DSI DATA SCIENCE AND INFORMETRICS
VOL.1, NO.4, NOV. 2021

New trends in China´s science and education evaluation research under the background of "Breaking the Five–only"

Wei Gong*, Tingxiao Wen

Department of Biomedical Informatics, School of Life Sciences, Central South University, Changsha, China

ABSTRACT

Based on the background of the special clean-up action of "Breaking the Five-only", this paper combs the relevant policies of domestic science and education evaluation. Using CiteSpace and VOSviewer scientific measurement software, this paper makes a visual analysis on the related domestic research of the "Five-only" and "science and education evaluation", and expounds the frontier hot spots and trends of science and education evaluation research in China. Based on this, this paper summarizes the countermeasures and suggestions on how to "break" the "Five-only" and how to "establish" the "new system of science and education evaluation", in order to provide a reference for the sustainable and healthy development of science and education evaluation in China.

KEYWORDS

"Breaking the Five-only"; Evaluation of science and education; Academic evaluation; Science and education evaluation policy; Visualization

1 Introduction

The reform of science and education evaluation is an important and difficult issue in the reform of the personnel system of scientific research system, as well as a key point in the construction of China's modern and characteristic university system (Cao, 2019). However, the stubborn malady of "Five-only" is still deeply rooted in the domestic science and education evaluation system, and the research of science and education evaluation has become an urgent task to deepen the reform of higher education evaluation under the background of "Breaking the Five-only".

Under the background of the special action of "Breaking the Five-only" in China, this paper studies the trend of China's research on science and education evaluation, analyzes the impact of "Breaking the Five-only" on domestic science and education evaluation, and analyzes how to "break" the "Five-only" and how to "establish" the new system of science and education evaluation in China under the guidance of "Overall Plan for Deepening the Reform of Education Evaluation in the New Era", in order to grasp the development trend of science and education evaluation in China and provide decision support for formulating reform and im-

*Corresponding Author: gongwei_csu@163.com

plementation methods.

2 Policy environment analysis of science and education evaluation

The Ministry of Education has started to draft guidance on the evaluation system of teachers in colleges and universities as early as 2016 (Ministry of Education, 2016). In March 2016, the Central Committee issued the "Opinions on Deepening the Reform of Talent Development System and Mechanism" (The Xinhua News Agency, 2016), which explicitly required "overcoming the tendency of only academic qualifications, professional titles and papers". Under the guidance of the above policies, the Ministry of Education formally issued the "Guidance on Deepening the Reform of the Evaluation System of Teachers in colleges and universities" in the same year (Ministry of Education, 2016), systematically expounds and stipulates the assessment and evaluation of university teachers, and closely combined them with the cultivation of "Four Haves Teachers". In January 2017, the General Office of the CPC Central Committee and the General Office of the State Council issued the "Opinions on Deepening the Reform of the Professional Title System" (The Xinhua News Agency, 2017), aiming to make the structure of professional and technical personnel more reasonable and continuously improve their ability and quality. Due to the long-standing problems in the assessment and evaluation of science and education personnel in domestic colleges and universities, the inertia of its operation makes it difficult for the reform of science and education evaluation to work in a short time.

In May 2018, general secretary Xi Jinping delivered an important speech at the academician conference of the two academies. He pointed out clearly that "the talent evaluation system is unreasonable, and the phenomenon of only papers, titles, and academic qualifications is still serious" (Xinhuanet, 2018). In July of the same year, the General Office of the CPC Central Committee and the General Office of the State Council issued the "Opinions on Deepening the Reform of Project Evaluation, Talent Evaluation and Institutional Evaluation", highlighting moral character, ability, and performance orientation, focusing on the quality, contribution, and influence of landmark achievements, further optimizing the management mechanism of scientific research project evaluation, improving the evaluation methods of scientific and technological talents, improving the evaluation system of scientific research institutions, and strengthening the supervision and evaluation and the construction of scientific research integrity system (The Xinhua News Agency, 2018). In the same month, the State Council issued the "Notice on Several Measures to Optimize Scientific Research Management and Improve Scientific Research Performance", which made it clear that it was necessary to carry out the centralized cleaning up of the problem of "only papers, titles, and academic qualifications" (The State Council, 2018).

In October 2018, the Ministry of Science and Technology, the Ministry of Education, the Ministry of Human Resources and Social Security, the Chinese Academy of Sciences and the Chinese Academy of Engineering jointly issued the "Notice on Carrying out the Special Action of Cleaning up 'only papers, only titles, only academic qualifications, only awards'" (Ministry of Science and Technology, 2018), which proposed that all departments should focus on cleaning up the practices involving "Four-only", among which the Ministry of Education should focus on clearing up the "Four-only" practices involved in discipline evaluation, "Double First-Class" construction, base construction, achievement awards, talent projects and other activities, guide and urge the affiliated universities to clean up the "Four-only" practices involved in internal management at the same time.

In November 2018, the General Office of the Ministry of Education issued a notice, deciding to carry out the "Five-only" special cleaning up of "only papers, only hats, only titles, only academic qualifications, only awards" in relevant universities(Office of the Ministry of Education, 2018). In October 2020, the CPC Central Committee and the State Council jointly issued the "Overall Plan for Deepening the Reform of Education Evaluation in the New Era (The Xinhua News Agency, 2020), which clearly pointed out that we should resolutely overcome the persistent malady of "Five-only", reverse the unscientific orientation of education evaluation, improve the ability and level of education governance, accelerate the modernization of education and build a powerful country of education.

From "Three-only" to "Four-only" and then to "Five-only", it reflects the new direction of China's science and education evaluation reform. The special action of "Breaking the Five-only" is undoubtedly a watershed in China's reform of science and education evaluation, which has an important impact on the research of science and education evaluation in China. Therefore, under the background of "Breaking the Five-only", this paper analyzes the new trend of science and education evaluation research in China, and grasps the frontier of science and education evaluation research, so as to better realize the "breaking" of the "Five-only" and the "establishment" of the new system of science and education evaluation.

3 Research Methods and Data Sources

3.1 Research Methods

As one of the most popular science knowledge map drawing tools, CiteSpace focuses on the analysis of the potential knowledge association contained in scientific knowledge. It is a scientific citation visualization analysis software gradually developed based on the background of scientometrics and data visualization, developed by the internationally famous information visualization expert professor Chen Chaomei (Chen et al., 2015). The structure, rules and distribution of scientific knowledge can be visualized by CiteSpace, and the visualized graphs drawn by CiteSpace are called "Map of Scientific Knowledge".

Although CiteSpace software has strong analytical capabilities and diversified patterns of graph display, it has drawbacks such as unstable software performance and overlapping tag nodes caused by version change. Therefore, this paper uses another visualization software VOSviewer to overcome the above defects while using CiteSpace analysis.

VOSviewer is a Java-based visualization tool jointly developed by Nees Jan van Eck and Ludo Waltman of Leiden University in the Netherlands, which can be used to construct and view bibliometric maps (Gao, 2015), analyze bibliometric networks, and create two-dimensional maps by using the distance and color between the elements to reflect their similarity. The advantage of VOSviewer is that regardless of the number of tags and nodes, there is no overlap in the graph, overcoming the shortcomings of CiteSpace and other visualization software.

In this paper, CiteSpace V.5.7.R2 and VOSviewer software are used to carry out visual analysis by using bibliometric analysis method.

3.2 Data Sources

3.2.1 “Five–only” topic data source

As the extension of the concept of "Four-only", the "Five-only" was first proposed in 2018, so the retrieval time is limited after 2018. CNKI was used as the search database, and the

search date was April 22, 2021. The retrieval formula is TKA = ('Four-only '+'Five-only'). The retrieval time is limited from January 1, 2018 to April 22, 2021. The results are 224 pieces of Chinese literatures, all of which are output in Refworks format.

3.2.2 "Science and Education Evaluation" topic data source

The purpose of this paper is to analyze the new trend of science and education evaluation research in China under the background of "Breaking the Five-only". And it is necessary to compare the differences of science and education evaluation research before and after "Breaking the Five-only". Since the concept of "Five-only" was put forward in 2018, and the corresponding special clean-up action of "Breaking the Five-only" was also held in the same year, 2018 will be regarded as the watershed of research and analysis of science and education evaluation in China, and the data of related topics of "science and education evaluation" will be divided according to the scope of "2010-2017" and "2018 to the present".

CNKI was used as the retrieval database, and the retrieval date was April 26, 2021. The retrieval formula is TI = ('science and education' + 'University' + 'scientific research' + 'academic' + 'education' + 'teacher' + 'discipline' + 'science' + 'Double First-class') * 'evaluation'. The retrieval time is respectively limited to 2015.01.01-2017.12.31 and 2018.01.01-2021.04.26. And the retrieval results are 11387 and 12186 Chinese literatures respectively.

Python command is used to clean all the acquired data, including the filtering of invalid data such as duplicate records and empty author field records. The data after cleaning are 10580 and 11606 respectively. At the same time, the keywords, authors, institutions and other fields are split and preprocessed.

4 Analysis of the research theme of "Five–only"

4.1 Visualization analysis of the study of "Five–only"

After importing the retrieved raw data into CiteSpace visualization software and transforming the format, the visualization analysis can be carried out. This paper mainly analyzes the co-occurrence of keywords and the evolution of the theme. In the CiteSpace parameter area, set the time range to January 2018 to April 2021 and the time slice parameter to 1. Select keyword for node type, select top 20.0% data for each time slice to generate analysis network atlas, and set keyword threshold as 4. The generated network atlases were cluster processed, and nominal terms were extracted from the keywords in the literature to name the clusters. These nominal terms reflected the research hotspots of the related topics of "Five-only" in China. The keyword co-occurrence network of related topics of "Five-only" is obtained, as shown in Figure 1.

Research shows that the value of Modularity > 0.3 means that the clustering community structure is significant. When Weighted Mean Silhouette value > 0.5, clustering is considered reasonable (Wang et al., 2015). As can be seen from Figure 1, the value of Modularity = 0.5494 > 0.3, and the value of Weighted Mean Silhouette = 0.8947 > 0.5, which shows that the clustering is reasonable, the community structure is significant, and the generated map of scientific knowledge meets the requirements.

It can be seen from Figure 1 that five themes are formed after clustering, namely overall plan, talent evaluation, result evaluation, moral cultivation and academic evaluation, which indicates that the research hot spots of the "Five-only" theme in China in recent years mainly focus on these themes. From the perspective of research objects, the subjects that have been studied more are educational evaluation, overall plan, new era education, academic evalua-

Figure 1 Co-occurrence network of "Five-only" keywords

tion, educational evaluation system, etc. It can be concluded that domestic research on the "Five-only" theme is mainly carried out in the direction of education and scientific research related evaluation system reform and system construction. From the perspective of research methods, multiple subject evaluation, classification evaluation, monitoring evaluation, process evaluation, result evaluation, value-added evaluation, comprehensive evaluation and so on are the commonly used evaluation methods in domestic-related research.

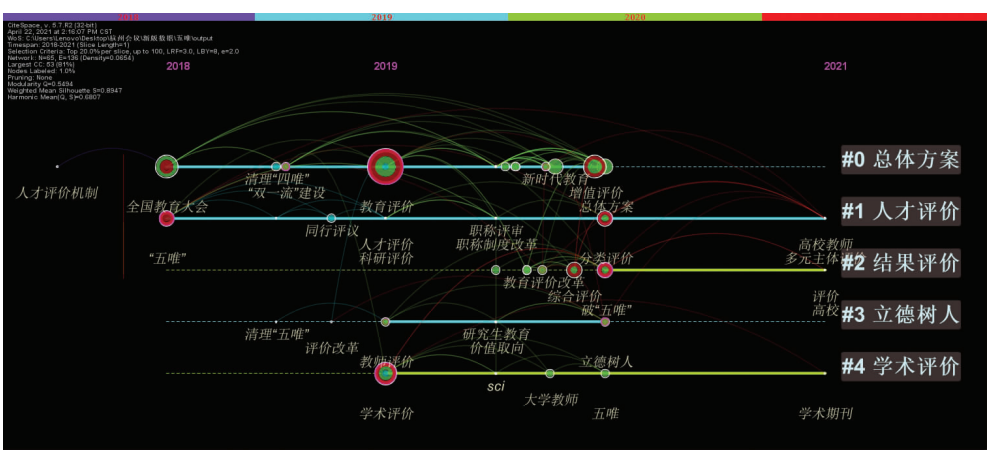

Figure 2 Timeline view for evolution of the "Five-only" theme

Figure 2 is the Timeline view of the evolution of related topics of "Five-only", in which literature topics of the same clustering are placed on the same horizontal line. The top of the Timeline view is the time when the topic appears. The closer the keywords on the horizontal line are to the right, the closer the time when they appear. Among them, on the clustering level of talent evaluation, keywords such as peer review, professional title review, and professional title system reform are distributed far and near in time, which indicates that the previously used peer review system has certain deficiencies, and it is necessary to improve the professional title review system on its basis. On the clustering level of result evaluation, key-

words such as comprehensive evaluation, classified evaluation and multi-subject evaluation are distributed from far to near, which provides some new ideas for the reform of science and education evaluation system. The reason why various evaluation methods and evaluation systems are full of reform and innovation under the theme of "Five-only" is precisely because the "Five-only" which is simple, absolute, quantitative and formal is quite unscientific and it is necessary to "Breaking the Five-only".

4.2 The essence and unscientificity of " Five–only"

The essence of "Five-only" is a single and absolute "only external evaluation", highlighting the absence of educational evaluation standards (Yi, 2021). The special activity of our government to clean up the "Five-only" is not to deny the external evaluation completely, but to deny the "only external evaluation". The long-term practice has proved that "only external evaluation" is not only unscientific but also harmful to the construction of academic ecological environment in China.

4.2.1 Difficult to form a comprehensive positive incentive

At present, when the science and education evaluation system in China is used to measure the academic performance of the evaluated object, it can not completely and accurately reflect the internal academic level of the evaluated object. For example, when domestic universities digitize their performance, they generally give higher scores to national, provincial and ministerial awards. But in reality, when many of the evaluated objects have won major topics and awards, their papers, monographs and other basic achievements may not be better than other evaluated objects in quality or quantity. According to the theory of equity put forward by the American scholar Adams, the judgment of the evaluated object is not only to see the absolute value of their own income, but also to compare it with others. When the basic achievements of an evaluated object in a university are excellent, but the evaluation value is lower than that of the evaluated object who has a major subject but does not pay attention to the basic achievements because of the scoring standard, it is easy to lead to the psychological imbalance of the former, which is not conducive to the overall positive incentive of scientific research output.

4.2.2 Score conversion lacks scientific basis

In the current domestic science and education evaluation, the papers, topics, works, patents and awards of the evaluated objects are converted into corresponding scores according to certain standards, and the total score corresponds to the total performance of the evaluated objects (Fu, 2020). This evaluation method seems objective, but it is unscientific and unfair. When colleges and universities give different scores to different types and levels of papers, there is no scientific theoretical basis to support their classification criteria. In addition, there are also different score standards among different universities and even in different periods of the same university. It is inevitable that there will be different evaluation standards and confused score values when comparing the evaluated objects in the academic field horizontally and vertically, which also indicates that the current score conversion in domestic science and education evaluation is lack of scientificity and fairness.

4.2.3 Aggravating the impetuous atmosphere of academic circles

Under the background of "Five-only", the evaluation of science and education has been reduced to a simple numerical operation outside the professional field of the subject. For a long time, the evaluation of science and education in China has paid too much attention to

the "grading" standards and quantitative indicators such as papers, topics and monographs, which makes some college teachers seek benefits from various evaluation indicators. This is not only contrary to the academic purpose and mission, but also easily leads to an impetuous academic atmosphere and even false prosperity of the academic community. Chinese universities should not only take scientific research as their own responsibility, but also put teaching and educating students in an important position. However, the current science and education evaluation indicators only focus on the publication level, subject level and funding, award level and other aspects, which weakens the relationship between teaching quality and science and education evaluation, as well as the social value of scientific research itself, academic contribution and academic ethics that scholars should adhere to. In addition, the nature of Chinese human society and people's self-interest also easily tend to aggravate the utilitarian phenomenon of academic misconduct.

5 Analysis on the research theme of "Science and Education Evaluation"

5.1 Hot spots and trends of research on science and education evaluation in China before and after the special action of "Breaking the Five–only"

The software VOSviewer was used for visual analysis of the cleaned data. The keyword thresholds of 2015-2017 and 2018-2021 years of data were set to 15, and keywords with low analytical value, such as "inspiration", "thinking" and "countermeasures", were removed manually. The cluster and density diagram of hot research spots in the field of science and education evaluation in China during 2015-2017 and 2018-2021 are shown in Figure 3 to Figure 6.

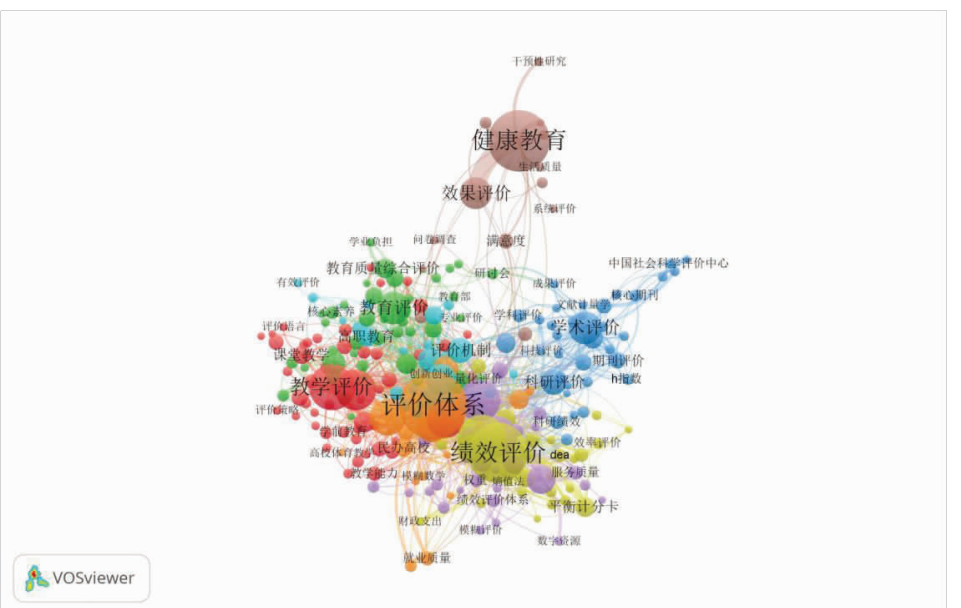

Figure 3 Clustering of hot spots of domestic science and education evaluation research in 2015-2017

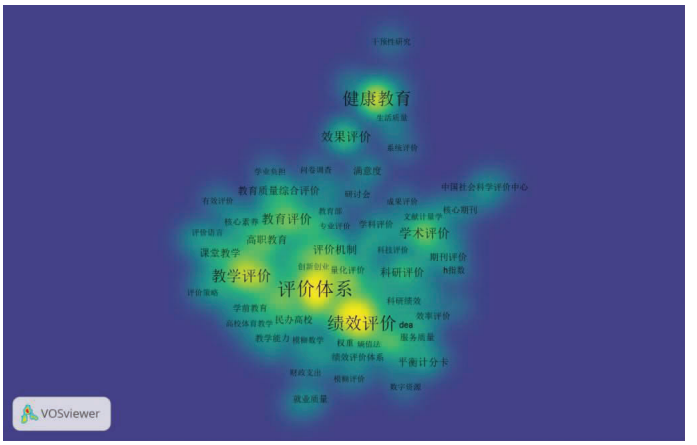

Figure 4 Density diagram of hot spots of domestic science and education evaluation research in 2015-2017

In the cluster view of research hotspots in Figure 3 and Figure 5, the more keywords are mentioned and studied, the larger the nodes are and the more they are considered as research hotspots. From Figure 3-4, it can be seen that the research hotspots in the field of science and education evaluation in China from 2015 to 2017 mainly focused on the evaluation system, performance evaluation, teaching evaluation, academic evaluation, health education and other topics. Among them, quantitative evaluation and other keywords are distributed under the theme of evaluation system, core journals and H index are distributed under the theme of academic evaluation, weight, entropy method and balanced scorecard are distributed under the theme of performance evaluation. From the keywords under these main themes, it can be concluded that the focus of domestic science and education evaluation research from 2015 to 2017 was on quantitative research, indicating that performance digitalization was a common phenomenon in domestic science and education evaluation during this period. In addition, for academic evaluation, people focus on explicit quantitative indicators such as journal grade and H-index. During this period, the domestic research methods for scientific research performance evaluation were relatively simple and more focused on quantitative evaluation indicators.

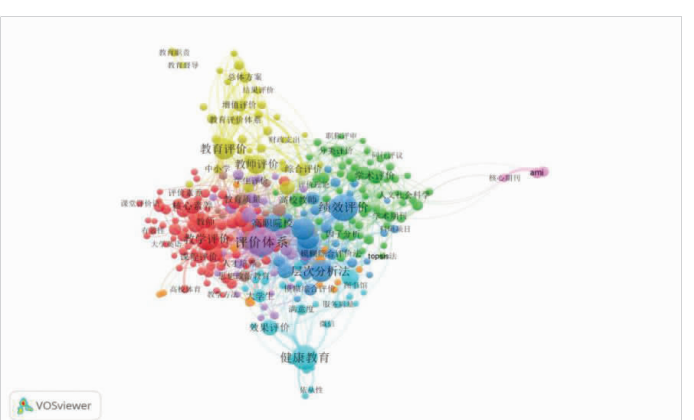

Figure 5 Clustering of hot spots of domestic science and education evaluation research in 2018-2021

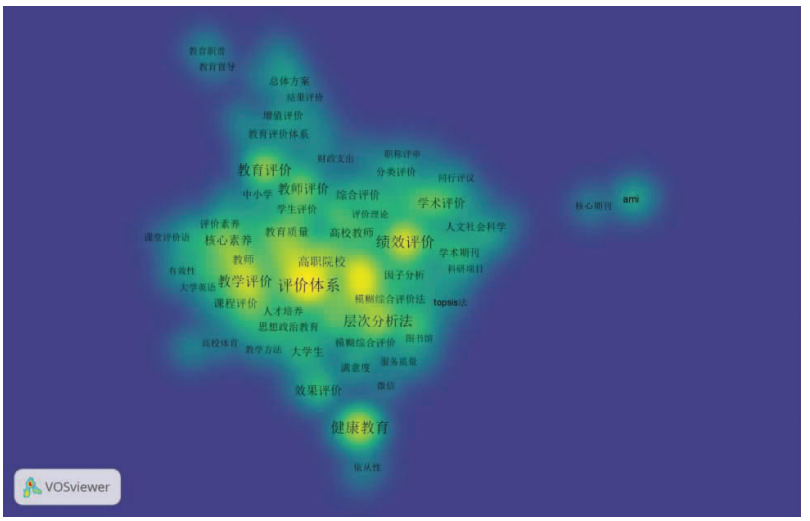

Figure 6 Density diagram of hot spots of domestic science and education evaluation research in 2018-2021

From Figure 5 to Figure 6, it can be seen that the research hotspots in the field of science and education evaluation in China from 2018 to 2021 mainly focus on evaluation system, performance evaluation, teaching evaluation, education evaluation, academic evaluation, effect evaluation, AHP health education and other topics. Compared with 2015-2017, domestic science and education evaluation related research topics in 2018-2021 are more abundant and evaluation methods are more diversified. As a decision-making method combining qualitative and quantitative analysis, analytic hierarchy process (AHP) has become a major research hotspot in the field of science and education evaluation in China in 2018-2021. Under the same cluster, there are also some keywords such as TOPSIS, factor analysis, fuzzy comprehensive evaluation and so on. It shows that the research trend of science and education evaluation in China has changed from quantitative analysis before 2017 to qualitative and quantitative combination in 2018-2021. It is worth noting that the keywords such as representative work evaluation, classified evaluation and peer review have been added under the theme of academic evaluation in domestic science and education evaluation research from 2018 to 2021, which is consistent with the guiding principle of "classification design and steady progress according to different themes, different periods and different types of education characteristics" in the "Overall Plan for Deepening Education Evaluation Reform in the New Era". In addition, compared with 2015-2017, evaluation system in 2018-2021 has new keywords such as talent cultivation, which shows that in the new era, China's science and education evaluation system pays more attention to the "human" factor than before, and focuses more on the implementation mechanism of scientific education and moral education, and the overall evaluation system focuses more on guiding teachers to devote themselves to educating students.

5.2 Research trend of science and education evaluation system

Figure 7 is the keyword correlation diagram of "evaluation system" in the evaluation research of science and education in China during 2018-2021. As can be seen from Figure 7, in the aspect of teacher evaluation from 2018 to 2021, China's science and education evalua-

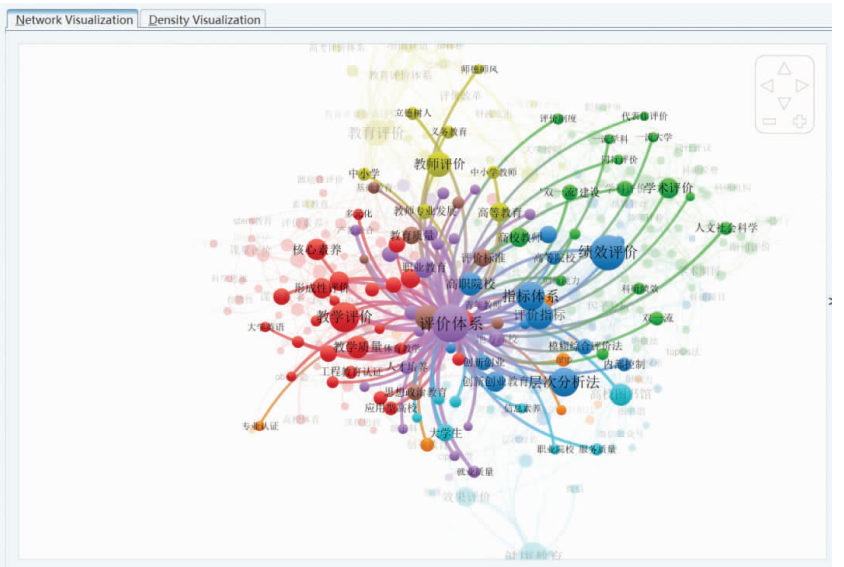

Figure 7 Correlation diagram of keywords of "evaluation system" in 2018-2021

tion has paid more attention to teacher ethics, moral cultivation and teacher professional development. In terms of teaching evaluation, more attention has been paid to teaching quality and key competencies. By further refining the correlation relationship, it is found that keywords such as big data and artificial intelligence have a high correlation with science and education evaluation related topics, indicating that applying a series of emerging technologies to science and education evaluation in China has become a hot research topic in related fields in recent years. In addition, multivariate evaluation, structural equation model, CIPP model and other keywords appear, indicating that there are many related studies using these methods to construct scientific and educational evaluation models. Among them, multiple evaluation is mainly reflected in the diversity of evaluation subjects, multi-dimensional evaluation content and diversified evaluation methods, which is conducive to giving full play to the role of the evaluation subjects, fully reflecting the ability of the evaluated, making the evaluation results more objective and authoritative, and also helping to mobilize the enthusiasm of the evaluated. Diversified evaluation has become a new trend in the development of science and education evaluation in China.

By comparing the hot spots and trends of research on science and education evaluation before and after the special action of "Breaking the Five-only", it is found that the trend is to explore how to "establish" a new system of science and education evaluation through different methods. According to the above analysis results, under the guidance of the "Overall Plan for Deepening the Reform of Education Evaluation in the New Era", this paper expounds on how to "break" the "Five-only" in China's science and education evaluation under the background of "Breaking the Five-only" and how to "establish the new system".

6 The "breaking" of the "Five-only" and the "establishment" of the new evaluation system of science and education

The relationship between "Breaking the Five-only" and "establishing" the new system of

science and education evaluation is indestructible and complementary. After analyzing the essence and unscientific nature of "Five-only" in the previous article, it is not difficult to find that the governance of "Five-only" is a rather complex system engineering, involving multiple remediations. In order to clean up the "Five-only" and "establish" the new system of science and education evaluation in China, we should not only stay in the reform plan documents of science and education evaluation in various departments and units, but also start from the following aspects to achieve overall consideration and cure both the symptoms and root causes.

6.1 Constructing 360° science and education evaluation system

The traditional unilateral evaluation has defects such as a lack of objectivity, which can easily breed academic corruption and affect the fairness and incentive function of scientific and educational evaluation. 360° feedback evaluation, also known as omni-directional feedback evaluation or multi-source feedback evaluation, is to obtain the information of the evaluated from the multiple subjects associated with the evaluated in various forms (Dubinsky et al., 2010). Building the 360° science and education evaluation system, which includes the evaluation of superior departments, peer review, self-evaluation and other multi-party evaluation into the science and education evaluation system in China, can effectively avoid the shortcomings of unilateral evaluation, make the science and education evaluation fairer and more objective, and have more persuasive and incentive effect for science and education personnel. For the scientific and educational personnel in colleges and universities, the student evaluation should be included in the performance evaluation, and the anonymous evaluation system should be strictly implemented. The quality of students' academic level and teachers' ethics should be linked with teachers' performance, so as to reduce the adverse phenomenon of "emphasizing scientific research but neglecting teaching" in colleges and universities, and promote the scientific and educational personnel to practice the important mission of cultivating morality, educating students through science and education, and educating talents for the party and the country.

6.2 Formulate classification and diversification assessment criteria

Due to the huge differences in the characteristics of different disciplines, it is difficult for the science and education evaluation system of "one ruler measuring all" under the background of "Five-only" to highlight the characteristics of colleges and disciplines (Li et al., 2020). We should fully respect the differences of disciplines, divide different classification evaluation standards according to the characteristics of disciplines, incorporate the relevant indicators such as basic frontier, applied technology development, achievement transformation and social service into the science and education evaluation system of our country, guide colleges and universities to carry out scientific self-positioning and reasonable differentiated development from multiple perspectives, and emphasize the practical contributions such as knowledge serving the society. Emphasis should be placed on the value and quality of the paper itself, rather than the level of the journal in which the paper is published. Over-classification of academic journals and external evaluation should be weakened, diversified standards for the evaluation of scientific research achievements should be adhered to, and diversified presentation methods of research achievements should be included in the academic performance reward system.

6.3 Combining quantitative and qualitative indicators

The problem of "Five-only" lies in "only", which is excessively extreme and simply defines academic evaluation as quantitative evaluation. This quantitative and formal evaluation which seems objective but implies many unscientific, has been discussed in detail in the previous text. The "Overall Plan for Deepening the Reform of Education Evaluation in the New Era" requires us to resolutely overcome the persistent malady of "Five-only", adhere to scientificity and availability, reform the science and education evaluation system from the aspects of "improving the result evaluation, strengthening the process evaluation, exploring the value-added evaluation, and improving the comprehensive evaluation", promote the implementation of the fundamental task of moral education, and establish a science and education evaluation system suitable for the new era. Compared with the "Five-only" evaluation which is too quantitative, the "comprehensive evaluation" emphasized in the "Overall Plan" obviously increases the non-quantitative indicators. Instead of abandoning the traditional quantitative indicators, the special action of "Breaking the Five-only" is to bring the non-quantitative indicators into the evaluation index system of science and education on the premise of retaining the quantitative indicators, and to give appropriate weights to the qualitative and quantitative indicators according to the actual situation, so as to realize the combination of quantitative and qualitative indicators.

6.4 Improve the science and education evaluation system based on China´s national conditions

The evaluation of science and education is not an objective, but a means to promote the output of more scientific and technological achievements and popularization of higher quality education. The policy of science and education evaluation should not only have the function of standard and restriction, promoting the construction of a perfect system conducive to the cultivation of innovative and top-notch talents and the output of major achievements, but also strengthen the construction of self-discipline in domestic academic circles, giving full play to the incentive effect of the reward and punishment system of science and education evaluation, enhancing the confidence of scientific and technological innovation in China, and creating a good ecological environment for scientific and technological power. We should establish the evaluation standard and system of science and education, which is rooted in the motherland and serves the interests of the country and the people. In today's turbulent international situation, China's science and education evaluation should pay more attention to the guidance of major achievements in scientific and technological innovation, such as key core technologies and original scientific discoveries, rather than focusing on the quantity and manifestation of papers, patents and other scientific research achievements. All kinds of major science and technology plans entrusted by state organizations are aimed at strengthening the country through science and technology and benefiting the people. They entrust universities, scientific research institutions and experts and scholars among them to tackle key problems and solve national strategic needs. In the process of tackling key scientific and technological projects, target assessment and scientific and technological achievements output are the corresponding appendages. As research achievements, they should have a variety of forms, such as major scientific discoveries or thinking contributions, key and core technology breakthroughs and industrial applications, economic and social benefits generated by scientific and technological achievements, rather than a fixed form and quanti-

ty of scientific and technological outputs.

6.5 Strengthen the construction of academic communities

At present, the influence of human relationships is widespread in the process of science and education evaluation in China, which not only challenges the authority and impartiality of peer review system in science and education evaluation, but also weakens the positive incentive effect that science and education evaluation should bring. We should make great efforts to establish and improve the academic conventions and articles of association of academic communities in the evaluation of science and education in our country, strictly implement the punishment measures of academic violations, and eliminate the involvement of human relationship in the evaluation of science and education. At present, there is still a management mode of academic subordination to administration in the evaluation of science and education in China, and the boundary of power and responsibility between administrative departments and academic communities is not clear. In the future, emphasis should be placed on strengthening academic governance, clarifying the respective rights and responsibilities of the administrative system and academic system, strengthening the important role of academic committee and expert committee in the evaluation, enhancing academic ethics and academic cultural identity of academic community, and strengthening the autonomy, fairness and professionalism of science and education evaluation in China.

7 Conclusion

The stubborn miasm of "Five-only" seriously affects the scientificity and impartiality of science and education evaluation in China. With the support of a series of reform policies of science and education evaluation, the special action of "Breaking the Five-only" has been launched in an all-around way, and China's science and education evaluation research has ushered in a new development trend. In order to thoroughly clean up the "Five-only" and build a new system of science and education evaluation, this paper proposes to take root in China's national conditions, realize the classification, diversification and combination of qualitative and quantitative indicators of science and education evaluation, build 360° science and education evaluation system, and strengthen the construction of the academic community, in order to promote the sustained and healthy development in the domestic field of science and education evaluation.

Acknowledgments

This research is supported by the Major Projects of the National Social Science Foundation of China, Research on the construction of science and education evaluation information cloud platform and intelligent service based on big data (Grant No. 19ZDA348).

References

Cao, T. S. (2019). "Five–only" problem: the consequence, root and solution of university teacher evaluation. *University Education Science, 2019* (1), 27–32.

Chen, Y., Chen, C. M., Liu, Z. Y., Hu, Z. G., & Wang, X. W. (2015). Methodology function of CiteSpace knowledge map. *Studies in Science of Science, 33* (2), 242–253.

Dubinsky, I., & Jennings. K. (2010). 360–Degree physician performance assessment. *Healthcare Quarterly, 13* (2), 71–76.

Fu, B. J. (2020). The essence, origin and governance of "Five–only" in Colleges and Universities. *Zhejiang Social Sciences, 2020* (2), 90–94,108,158.

Gao, K. (2015). Research on Application of Bibliometric Analysis Software VOSviewer. *Sci–Tech Information Development & Economy, 25* (12), 95–98.

Li, L.G., Zhao, K., Wang, C.Y., Cheng, Z., Chen, X.J., Ren, Z.Y., Tan, X.F., & Yang, L.S. (2020). Beyond the " Five–only": worries and prospects of higher education evaluation in the new era. *University Education Science, 2020* (6), 4–15.

Ministry of Education. (2016). "*The Guiding Opinions of the Ministry of Education on Deepening the Reform of the Evaluation System for College Teachers" Answers to reporters´ question*. Retrieved 2021–04–29 from http://www.moe.gov.cn/jyb_xwfb/s271/201609/t20160920_281619.html.

Ministry of Education. (2016). *Guiding Opinions of the Ministry of Education on Deepening the Reform of the Evaluation System for Teachers in Colleges and Universities.* Retrieved 2021–04–29 from http://www.gov.cn/xinwen/2016–09/21/content_5110529.htm.

Ministry of Science and Technology. (2018). *Ministry of Science and Technology, Ministry of Education, Ministry of Human Resources and Social Security, Chinese Academy of Sciences, Notice on Launching the Special Action to Clean Up "Only Papers, Only Professional Titles, Only Educational Backgrounds, and Only Awards".* Retrieved 2021–04–29 from http://www.most.gov.cn/tztg/201810/t20181023_142389.htm.

Office of the Ministry of Education. (2018). *Notice of the general office of the Ministry of education on carrying out the special action of "only papers, only hats, only professional titles, only academic qualifications, only awards".* Retrieved 2021–04–29 from http://www.moe.gov.cn/srcsite/A16/s7062/201811/t20181113_354444.html.

The State Council. (2018). *Notice of the State Council on Several Measures for Optimizing Scientific Research Management and Improving Scientific Research Performance*. Retrieved 2021–04–29 from http://www.gov.cn/zhengce/content/2018–07/24/content_5308787.htm.

The Xinhua News Agency. (2016). *The CPC Central Committee issued the opinions on deepening the reform of talent development system and mechanism*. Retrieved 2021–04–29 from http://www.gov.cn/xinwen/2016–03/21/content_5056113.htm.

The Xinhua News Agency. (2017). *The General Office of the Central Committee of the Communist Party of China and the General Office of the State Council issued the "Opinions on Deepening the Reform of the Professional Title System"*. Retrieved 2021–04–29 from http://www.gov.cn/xinwen/2017–01/08/content_5157911.htm#1.

The Xinhua News Agency. (2018). *The General Office of the Central Committee of the Communist Party of China and the General Office of the State Council issued the "Opinions on Deepening the Reform of Project Review, Talent Evaluation, and Institutional Evaluation".* Retrieved 2021–04–29 from http://www.gov.cn/zhengce/2018–07/03/content_5303251.htm.

The Xinhua News Agency. (2020). *The CPC Central Committee and the State Council issued the overall plan for deepening the reform of education evaluation in the new era*. Retrieved 2021–04–29 from http://www.gov.cn/zhengce/2020–10/13/content_5551032.htm.

Wang, L., Xiao, S. F., Yao, M., Jiang, K., & Dong, J. C. (2015). *Visualization analysis of medical informatics research hotspots based on CiteSpace. China Digital Medicine, 10* (10), 27–29, 75.

Xinhuanet. (2018). *The full text of Xi Jinping´s speech at the academician conference of the two academies.* Retrieved 2021–04–29 from https://baijiahao.baidu.com/s?id=1601710361900653180&wfr=spider&for=pc.

Yi, L. Y. (2021). "Five–only" Issue: Essence and Outlet. *Educational Research, 42* (1), 4–14.