

# RESEARCH ON THE INFLUENCE OF HIGHER EDUCATION TEACHING DESIGN AND EVALUATION UNDER THE FRAMEWORK OF INTERPRETING LEARNERS' GROUP CHARACTERISTICS

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## Abstract

Based on the analysis of learners' cognitive state, learning style and other data, big data uses the analysis model to build an interpretation framework that describes learners' characteristics and learners' group characteristics, so as to achieve a better understanding of learners before the implementation of instructional design, as well as the integration and integration of learning resources in the process of instructional design. By interpreting the data, finding the difficulty of learning content, mining and presenting the rules of learners' learning result data, we can better determine the effectiveness of the teaching process, predict the future learning trend, and promote the continuous adjustment and improvement of teaching content.

**Key words:** big data, group characteristics, higher education, teaching design and evaluation

## 1. INTRODUCTION

Big data and artificial intelligence technology provide technical support for the realization of personalized learning. "Intelligent education" [1,2] has become an important part of the national strategy of artificial intelligence, and has been written into the new generation of artificial intelligence development plan of the State Council and China's education modernization 2035 as a key task. In March 2019, the Ministry of Education held a seminar on intelligent education strategy research in Beijing, which proposed to promote the reform of education mode and ecological reconstruction supported by emerging technologies such as artificial intelligence, big data. In December, 2021, the 2021 smart education development blue book analyzed and prospected the education evaluation industry ecosystem, market competition pattern, technology application trend and industry development trend under the empowerment of smart technology.

With the help of emerging computer Internet technology, big data storage and mining technology and deep learning technology [3,4], this paper aims to deeply explore and analyze students' basic information through computer means, broaden education methods, explore students' potential and potential, and make exploratory research and attempts for intellectual education to be more practical and improve quality. Intelligent education technology based on big data cloud computing [5-7] strives to break away from people's subjective influence, truly realize the objective analysis and evaluation of students' real potential, recommend a variety of training programs, help users customize improvement plans for students' characteristics, students formulate their own learning programs according to their own interests and goals, and use the system to supervise and feedback the implementation of their own programs. Teachers and parents can find the advantages of each student in a timely manner through the system to guide the situation,

truly teach students according to their aptitude, comprehensively implement quality education, strive to improve the quality of education, and cultivate students' innovative spirit.

When analyzing the impact of big data on higher education, this study follows the principle that higher education takes cultivating talents as the core, focuses more on the application of big data technology in teaching activities, including the impact of big data on teaching design, teaching evaluation and teaching management of higher education, and gives new trends and technological breakthroughs in the application of technology in higher education teaching activities, in order to realize the personalization, popularization and popularization of higher education Sharing and open development provide ideas for technology application.

## 2. CONCEPT AND CHARACTERISTICS OF EDUCATION BIG DATA

As the application of big data in the field of education, educational big data has not been clearly and uniformly defined by educational institutions at home and abroad. Education big data can be understood as an education data set that involves a large scale and a wide variety of education data, so that traditional processing tools cannot effectively capture and process it. Education big data mainly has the following characteristics:

- 1) Large amount of data is the primary feature of education big data. With the development of information technology, most schools use advanced information management systems for teaching management. The comprehensive integration of teaching management and teaching resources will produce and record a large amount of teaching information[8]. In addition, more and more learning behaviors occur on the Internet, which also leads to the explosive growth of the amount of educational data generated by online learning platforms.
- 2) Traditional education data is more focused on statically recording students' test scores, while education

big data has the ability to track and master students' learning dynamics, such as students' attention concentration time, the number of questions answered, etc. These data are dynamic and rapidly changing.

3) Education big data is of great value to students, parents and teachers. It can help students improve their academic performance, help parents understand students' learning behavior, and help teachers improve teaching programs to ensure that each student receives effective and efficient customized education.

4) Traditional education data has obvious structural characteristics, but with the rapid development of teaching means and teaching tools, the variety of education data continues to increase, and the data structure becomes more complex, forming a variety of heterogeneous education big data[9], such as teaching video, audio, log, email, etc. These unstructured data hide a lot of information, such as students' learning attitude, ability and preference. Educators in the era of big data should learn to use and analyze these different types of education data to restore the integrity and authenticity of students' learning.

### 3. ANALYSIS OF THE IMPACT OF BIG DATA ON THE DEVELOPMENT OF HIGHER EDUCATION

The core of the direct impact of big data on the development of higher education is that big data is used as a technical means to optimize the teaching process of higher education. The innovation of higher education teaching activities brought by technology is the direct force driving the development of higher education. Next, we will study the different influence and characteristics of big data in teaching management, teaching evaluation and teaching design.

#### *A. Analysis and Research on the impact of big data on higher education teaching management*

The biggest impact of big data on higher education teaching management is reflected in the easy access and controllability of decision-making information in the teaching process. Higher education teaching management based on "data management" can enable teachers, students and education managers in the teaching process to obtain the data they need, and make decisions conducive to the teaching process based on the prediction of learning behavior and learning trend based on the data, as well as the data analysis generated in the learning process[10]. Traditional teaching management adopts more empirical decision-making methods. A priori information comes from the information obtained by observing things before. Big data technology relies more on actual information, that is, it obtains information in the teaching process of walking with data to make management decisions. For teachers, traditional teaching decisions mainly rely on Teachers' personal teaching experience to judge students' learning behavior and make teaching decisions in the teaching process. Teaching decisions under big data are generated based on data evidence and through the scientific analysis of students' learning process and learning results.

Taking the data flow in the teaching management process in the adaptive learning system[11,12] as an

example, the whole adaptive learning system includes five information feedback loop data flows to realize the common participation of learners, teachers and education managers in management and decision-making. The first step of data flow is the interaction between students and learning content. In the second step, the interactive content is stored in the student learning data system. The third step is to apply educational data mining and learning analysis technology to analyze the prediction model based on extracting students' learning data and background data, and then transfer the results to the adaptive engine. Fourth, the adaptive engine makes learning adjustments for specific students, and these adjustments are shown through the changes of learning content strategies and learning content. The fifth step occurs at the same time, and the prediction results can also be conveyed to teachers and managers through the data visualization panel. When students, teachers and managers get relevant information, the whole feedback loop can be completed. At this time, students can reflect on themselves according to the results, while teachers and managers can decide whether to intervene.

#### *B. Analysis and Research on the impact of big data on higher education teaching evaluation*

Quantitative analysis thinking based on data is the main line for big data to affect the teaching evaluation process of higher education. It selects diverse, large-scale and real-time massive data to build a model to explain the correlation between multiple data variables, visually interpret the results, and implement multi-directional, multifaceted, full sample and whole process evaluation on learners, teachers and teaching process, visually present the results, and digitize the teaching evaluation process. Big data technology can record the data of the whole process of teaching activities. The scope of data collection and analysis runs through all processes of teaching activities, from course input, teaching activity process to learning outcome output, so as to achieve effective analysis and supervision of teaching activities. In the past, teaching evaluation paid more attention to the evaluation of teaching results to draw a qualified end-point conclusion, while big data extracted information based on a large number of data such as learner behavior, learner embedded test results, teacher-student interaction data, etc., truly and objectively reflected the state and problems that students maintained in the learning process, and through the collection of variables for modeling and analysis, the final feedback obtained the student learning analysis report, It is used to test the learning theory to guide the next stage of learning practice, provide an important basis for teaching decision-making, and will undoubtedly promote the improvement of higher education teaching quality. Taking students' homework correction process as an example, homework evaluation under big data thinking is based on data, model analysis, and visual presentation of results. It is worth noting that the end point of big data evaluation is not to identify the

correctness of learning results, but to get the curve of students' homework methods, homework thinking, and homework attitude development, so as to find the teaching laws existing in this actual teaching process. Big data can also analyze the data of teacher-student interaction and student-student interaction activities, and extract information conducive to improving course content and learning process by using text mining, multimedia mining and other means.

### *C. Analysis and Research on the impact of big data on higher education teaching design*

In the design process of teaching resources, big data, based on multimedia teaching resources such as text, video and audio, gives full play to the functions of acquiring, collecting, analyzing and managing complex data, and realizes the integration and integration of learning resources shared by learners and learning resources independently generated by learners, so that teaching resources are no longer limited to teachers or teaching platforms, but will be more shared. Independent teaching resources are incorporated into teaching resources. Ideal teaching feedback is bidirectional and occurs in the teaching process, which cannot be reflected in the current teaching design. The reason is that there are great difficulties in capturing and analyzing information. Big data is changing this process. Previously unavailable learning data can be used for the supervision and adjustment of the learning process, which can be quickly fed back to learners to improve learning understanding and academic performance. At the same time, it can be fed back to teachers to improve teaching effects, supplement students with required specific learning materials or correct teaching errors in time, and feed back to education managers to realize real-time correction of the teaching process, improve the teaching system and implement decision-making intervention based on data.

Choosing effective teaching resources, teaching processes and feedback mechanisms through the probability prediction of big data, mastering the individual characteristics and difference descriptions of learners, monitoring the overall learning situation and predicting learning behavior are the ways for big data to enhance the effectiveness of higher education teaching design. Big data can classify student groups on the basis of data clustering analysis, clearly describe individual differences, selectively push learning contents and learning plans, and achieve the purpose of predicting students' learning behavior through the analysis of the correlation between learning results, learning resources and teaching behavior, so as to increase the selectivity of teaching plans and improve the effectiveness of teaching design.

## **4. THE IMPACT OF BIG DATA ON SCHOOL ADMINISTRATORS, TEACHERS AND STUDENTS**

### *A. Impact of big data on school managers*

A large amount of data will be generated in the process of school teaching. These originally scattered data will be mined, collected and constructed from the original departments, teaching and research groups, grades, classes and teachers of various subjects, and a perfect big data platform will be gradually established. Then the data will be refined, analyzed and studied, so that school managers can find the reform needs of school teaching, Grasp the reform direction sensitively and accurately, and put forward the reform objectives that meet the actual situation and development needs of the school. The informatization of school management system is an important trend of school teaching reform.

As the teaching department responsible for school teaching affairs, it should pay more attention to the informatization of the management system, establish a perfect big data platform, which can clearly reflect the development history and current situation of the school, and predict the future development and changes of the school. Through the big data platform, school managers understand the situation, problems and trends in teaching, as well as the suggestions of teachers and students. Strengthen the teaching function of teaching supporting organizations and facilities such as libraries, laboratories, special classrooms and professional classrooms. Grasp the changes of school running quality and the results of various investigations and assessments. The big data platform connects teaching and teaching evaluation to improve the teaching quality of the school. Through the analysis of teachers' teaching data, we should change the previous summative evaluation method for teachers, avoid the one size fits all evaluation of teachers, and pay attention to the formative evaluation of teachers.

### *B. Impact of big data on students*

Through the analysis of students' participation in teaching activities and learning situation, their scientific and cultural knowledge and skills, the development of intelligence and physical strength, and the formation of morality, help students explore their own weak links, and avoid blindness and repetition of teaching. In school teaching, we should analyze the reasons and processes behind students' academic scores through the big data platform, integrate, correlate and interpret with students' usual homework completion, classroom performance and data and information in extracurricular activities, so as to help students solve problems in a refined, personalized and efficient manner and improve learning results.

### *C. Impact of big data on school teachers*

The big data platform can effectively guide teachers to carry out professional skills of teaching and scientific research activities with classroom as the main position, student development as the purpose and subject teaching as the main content, and improve teachers' scientific research level. Professional skills to supervise teachers to complete teaching tasks and achieve teaching goals, so as to make teachers' teaching behavior scientific and reasonable. With the support of big data platform, it helps to implement interdisciplinary teaching and research, cross school teaching and research, and cross

time and space teaching and research activities, and changes the limitations of traditional teaching and research. Teachers should pay more attention to the relationship between learning and life practice data, and the focus of teaching should be changed from receiving knowledge to practical application. Getting through the data of each school will help to realize resource sharing, system optimization, concept updating, and ultimately serve the improvement of teachers' teaching ability, accurately grasp the problems of students in all aspects of morality, intelligence, physical education, art and labor, and solve the problems efficiently and pertinently.

##### 5. CHALLENGES FACED BY PERSONALIZED LEARNING BASED ON BIG DATA

The application of big data technology in the field of education is a big impact on the traditional education model, and will lead education into a new era of personalization. But in practical application, there are also some problems.

The premise of big data technology is to have massive data, which can provide timely and accurate data analysis for teaching. But now many schools' teaching is still dominated by traditional classroom teaching, and the data collection and analysis may lag behind, which is bound to affect the effectiveness of the final analysis results. Therefore, in the field of education, if big data technology wants to play its due role, schools should strengthen the construction of educational informatization and improve the ability of data processing and analysis in teaching, so as to truly realize students' personalized learning and improve teaching efficiency.

The application of big data in higher education is based on education big data. The massive data based on teaching, scientific research and management constitute education big data. These huge data also contain great value, which can reflect higher education teaching and scientific research management in more and more real-time, but it is undeniable that these data are mixed with a lot of "wrong information", And the diversity of data determines the universality and complexity of massive data sources. These reasons make education big data large in scale but low in quality. In the face of a large amount of complex and diverse data, how to ensure the high quality of data extraction is still a problem at present, which has become an important factor restricting the development of big data technology.

In the process of data collection, it is necessary to track and record students' learning behavior and conduct data mining, which will inevitably involve students' privacy information. At present, the laws and regulations on personal privacy are not sound enough. Therefore, the application of big data technology in the field of education will involve double challenges from law and morality. When collecting, processing and analyzing educational data, we should obtain the recognition of students and parents, and formulate laws and regulations related to the protection of students' information privacy to ensure that all collected educational data will be applied to the improvement of educational mode.

For college teachers, the application of big data means the production of teaching structure and teaching methods, the transformation of scientific research methods, and the reshaping of teachers' role and quality in the application of educational technology. These changes will inevitably put forward new requirements for their knowledge structure, quality and ability, which means that college teachers need to break through the formed teaching and research mode and explore a new teaching and research method that meets the needs of big data. This is a difficult process for teachers, so it also constitutes an important resistance for big data to be accepted and recognized by higher education.

##### 6. CONCLUSION

To sum up, big data can comprehensively record students' growth records and conduct scientific analysis, so that students can better understand themselves. Through the big data platform, students' behavior data such as school classes, meals, book borrowing, dormitories, physical exercise can be collected in time, so that school leaders, educational administration, students and teachers can comprehensively grasp each student's school situation, and help instructors understand students' grades and students' learning efforts in school help them improve their academic performance. The project builds an integrated platform of educational big data, depicts the characteristic information of students, can accurately help students predict their grades and career tendencies, study students' life and learning trajectory, provide support for teachers to optimize teaching management, and provide reasonable suggestions for higher talent training in colleges and universities.

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