



# Bibliometric Analysis of Big Data Application in Education in China from 2013 to 2022

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**Abstract.** Relying on the CNKI data platform, articles were screened for "education big data" and the search period was set to "January 1, 2013 to August 30, 2022". The data were screened, collated and analyzed by using bibliometric statistical methods. The conclusions were as follows: 1. The attention of big data application in education has decreased significantly. 2. Associated paper arguments are more focused on colleges and universities, and research in other areas of education is scarce. After analyzing the causes of the above problems, a total of three prospects and suggestions were put forward to assist the subsequent application of big data technology in the field of education.

**Keywords:** Big data, education, bibliometric method, application

## 1 Study background

Our research is bibliometric analysis of the application of big data in education in China from 2013 to 2022. Big data, also known as data mass, refers to the information involved in the huge amount of data that cannot pass through the human brain or even mainstream software tools to achieve retrieval, management, processing, and collation in a reasonable time to help enterprises make more positive business decisions.

In 2020, Zhang Zhishi discussed the transformation of Big data from technology to strategy in the new development period, and the profound changes Big data has brought to education in the era of education informatization 2.0. [1] In 2021, He Yonghong analyzed the progress and ideas of learning analysis technology in multiple research fields, starting from the current hotspots and difficulties in education development. [2]

With the rapid change of science and technology in China, big data has been gradually popularized in daily life. According to the current point of view, it has been successfully applied in economic, political and people's daily life, and has brought profound changes to the relevant fields. For example, short-video software will judge the user preferences according to the user's video browsing time, and then increase the recommendation amount of similar videos to increase user's service time. Then what role does this technology play in education? General Secretary Xi Jinping once said: "Focus on chock point and weakness, aim accurately and work synergistically" [3]. It is based on such questions that I have carried out study on scholars' research and related papers.

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In the field of education, data are also generated very frequently. In 2010, the Horizon Report of the New Media Alliance of the United States first proposed learning analytics technology, which attracted attention from all sectors. Subsequently, in the 2014[4] and 2015[5] Horizon Reports, the overall popularity of learning analytics technology showed a significant upward trend. G. The practical application value of the learning analysis carried out by Siemens and others on the premise of Big data for better education work. [6] Our research is bibliometric analysis of the application of big data in education in China from 2013 to 2022. Big data, also known as data mass, refers to the information involved in the huge amount of data that cannot pass through the human brain or even mainstream software tools to achieve retrieval, management, processing, and collation in a reasonable time to help enterprises make more positive business decisions.

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In the field of education, data are also generated very frequently. In terms of students, their examination results, elective information, award-winning situation, borrowing books and books can produce a lot of information; at the same time, teachers' resumes, scientific research level, achievement records, courseware information, etc. are also a huge database; and the local ranking, social dynamics, and school history of the school itself can also be regarded as data, these elements constitute the big data in education. In this era of extremely high information value, education and educatees will benefit from it. "The data-driven precision teaching model will become a new normal for future education and promote the optimization and precision of the educational process" [8]. In this study, bibliometric methods were used to statistically analyze the relevant literature on the application of big data in education in China from 2013 to 2022, with attention to further perform a systematic analysis of the current status of the application of big data in the education field, understand its development process and current status, so as to provide some reference for researchers, and play a certain enlightenment role for the development of relevant technologies in China. [9] Srinivasa K G and Kurni M influence students' learning methods through Big data analysis. [10] In terms of students, their examination results, elective information, award-winning situation, borrowing books and books can produce a lot of information; at the same time, teachers' resumes, scientific research level, achievement records, courseware information, etc. are also a huge database; and the local ranking, social dynamics, and school history of the school itself can also be regarded as data, these elements constitute the big data in education. In this era of extremely high information value, education and educatees will benefit from it. "The data-driven precision teaching model will become a new normal

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## 2 Data source

Relying on the CNKI data platform, the screening conditions were "education big data", and the search period was set to "January 1, 2013 to August 30, 2021". Given the high timeliness of data upload, the data collected for this paper analysis was up to December 30, 2021, that is, date uploaded into the CNKI database from 30 December 20, 2013 to December 30, 2021 before December 30, 2021. The contents include authors, paper titles, keywords, publication journals, publication time, author units, source of fund projects, subject categories, and number of citations. Through conditional screening, a total of 857 valid data were finally output.

Data analysis. Contents: Authors' related information (unit, number of papers), paper publication (quantity, publication time, funding source, keywords, subject classification), publication journal (category, content), paper author influence; Methods: Bibliometric statistical methods and library information analysis system were used.

## 3 Data analysis

As shown in Figure 1, it can be seen in the data that a large number of researchers have done a lot of research on the application of big data technology in the field of education from 2013 to 2019, while the research attention has been significantly reduced from 2019 to 2022.

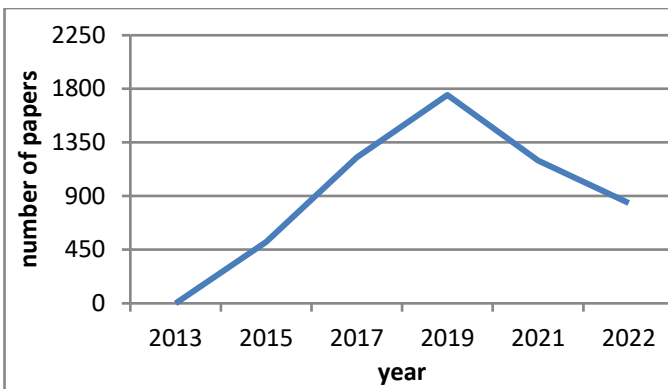


Fig. 1. 2013-2021 "Big Data Education" Paper Number Change Chart

As shown in Figure 2, there are 32 articles from Huazhong Normal University, 30 articles from East China Normal University, and the rest are colleges and universities, companies and scientific research institutions. It shows that the application of data technology in the field of education in recent years is mainly studied by Central China Normal University and East China Normal University.

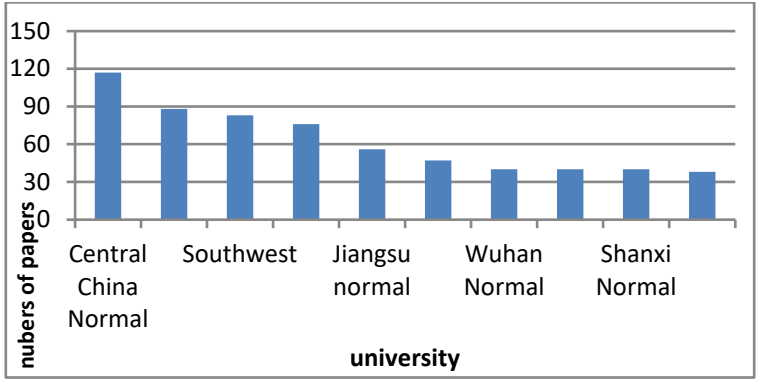


Fig. 2. 2013-2021 Comparison chart of institute publication volume of “big data education” paper

As shown in Figure 3, it can be seen from the figure that "big data" is used most frequently, and words such as "artificial intelligence", "colleges and universities", "application", "ideological and political education", and "college students" are also used at high frequencies. It can be seen that these are the hot spots of big data application research in the field of education.

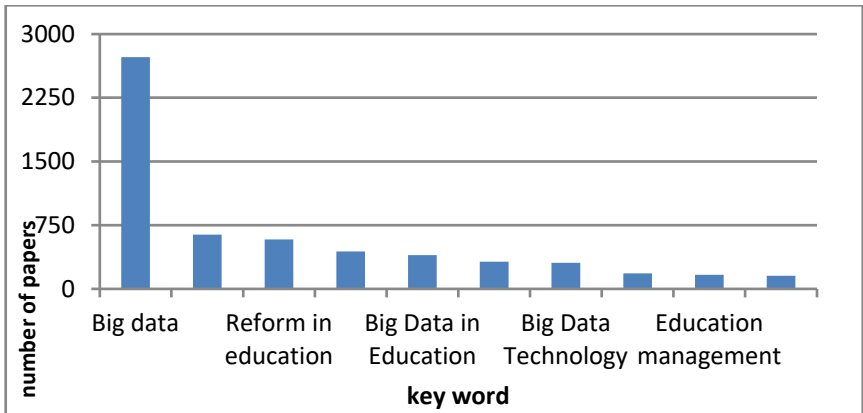


Fig. 3. 2013-2021 "Big Data Education" Keyword Trial Chart

## 4 Analysis and discussion

Through the quantitative analysis, content analysis and visual analysis of the relevant literatures on the application of online big data in education from 2013 to 2022, the following conclusions are drawn: in terms of the number of literatures, there is no paper research before 2013; it begins to increase in 2013 and develops rapidly after 2014. The number of literatures coincides with the development of big data in China. The media refers to 2013 as the "first year of big data" in China. This year, big data began to move towards all walks of life. Ali, Baidu and other enterprises signed a strategic cooperation framework agreement with the government to promote the application of big data in government statistics. Education, medical and other industries also recognize that big data has important strategic value for solving various problems faced, and the research and application of big data technology in various industries has gradually increased. As we can see from the data, since 2013, the literature related to big data technology and education has increased rapidly, and big data has been increasingly studied and applied in the field of education, reaching its peak in 2019. However, the number of papers began to decline year by year after 2019, especially from 2020 to August 7, 2022, showing a fault decline.

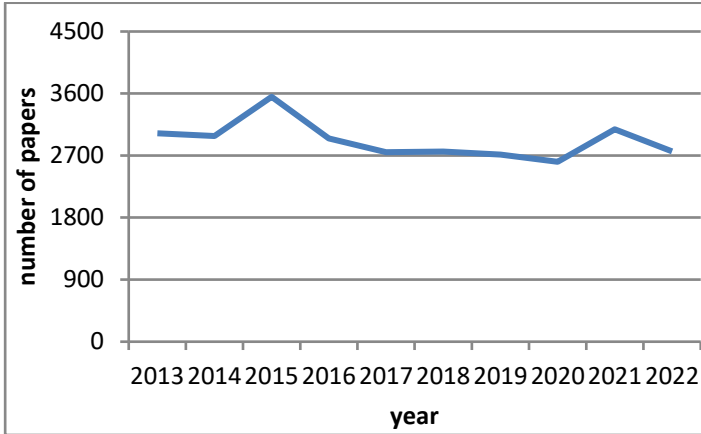
I propose three speculations about why paper output has declined.

The attention subsided spontaneously. Attention subsidence does not mean that the frequency of use of this technology has decreased. Because this technology has been integrated into people's daily life, a more common understanding had formed, and there is no need to overemphasize and study.

Technology is maturing. From the perspective of technology research and development, the current innovation of big data and cloud computing technology itself has been difficult. For example, in the graduate papers I have browsed, many graduate students often stand in the industrial point of view to study big data when selecting the main direction, rather than simply seeking breakthroughs from the technical architecture. The reason lies in the difficulty and failure of meeting the current development trend and application trend. Therefore, there will be a corresponding decrease in the relevant paper yield.

Causes of the COVID-19. This is only a speculation. From the outbreak of COVID-19 in 2020, the country's economic industry and cultural industry have received a certain impact because of the city closing. This is not the main reason. I referred to other topics that are not affected by the attention of research and did not find a significant decrease in the number of papers before and after 2020.

(The following figure shows the number of relevant research papers on Lu Xun)



**Fig. 4.** Number of research papers on Lu Xun

As shown in Figure 4, similarly, through the analysis of the relevant literature data on the application of online big data in education from 2013 to 2022, the following conclusions are drawn:

Associated study audiences focus on keywords "colleges and universities" and "college students". These two keywords has been mentioned 37 and 35 times in papers on the application of big data in the field of education, respectively.

The curriculum for big data applications is also more focused on "ideological and political education". Keyword "ideological and political education" has been mentioned 45 times in papers on the application of big data in the field of education.

There are also some speculations about the reasons for word frequency formation.

Regarding the reason why "colleges and universities" and "college students" appear relatively frequently in keywords, one is because college students, as high-end social knowledge talents, both their acceptance of new things and their adaptability to new environments are the top among the educated masses, and big data, as a new thing, is also equally suitable for first application in college students, which is the first reason; at the same time, the main creator of papers is also students, whether it is the acquisition of data or the observation of phenomena, it is concentrated in the corresponding classmate groups as well as colleges and universities environments, and the number of related keywords is naturally reasonable.

The reason for the relatively high frequency of "ideological and political education" in keywords is that big data appears for a relatively short period of time and is an extremely young technology, which is not applicable in the main and professional courses during its trial period, while as a relatively marginal college students compulsory course, ideological education is a good subject for trial.

## 5 Conclusion

For the research, focusing of colleges and universities and college students is still one-sided, and more big data can be tried to study the application of primary and middle school students or teachers.

Optimizing capital investment structure for field application of big data. As an emerging industry, big data is still very promising, and the research trend should not present such a fault decline.

Some achievements have been made in the relevant research of big data in education. In the future, researchers still need to pay attention to the research depth and the research on the application of key technologies of big data in education. We should transform the theoretical achievements into practical application by not only focusing on ideological and political education, but also penetrating it into more major compulsory courses.

## References

1. He Yonghong. Analysis and thinking on the application research of learning analysis technology in the context of Big data [J]. Education Communication and Technology, 2021 (03): 89-95
2. Zhang Zhishi. Education Informatization 2.0: Practical Research on Big data Driving Education Modernization [J]. Adult Education, 2020, 40 (06): 17-20
3. Xi Jinping presided over the 22nd meeting of the Central Leading Group for Comprehensively Deepening Reform to emphasize the institutional mechanism for promoting the precise focus and coordinated force of reform measures, to form and implement the new development concept [N]. People's Daily, 2016-03-23 (1);
4. NM Consortium.NMC Horizon Report:2014 Library Edition[EB/OL].(2014-06-18)[2023-02-18].<https://xueshu.baidu.com/usercenter/paper/show?paperid=43bb741588c89648e08e4dac4155fc12>;
5. NM Consortium.NMC Horizon Report:2015 Library Edition[EB/OL].(2015-08-19)[2023-02-20].[https://xueshu.baidu.com/usercenter/paper/show?paperid=68654a86df80e86cf8b557919b28d63b&site=xueshu\\_se](https://xueshu.baidu.com/usercenter/paper/show?paperid=68654a86df80e86cf8b557919b28d63b&site=xueshu_se);
6. Kavitha M G ,Raj L D .Educational Data Mining and Learning Analytics- Educational Assistance for Teaching and Learning[J].Trends,2017(41): 21-25;
7. China Association of Artificial Intelligence, China Intelligence Education Technology Development Report (2019-2020) [M], Beijing, Machine Industry Press, 2020:104.
8. Romero C,Ventura S.Educational data mining and learning analytics:An updated survey[J].Wiley Interdisciplinary Reviews: Data Miningand Knowledge Discovery, 2020,10(03):e1355.
9. Siemens G , Long P. Penetrating the Fog: Analytics in Learning and Education[J]. EDUCAUSE review, 2011,46(05):30-40.
10. Srinivasa K G ,Kurni M.Educational Data Mining & Learning Analytics[M].New York:John Wiley & Sons, Inc, 2021.

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