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Research on the Application of Big Data in Education

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Abstract: In the context of the big data era, artificial intelligence, data analytics and other technologies related to big data are developing rapidly and are gradually being applied in various industries to become important tools in various fields. The combination of development with big data technology also becomes the inevitable development direction of each industry. In education, it is also necessary to seek change and development, so the combination of education and big data technology enables the education industry to better explore the future development direction and possibilities. This paper uses the method of literature review to study the use and opportunities of big data in education, and considers the possible future directions and risks of its use. The integration of big data technology and education can effectively solve the problems of traditional education and has a lot of room for development. The use of big data technology helps education to better adapt to the characteristics of each student and achieve personalized education and development. The research in this paper provides a direction for the development of education, and puts forward a practical path of combining with big data, and puts forward reasonable suggestions for the development of the education field.

Keywords: Big Data, Education, Change, Convergence, Development

1. Introduction

Nowadays, in the rapid progress of science and technology, the application of data penetrates into all aspects of people's lives and brings convenience to people, such as preference recommendation by shopping software and route planning by map software [1]. In the past decade, relying on the development of networks and hardware, big data technology and machine learning algorithms and other continuous improvement, the computing power has been substantially improved, which has brought about an impact on production and daily life, as well as new opportunities for education, which makes education actively seek changes. Education in the traditional sense refers to an education model centered on schools, teachers, and textbooks, emphasizing knowledge instillation and passive acceptance by students. This type of education was seen as a model of success for a period of time in the past, and countless Chinese families viewed it as a guarantee of their children's future success. However, with the development of society and the advancement of science and technology, the shortcomings of traditional education have gradually appeared, such as the lack of innovation ability, over-reliance on memorization, neglect of individual differences, restriction of students' development, and lagging knowledge [2].

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The use of big data can help educational resources break through the geographical and spatial limitations, which is conducive to the optimal allocation of educational resources. Teachers can have more educational resources in the teaching process to achieve "tailored teaching", so that students from fuzzy learning to accurate positioning. In addition, compared with traditional education methods, the new type of education combined with big data technology can effectively collect students' learning progress data, homework completion, check-in status and other information. This can help to deeply understand the interests and learning preferences of each student, so as to make different learning plans according to different situations to meet the individual differences of students. Therefore, the use of big data technology in the field of education has great potential and development space.

Therefore, this paper uses the method of literature review to study the use of big data technology in the field of education, thinking about the possible opportunities and current drawbacks, and pointing out the direction and providing suggestions for the high-speed development of the field of education in the digital era.

2. Applications

2.1. Assisting teaching in the classroom

The application of big data technology in classroom teaching can assist the teacher in controlling the classroom and managing the classroom environment. During the course, it can assist teachers in responding to questions posed by students, and optimize the teaching method and preparation efficiency by allowing teachers to quickly obtain videos and auxiliary materials related to classroom knowledge. In addition, face recognition technology can effectively detect the state of students to maintain school discipline, such as whether they are distracted in class and whether they cheat during exams. In addition, in terms of the degree of students' academic completion, teachers can utilize the relevant system to effectively identify the completion of students' homework and analyze the completion of students' homework on this basis, in order to assist teachers in understanding the degree of students' mastery of classroom knowledge. In language-related courses, speech recognition technology can be used to identify students' mastery of the new language and learning progress. In terms of exams, big data technology can help teachers quickly read papers and intelligently analyze students' problems, avoiding the repetitive work of teachers [3].

2.2. Personalized tutoring outside the classroom

Outside the classroom, big data technology can be based on the different circumstances of each student to develop a personalized learning plan and personalized learning, including different levels of difficulty and different knowledge boards of learning content. This improves students' learning efficiency while avoiding repetitive learning of already mastered knowledge. A personalized learning recommendation system provides customized learning resources (e.g., courses and test papers) for each learner based on the student's interests, learning history, and learning characteristics, and with the help of multiple algorithms to analyze learning behavior data and personal characteristics. Such a system can greatly improve learners' learning effectiveness and satisfaction, and promote deeper and more efficient student engagement in the learning process [4].

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3. Evaluation

3.1. Benefits

3.1.1. Transformation of education mode

At present, based on the diversity of learning tools and learning methods, the education model has changed to a combination of online and offline education model. While students complete their coursework offline/in the classroom, they also need to complete the homework, exercises and lessons assigned by the teacher outside the classroom. This combination of online and offline education greatly utilizes the limited time available in the school classroom, allowing the teacher to focus on teaching a fixed course of knowledge in the classroom, improving the efficiency of the vocabulary course, and the student does not need additional time to consolidate his/her knowledge after completing the effective classroom learning. And in the classroom, the teacher can also through online means, to carry out the questioning and examination of the students, to check whether the students are serious in the learning process.

3.1.2. Rationalized allocation of educational resources

After the use of big data technology, teachers can arrange different teaching methods and teaching contents according to the students' situation fed back by big data analysis. This can effectively improve the teacher's energy and use it in more critical teaching aspects. Moreover, based on the big data analysis, teachers can find out the weak points of students' knowledge from the analysis results, so that they can teach accurately and efficiently. It is vastly different from traditional learning methods, in which all knowledge points are consolidated mechanically and repetitively, making traditional methods time-consuming and inefficient. Based on the assistance of big data, teaching and learning methods can be optimized and improved. In addition, when students use online exercises, big data will give each student personalized tutoring [5]. The knowledge that has been learned is no longer repeated, on the contrary, the knowledge that does not know will keep repeating the practice until the student learns it. Currently, there are cases of using big data technology to assist personalized tutoring in various subjects from high school to university courses [6-7].

3.2. Defects

3.2.1. Data accuracy cannot be guaranteed

Currently, each educational software on the market distinguishes between students and teachers, with students using the student terminal and teachers using the teacher terminal. The teacher's terminal will display the information collected through the student terminal and the results derived from the analysis of this information, which is the best way for teachers to understand the learning outcomes of students. However, there is no guarantee of the accuracy of the information collected. Nowadays, APPs and WeChat apps provide the functions of signing in for students, swiping lessons, answering questions, and even signing on behalf of students, and online exams have increased the prevalence of cheating and the possibility of cheating [8]. This results in the collection of false information, which in turn leads to incorrect analysis based on the inaccurate data, giving incorrect feedback to the teachers who use it. Teaching methods developed on the basis of false information are not able to respond in a timely and correct manner to the potential pitfalls that may exist in the learning process of students.

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In addition, some of the software is not fully functional and does not have complete anti-cheating measures. If such software is used to test or practice with students, it is not possible to get positive feedback on students' learning progress, and the testing method loses its effectiveness. In addition, the inability to guarantee the accuracy of the data collected is also a problem that needs to be solved.

3.2.2. Algorithmic Bias

The term "bias" is often used in life value judgment, meaning an unfair value evaluation or value judgment of a thing or a phenomenon. Generally speaking, it is often believed that bias exists only in the subjective determination of human beings, which is affected by emotional and other perceptual factors, while algorithms, unlike human beings, consist of only 0 and 1, and can always maintain objectivity. But in reality, algorithmic bias still appears [9].

Algorithmic bias can inhibit creativity and imagination, it can keep people from pursuing progress, and it can keep people from realizing their own flaws and falling into a comfort zone. If the algorithm is limited to its own question bank, the test questions uploaded by the teacher, etc., it will wrongly judge the current situation of the students, so that the students will not make progress and keep indulging in the "excellence" given by the algorithm.

3.2.3. Security risks of user privacy

In the current network society, the leakage of personal privacy will bring very serious consequences to personal safety and property security. Personal information includes an individual's name, address, date of birth, identity card number, medical records, personnel records, photographs, and other information that, alone or in combination with other information, identifies a specific individual [10].

Software used in teaching collects personal information of students, teachers, or other users in the process of using it, and if the relevant information is obtained by unlawful elements by illegal means because it is not properly protected, it may be used for various illegal activities, thus exposing personal and property safety to enormous risks. In addition, there are security risks such as the theft of social accounts, the theft of emails, and the dissemination of private photos or personal events [11].

4. Future Optimization Direction

4.1. Strengthening the data collection link

In response to the problems associated with data collection, checking measures on data collection steps can be strengthened. First of all, it needs add and enhance the prevention of "cheating" software and small programs, through the perfect security measures to make the generation of false information, such as signing on behalf of the brush class, or even eliminate the emergence of such behavior. Moreover, through the account and cell phone binding form, to achieve "one machine for one person", "one person for one account", to prevent the phenomenon of one person signing on behalf of many people. In addition, cutting-edge technologies can be used, such as TrackingJS library + Baidu cloud face recognition course check-in system, which uses a variety of big data cutting-edge technologies combined to construct a reliable check-in system [12].

4.2. Enhanced integration with online courses

Nowadays, various video platforms have different professional directions and different focus types of online classes provided to users, such as the series of math classes on bilibili, etc. The quality of

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these courses can not can not be unified, and it is very difficult for students to distinguish the quality of the online classes through their own ability. Therefore, quality online classes can be screened out in advance through algorithms or the background, and provide viewing channels on the learning software. In addition to classroom teaching, offline teachers can allow students to combine online classes with online classes to pre-study or review the knowledge they have already learned. While reducing the burden on the teacher, it provides students with a variety of learning channels. In addition, the university MOOC about the combination of online classes and homework is also a good example. Blended teaching refers to the mixing of online and offline, which improves the shortcomings of E-Learning by introducing face-to-face teaching [13]. And the current progress and application of big data technology makes blended teaching more effective, and students can analyze the big data technology to find the weak part of their learning and strengthen their learning.

5. Conclusion

The combination of big data technology and the field of education can be a good solution to the shortcomings of traditional education, and is conducive to the progress of teaching. In addition, it can achieve personalized development and learning counseling for each student, and can help share the pressure and workload of teachers. With the continuous development of technology and the continuous improvement of the education model, the combination of big data and education will be more three-dimensional, will provide better assistance for students and teachers. In the future development of society, it is necessary to fully develop the combination of big data technology and the direction of education, and to strengthen the application of big data in teaching methods and educational concepts. The big data platform on which the big data technology relies needs further construction and technical development, so as to provide technical and professional support for the development of China's education field. However, there are shortcomings that can be optimized in the research process of this paper, including the lack of relevant social surveys and interviews, as well as the lack of relevant data collection and data analysis, so the views and themes of the article are mainly based on the summary and overview of the literature. In the future, improvements can be sought in the survey method and analysis method.

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