Application Analysis of Big Data Technology in Art Education Curriculum System

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Abstract: With the arrival of the era of big data (BD) thinking and application, information technology has gradually evolved from the original technical level into people's lifestyle, which has promoted a series of educational changes. This paper mainly studies the application analysis of BD technology in art education curriculum system. This paper first analyzes the arrival of the BD era and the characteristics of the BD era, which lays a good foundation for the study of BD technology on the art education curriculum system. Then the data literacy questionnaire survey was conducted on the art students of a university, and the acceptance and understanding of BD by the art students were obtained and analyzed. Finally, it proposes to apply BD technology to reform the art education curriculum, and innovate the art education curriculum system by updating the concept, clarifying the template and exploring the reform path.

1. Introduction

With the rapid development and iterative updating of information technology, we have quietly entered an intelligent era of BD [1]. BD is profoundly affecting and changing all walks of life in society, bringing major breakthroughs to the solution of many practical problems, and also a huge impact on our traditional way of thinking, living habits and knowledge system. It can be said that challenges and opportunities coexist [2]. In the report of the 19th National Congress of the Communist Party of China, the content related to the Internet was mentioned eight times. When talking about the achievements in the past five years, it was discussed that the management and application of Internet construction were constantly improved. It also discussed the important role of the Internet in promoting the prosperity of socialist culture, comprehensively promoting the modernization of national defense and the army, and promoting the construction of a community with a shared future for mankind, and advocated that we should attach great importance to and develop online education [3]. It can be seen that the arrival of the BD era has brought new impetus to the innovative development of China's economy, promoted the continuous progress of China's education, and created more conditions conducive to the development of all aspects of society.

In the application of BD education, the University of Northern Arizona uses the global positioning system to check the attendance rate. In addition, when students' personal academic research and works are plagiarized or falsified, students will automatically receive notification

information. Students can also give feedback on the problems of the system [4]. Purdue University in the United States applies the course signal system in the classroom. This system can give early warning to students' writing and performance, and remind students who do not take classes seriously and are inefficient in class, so that teachers can intervene in advance, so as to gradually improve students' attention and learning efficiency [5]. Bor State University has developed a visual collaborative knowledge analysis and application platform, which is mainly used for students' communication and cooperation. It has designed interactive functions, which can facilitate students from different regions to communicate with each other. However, this technology has not been popularized [6]. But the domestic related research is still imperfect.

This paper hopes to add a new, closely following social development and more effective education method to China's art education through the continuous development of new technologies that have a more and more profound impact on life, so that China's art education can establish students' interest in art and improve the overall Art Literacy of the Chinese people.

2. BD Era and its Characteristics

2.1 Arrival of BD Era

With the improvement of information technology in all walks of life, various business data exploded in the form of geometric evolution. There are different forms. Some information can be found in relational databases. Some data exists in the form of text editing and email files. A large amount of information is stored and published on the Internet, as well as information found in rich video, image and audio files. In the face of data in various formats and complex contents, it is no longer possible to analyze and edit them the previous way. Advanced analysis tools are needed to create or use a structure that facilitates people to perceive and interact. The concept of BD was therefore created [7].

In recent years, from research, application to industrial development, BD is gradually enriching from a single "data set" concept to a comprehensive system combining data, technology and industry. In general, BD is not a simple individual element, but a set of data with its own characteristics. It can also be considered as advanced technology, which can collect, sort and analyze complex data. Its ultimate value lies in the use of new technologies to obtain useful information from mass data, analyze and predict the future and resolve existing problems in a timely manner [8].

The era of BD is a new era of social development. On the one hand, the era of BD shows its unique advantages. Supported by BD technology, the influence of BD thinking is gradually expanding. On the other hand, the changes triggered by the BD era can not be ignored. It changes the way people know and understand the world, has a wide impact on all walks of life, and makes social life networked, digital and diversified. It can be seen that the arrival of the BD era is an unavoidable fact. Only by grasping the opportunities of the BD era can we seize the opportunities and win in development [9-10]. As shown in Figure 1, the main technical demonstration of each link of big data
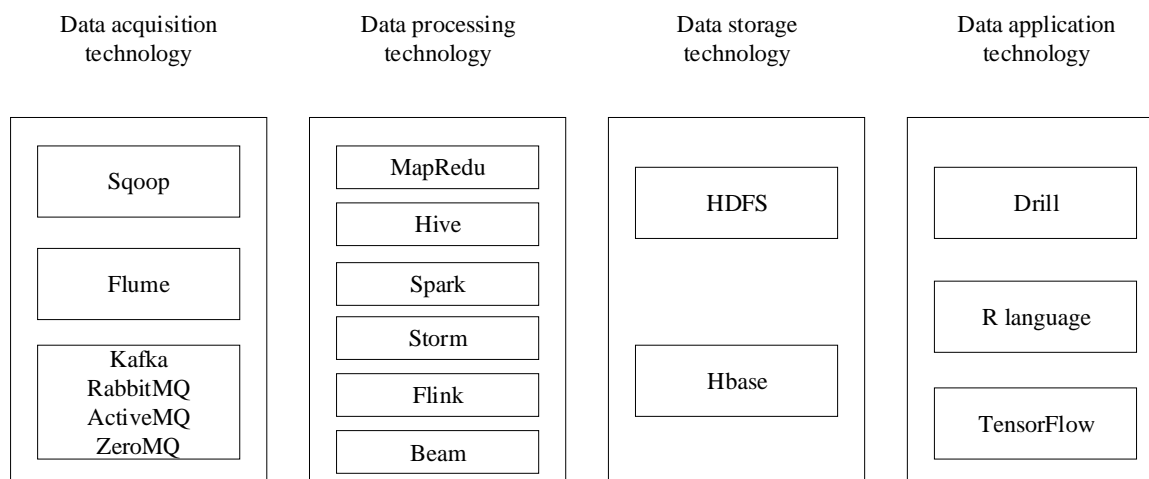
Data acquisition technology	Data processing technology	Data storage technology	Data application technology
Sqoop	MapRedu		Drill
Flume	Hive	HDFS	
	Spark		R language
Kafka RabbitMQ ActiveMQ ZeroMQ	Storm	Hbase	
	Flink		TensorFlow
	Beam		

Figure 1: Major technologies in all aspects of big data

2.2 Characteristics of BD Era

Each era has its own characteristics, which are different from other times. The BD era also shows its unique characteristics. A large amount of complex and diverse information shows the obvious advantages of the BD era [11-12].

Internet Data Center (IDC) believes that BD should also have value, and the value of BD often shows the characteristics of low density. The amount of information generated through various channels every day is very large, but the information useful to a certain person or thing is a small part of it, which increases the time of data analysis and the difficulty of data processing. Take the monitoring video as an example. A large number of data videos are generated every minute and every second. Generally, these data videos are boring and will not attract attention. However, if the illegal and criminal acts happen to be photographed, it will be very valuable for the public security organs to solve the cases [13]. However, when people don't know which moment is useful, they record it all, even keep it for a long time, just for a few seconds to successfully solve the case. It can be seen that the low value density of BD does not mean that the value of BD itself is low. We should make rational use of low-density value data and conduct correct and accurate analysis, which will bring huge [14].

2.3 Great Value

Digitalization is one of the characteristics of the BD era. In the BD era, words become data and directions become data, and digitalization has an impact on all walks of life. It can even be said that everything in the world will be digitalized. With the popularization of smart phones and computer technology, it is very easy to realize the digitalization of individuals from body to mind. College Students' use of mobile phones has become a common phenomenon, and their behavior will leave traces. These traces of data can be analyzed by using BD technology, so that educators can master the dynamics of students. Personalization is another obvious feature of the BD era, which pays more attention to meeting people's individual needs and paying more attention to everyone's uniqueness [15].

3. Survey on BD Literacy of Art Students

3.1 Respondents

The subjects of the questionnaire were undergraduates majoring in Fine Arts in University a. According to the actual specialty setting of University A, all full-time postgraduates, including freshmen, sophomores, juniors and seniors.

3.2 Investigation Methods

The questionnaire survey uses two forms: paper questionnaire and network questionnaire. The paper questionnaire is distributed offline in the classroom by contacting the teachers in advance. The online questionnaire uses the network platform to collect data. At the same time, it uses the class group in QQ and the publicity function of wechat to widely spread the web links and QR codes of the questionnaire generated by the platform, so as to obtain more data. The questionnaire was distributed in combination with the specific distribution of art undergraduates in University A, including the proportion of men and women, the proportion of people in each grade, and the proportion of people in each professional category. Distribute the questionnaire in a targeted manner, summarize and update the filling status of the questionnaire in real time, and monitor the composition of the sample. If it is found that the sample composition deviates from the expectation, appropriate adjustments shall be made according to the specific situation of University A, so that the data can comprehensively and truly reflect the current situation of the data literacy ability of art undergraduates to a certain extent. As shown in Table 1, a total of 300 questionnaires were distributed this time, 150 online and 150 offline, among which 136 online questionnaires and 148 offline questionnaires were collected.

Table 1: Statistics of recovered data from questionnaire survey

	Number of questionnaires issued	Number of questionnaires collected	Questionnaire recovery rate
Online	150	136	90.66%
Offline	150	148	98.66%

3.3 Data Processing

The data were preprocessed according to the collected questionnaire, and the results were counted and analyzed by SPSS 22.0 software, and t-test was performed. T test formula is as follows:

$$t = \frac{\overline{X} - q}{\dfrac{p_x}{\sqrt{n-1}}} \tag{1}$$

In Formula 1, t is the deviation statistic between the sample mean and the population mean; Q is the population average, PX is the sample standard deviation, and N is the sample size.

$$t = \frac{\overline{X_1} - \overline{X_2}}{\sqrt{\dfrac{p_{x_1}^2 + p_{x_2}^2 - 2yp_{x_1}p_{x_2}}{n-1}}} \tag{2}$$

In formula 2, X1 and X2 are the average of two samples respectively, and Y is the correlation coefficient of relevant samples.

4. Analysis of Questionnaire Survey Results and Suggestions for Improvement of Art Education Curriculum

4.1 Analysis of Questionnaire Survey Results

Table 2: Descriptive statistical analysis of various dimensions of data literacy

	Mean value	Title standard deviation	Dimension standard deviation
Cognition	4.23	0.83	0.728
Ability	3.71	0.85	0.731
Application	3.76	0.82	0.669
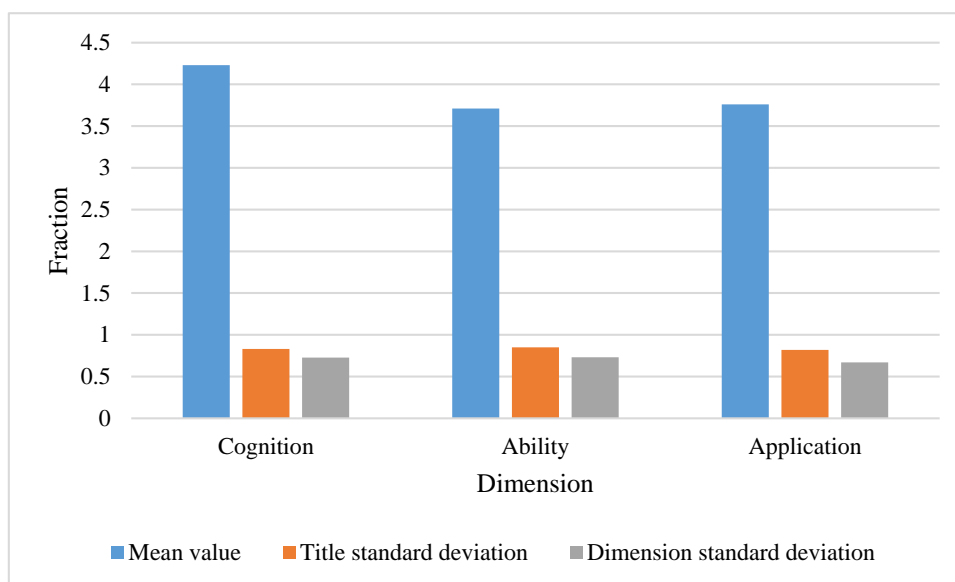
Figure 2: Statistical analysis results of data literacy

As shown in Figure 2 and table 2, the average scores of the three dimensions of art undergraduates are about 3-4, which is relatively average, indicating that art undergraduates as a whole have a certain level of data literacy. However, among the three dimensions, only the average score of cognitive dimension exceeded 4, which was also the highest mean value of the three dimensions, reaching 4.23, and the lowest mean value was the ability dimension, only 3.71. The statistical results show that art undergraduates perform better in the "cognitive dimension", followed by the "ability dimension" and "application dimension", and are obviously inferior to the "cognitive dimension", and the overall performance is "unsatisfactory". It can be seen that the data literacy of human art undergraduates needs to be improved in the cognitive dimension, ability dimension and application dimension, especially the cultivation and education of ability dimension, which should be highly valued.
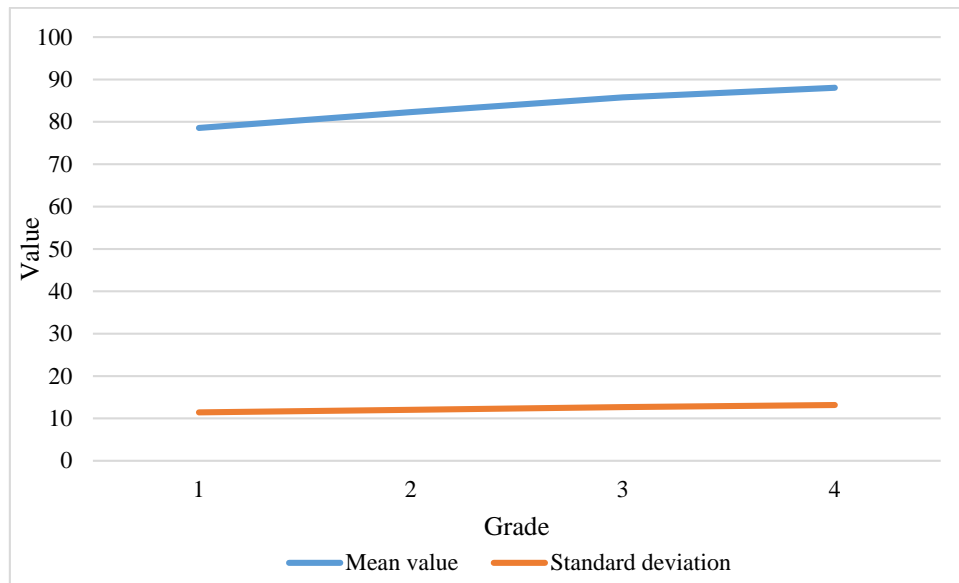
Figure 3: Statistics of data literacy of Undergraduates of different grades

As shown in Figure 3, under objective circumstances, with the increase of grade, the knowledge learned and the scientific research practice participated in increase, which explains to a certain extent that the data literacy of freshmen to seniors is different, both in terms of overall data literacy and at all levels. At the same time, according to the law of learning and development of art undergraduates, they basically started to be in a stable state in their junior year, because most professional courses of Humanities and Social Sciences ended in the first semester of their senior year, which explains the difference between Freshmen and sophomores, freshmen and juniors and seniors are more significant, while juniors and seniors are not very significant.

4.2 Art Education Curriculum Improvement based on BD

(1) Renew educational concept

In the era of BD, the education reform of art colleges and universities must focus on the goal of promoting the modernization of education governance at a high level, take the "run once at most" reform as the traction, promote the digital transformation with a higher starting point, higher standards and higher quality, change the previous practice of simply imitating and mechanically transplanting the education of foreign colleges and universities and domestic pilot colleges, and actively cultivate and give play to their comparative and absolute advantages, According to the goal orientation, professional characteristics, discipline advantages, social resources and development reality of art colleges and universities, make full use of new scientific and technological means such as BD, carefully plan, advance the layout, strive to take the initiative, actively expand the breadth and depth of education application in art colleges and Universities, and enable the reform of education with digital characters to realize the leapfrog development of art education in the new era.

Schools should seize the new opportunity of intelligent technology, actively explore the discipline system and teaching mode of "better understanding students", apply highly intelligent scientific decision-making aids, promote the digital transformation of school governance, realize scientific educational decision-making, accurate educational governance, efficient educational services, and intelligent educational methods, and finally realize the fundamental change and leapfrog development of education in art colleges and universities.

(2) Define educational objectives

Higher art education is an inevitable trend and an important opportunity in this era of knowledge economy and the development of cultural industry. Compared with other comprehensive universities, art colleges and universities have the same educational goals, but the educational emphasis will be significantly different. The birth of any great art works and cultural design products is inseparable from innovative ideas and personalized expression. Therefore, in addition to attaching great importance to the inheritance of professional knowledge, professional skills and practical ability, art colleges will also place special emphasis on innovation. Therefore, the overall goal of the education reform of art colleges and universities in the era of BD is to cultivate students into compound art talents who can adapt to the economic and Technological Development and changes of the society, have certain quality and technological entrepreneurship ability, and can continue to innovate.

(3) Exploring the path of reform

BD thinking can help teaching quality evaluation and prediction, and change the previous way of drawing conclusions through single indicators and small data statistics. Instead, it uses BD thinking and technology to analyze a large amount of unstructured data through a multi index system to draw a more realistic and scientific conclusion, so as to better guide the education reform.

BD thinking will also fundamentally change the traditional classroom teaching methods, break the space-time constraints between virtual and reality, solve the problem of lack of teachers, realize the transformation from elite education to popular education, and finally realize the deep cross integration of education and art education. Scientific prediction and auxiliary decision-making are the core values of BD, providing us with another powerful way to understand and grasp the world, and to predict the possibility of things and the hidden relevance behind things through mathematical algorithms. BD thinking will also bring about a change in entrepreneurial thinking, making data "sound" and not too tangled with the causal relationship behind the data, which will greatly help students identify market opportunities and industry trends, improve their creative works and designed products, adjust the direction and scheme, and greatly reduce the cost and cost of trial and error innovation.

5. Conclusions

Through theoretical analysis and practical investigation, this paper summarizes the main problems existing in the education of art colleges and universities in the era of BD, and analyzes the underlying reasons. It is proposed to actively embrace technological change, digitally empower education reform, and realize education concept, discipline system, teaching management carrier, governance mode, evaluation method, ecosystem and other reforms. Finally, from the four dimensions of method, carrier, mechanism and evaluation, the author creatively puts forward the specific path of education reform in art colleges and Universities: by introducing BD thinking and technology, changing education concepts, innovating teaching means, and promoting the construction of education curriculum system.

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