering have been established one after another [2]. A variety of big data products of education are emerging in the market, which cover many businesses, such as test and evaluation, course teaching, college entrance examination service, matching of tutors, student management and so on.

2. New Thoughts on the Balanced Development of Regional Education in the Age of Big Data

The establishment of China's three major education basic databases, as well as the implementation of a unified and standardized electronic student registration system, will effectively integrate the nation's educational data resources and gradually form a standardized national education management big data. Dynamically supervise the teacher's change of posts, transfer of posts, and the trajectory of student status, transfer, and further studies, master the status quo of regional education development, simulate the future state of education in the region, rationally arrange educational institutions, allocate teachers, allocate education funds, etc., and achieve high-quality regional education [3]. Resource balance configuration

Education big data plays an important role in assisting science in formulating education policies,

balanced education development, improving education quality, optimizing teaching effects, and teaching students in accordance with their aptitude. At present, big data still has many problems in educational practice. The application of big data is based on the possession of massive data, which involves the challenges of data storage technology and the technical challenges for data processing and analysis [4]. For high-tech talents and professional data talents, China is still in a state of deficiencies. Secondly, in the educational application of big data, data collection and problem-solving analysis are the core links, and application developers have to face the challenges of data acquisition technology and problem-solving analysis technology [5]. This requires technical workers not only to have a strong and solid professional foundation, but also to have a strong mentality. It is necessary to continuously increase the cultivation of professional talents and promote the application of big data. In terms of teaching, digital teaching is moving toward smart teaching. Wisdom teaching is a teaching activity in which teachers use all kinds of advanced information technology and information resources in a smart teaching environment [6]. Compared with traditional digital teaching, smart teaching is more efficient, open and diverse. Communication between participants in teaching activities is smoother and more interactive. Teachers' preparation, assignment correction, and teaching evaluation are more intelligent.

3. The Construction of Regional Education Data Network under the Era of Big Data

3.1. Education Data Network Architecture

The construction of the district education data network is closely related to the large platform. The data is generated by the application systems deployed by the district and the school, and flows between the data center and each application system. At present, education data networks at all districts and counties in China often use the education data center as the core link to carry out the overall structure. As shown in Figure 1.

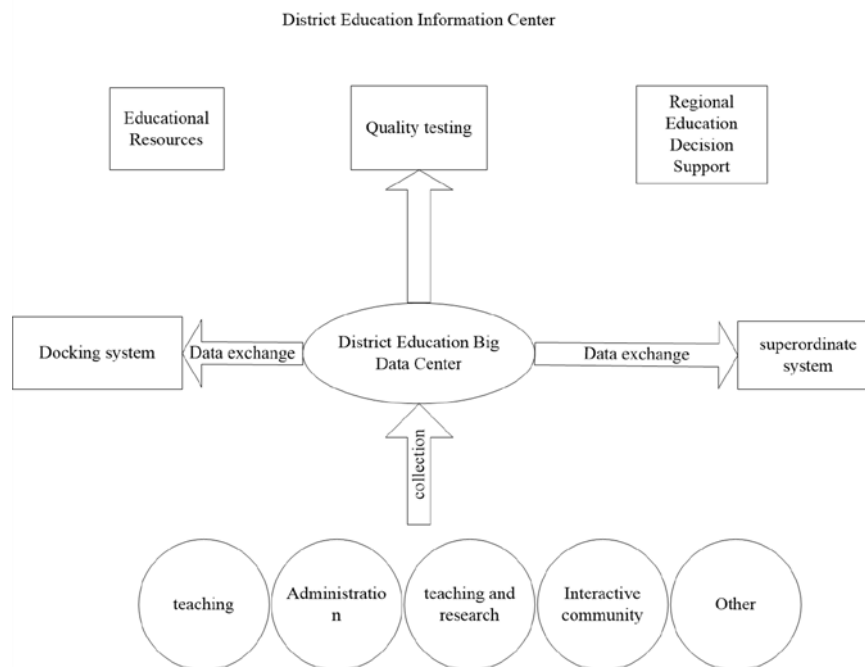


Fig.1. Educational Data Network Architecture at District and County Level

The education data center is the core module of the regional platform, and is the intermediate node for large-scale data storage and information circulation, providing educational information sharing services for the whole region. The data center collects the basic data generated by the four major cloud application systems and the data generated by the application systems of each school. It stores a large amount of data, while effectively managing data, and provides means of data access, providing a platform for system integration and data sharing between systems to ensure the timeliness, integrity and consistency of data.

3.2. Educational data network construction steps

Strictly speaking, there is no unified construction model and implementation path for the development of regional education big data. However, the development of China's educational big data is in its infancy as a whole, lacking practical examples and experiences for reference. In order to further promote the development of big data in education in the country, we will outline the implementation path of regional education big data, and hope to play a guiding role. The development of regional education big data is a process from low-level to high-level development, and its construction and application promotion can be roughly divided into four stages (as shown in Figure 2). The development priorities of these four stages are different, but they are not determined to be separated. There is a certain overlap and overlap between development tasks.

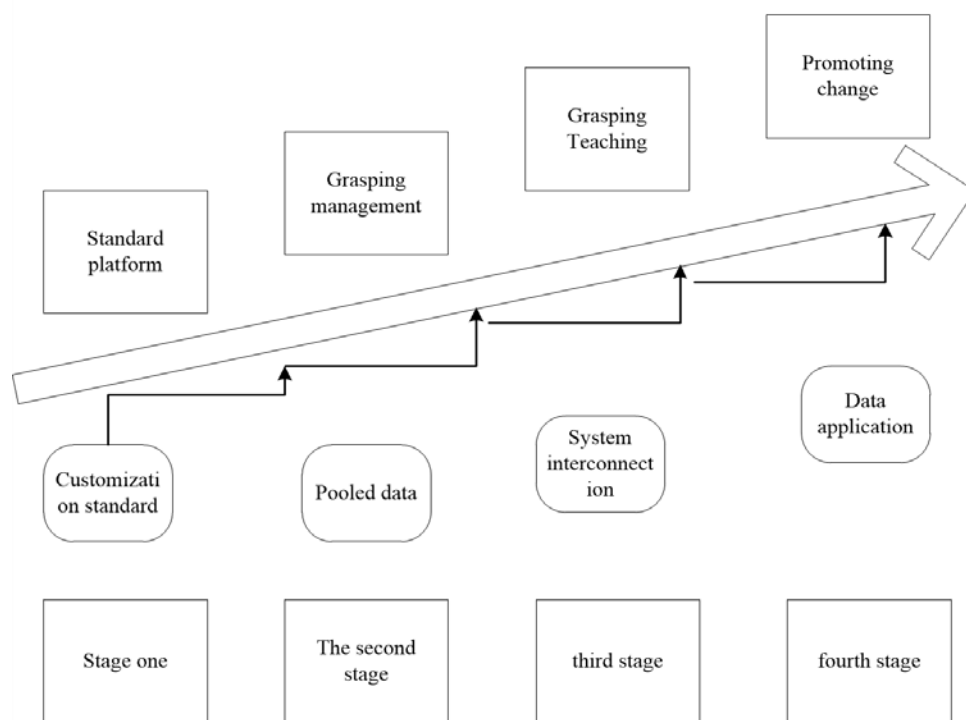


Fig.2. Regional Education Big Data Implementation Path

The first stage is to set standards and build platforms. This paper comprehensively combs and analyses all kinds of existing educational information application systems in the whole region, and plans the collection scope, technology and mechanism of educational data in the light of regional educational development strategy and actual needs. Comprehensive the existing national, provincial and municipal education informatization standards, formulate regional education data construction standards. Applying cloud computing technology to build the basic supporting platform of regional education data center.

The second stage: gathering data, focusing on management. Open the data transmission channels between the data center and various management application systems, focusing on the standardized collection, storage, sharing and analysis of all kinds of education management data. To realize the interconnection and interoperability with the management information systems of the state and provinces [7]. Actively explore the reform of data-based education management model, research and development of data application systems such as education decision support, education quality testing, education development evaluation and so on. Develop special training on data literacy improvement for educational managers.

The third stage: gathering data and focusing on teaching. Open the data transmission channels between the data center and the teaching and research application systems, focusing on the collection of effective data in the process of teaching and learning as well as teaching and research training [8].

Educational data mining, learning analysis, visualization and other key technologies, research and development to promote students' personalized learning, teachers' personalized development of various application systems and intelligent tools [9]. Teachers are encouraged to explore innovative application models of big data in promoting teaching, accumulate excellent cases and share them. Develop data literacy training for teachers and researchers.

The fourth stage: using data to promote change. According to the massive educational data gathered in the previous stages and the experience of data application accumulated in management and teaching, the action plan of innovative application of educational big data is launched [10]. Introducing high-level research and think tank teams from outside, exploring and popularizing the application model and practical cases of big data in promoting regional education development and change, forming a culture of using data to carry out education management, decision-making and teaching activities, and realizing the successful reform of regional education driven by data.

3.3. Key Issues in the Construction Process

The collection mechanism of educational data. The construction of regional education big data needs comprehensive application of various data acquisition technologies, including four categories (Material Link Perception Technology, Video Recording Technology, Platform Acquisition Technology and Image Recognition Technology), and thirteen common technologies. The range and emphasis of data collected by each technology are different.

Internet of Things (IOT) sensing technology is mainly used to collect equipment status data and students' physique data. Video surveillance technology is mainly used to collect campus security data. Intelligent recording and broadcasting technology is mainly used to collect classroom teaching data. The technology of online evaluation and online reading is mainly used to collect data of students' examination results, while the lattice digital pen technology is mainly used to collect data of various assignments, exercises and examinations. Photo search technology is mainly used to collect students' homework practice data. Emotional recognition technology is mainly used to collect emotional data in students' learning process. Log search analysis technology is mainly used to collect operation and maintenance log and user log data. Online learning and management platform technology is mainly used to collect various online learning and management data. Mobile APP technology is mainly used to collect various mobile learning process data. Wearable technology is mainly used to collect individual physiological data and learning behavior data. Campus card technology is mainly used to collect all kinds of campus life data; network crawler technology is mainly used to collect educational public opinion data.

In order to ensure the sustainable collection of high-quality education data, the following points should be paid attention to in the process of practice. The acquisition needs to be planned and designed in advance, including the scope of data acquisition, the data acquisition technology used, the deployment of data acquisition environment, the guarantee measures of data acquisition quality, the application purpose and scene of data acquisition, the storage scheme of data, the update mechanism of data, the exchange standard of data, etc. The acquisition needs a clear boundary, rather than blindly collecting any educational activity data. The range of data collected depends on the purpose of data application. Collection should maintain continuity and standardization, adhering to the concept of "continuous creation of value, standardization and promotion of value". On the basis of guaranteeing data validity, data granularity should be as small as possible in order to excavate more potential value. Collection should conform to ethics and morality, and the subject of data generation should have certain right to know and choose.

4. Conclusion

The big data of education is not only an important asset for the development of regional education, but also an important force for promoting scientific innovation and precise change of regional education. The great significance of "big data" in economic development does not mean that it can replace all rational thinking on social issues. The logic of scientific development can not be obliterated in mass data. Education should quicken its pace in the torrent of social progress, properly

abandon the disadvantages of traditional education, vigorously develop education by making use of the convenience brought by the era of big data, so that education can continuously inject fresh blood and better face the unknown future. The construction of district education data center is not "from scratch". It should integrate existing hardware and software resources effectively and protect existing investment.

Acknowledgement

In this paper, the research was sponsored by the Guangxi Key Laboratory of Cryptography and Information Security in 2019: "A Study on the Key Technology of Vehicle Warning System Based on the Deep Learning of fine-grained classification (No.GCIS201812)".

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