

Analysis on The Current Situation of Geography Teaching Research in Middle School -Taking China as An Example

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Abstract

The analysis of the current situation of middle school geography teaching research is of great significance to the future teaching and research. Through combing the research results in recent 20 years, the results show that: (1) The number of documents issued changed gently before 2005, then increased rapidly, but showed a significant downward trend after 2019. (2) Among the top 100 document issuing institutions, urban, county town, and township account for 73%, 22% and 5% respectively. As far as the number of middle school geography teachers is concerned, it has continued to grow over the years, and the number of cities and counties has been higher than that of villages, and villages show a downward trend. (3) In terms of the education background of middle school geography teachers, the proportion of obtaining graduate education increased from 0.78% in 2000 to 7.09% in 2020, and the proportion of less than undergraduate education is becoming less and less. Although the Chinese government's investment in education has increased year by year over the past 20 years, the proportion of education investment in GDP in recent years is about 4%, which is lower than the world average 5.1%. (4) In terms of keyword analysis, there are similarities and differences between Chinese and English literature. The same research hotspots are GIS, environmental education, and map etc. (5) In terms of the number of papers published by researchers, Xu Baofang has the most achievements, with 11 papers and less than 10 others. On the author's cooperative relationship, there is only one cooperative team within the nine-year scale.

1. Introduction

Bibliometrics is a branch of science and technology that takes the literature system and bibliometric characteristics as the research object and uses mathematical and statistical measurement methods to evaluate and predict the research status and development trend of science and technology[1]. Metrological analysis mainly obtains the current research hotspots in this field and the development trend of research hotspots through the system and Bibliometric analysis is applied to various fields, such as ecological efficiency research[2], in-depth learning research[3], circular economy research[4]. In the field of education, there are: effective teaching research[5], higher vocational education research [6], ideological and political education research[7], middle school physics education research[8], middle school art teaching research[9], middle school chemistry education research[10], etc. There are few researchers in geography education only two results of bibliometric analysis of documents about middle school geography teaching searched in China national knowledge internet. Lei Jiaoyang and Li Yue only take the three major journals of geography education as examples to study the space-time hot spots of the integration of information technology and middle school geography teaching[11], Yan Yinyin and others only study the hot spots and trends of GIS application in middle school geography teaching [12]. The existing bibliometric analysis and research on middle school geography teaching have limitations in both the source of literature and the scale of research and cannot analyze the current situation of middle school geography teaching research.

The analysis of the current situation of geography teaching research in middle school is of great significance to cultivate qualified citizens and give full play to the educational value of geography. At present, there are few research results, which is not conducive to the research and teaching of geography teachers in universities and middle schools. To better promote geography teaching, in the face of many research results in recent 20 years, it is necessary to sort out the overall situation of middle school geography teaching research, to show the research overview and hot spot changes in this field clearly, so as to provide useful reference for the later research of middle school geography teaching.

2. Data Sources And Research Methods

2.1. Data sources

The literature selected in this paper comes from the China national knowledge internet (CNKI) and web of science. The retrieval subject input is "middle school geography teaching", and the time limit is from 2000 to 2020. After screening the search results, deleting the repetition, the introduction and notice of individual excellent teachers, the literature without author and irrelevant, and the literature with little relevance to middle school geography teaching caused by the search error, a total of 5309 Chinese documents and 45 English documents related to the theme of middle school geography teaching were finally obtained. The number of middle school geography teachers and their urban-rural distribution over the years, the changes in the educational qualifications of middle school geography teachers over the years, the fixed output value of middle school experimental equipment and the investment in education funds all come from the education statistics in the government portal of the Ministry of Education of the People's Republic of China. The proportion of foreign education investment in GDP comes from United Nations Educational, Scientific and Cultural Organization (UNESCO), Montreal, the UNESCO Institute for Statistics (UIS) statistics database.

2.2. Research methods

This paper mainly adopts the scientific literature analysis tool CiteSpace software[13] and literature method [14] jointly developed by Dr. Chen Chaomei of the school of information science and technology of Drexel University and wise Laboratory of Dalian University of technology to analyze the search results ; Excel software is used to process the statistical data to generate more intuitive visual charts; Arcgis software [15] developed by American ESRI company is used to analyze the geographical coordinates of the place where the document is published and the geographical coordinates of the organization, so as to form the visualization of distribution on the map.

3. Result Analysis

3.1. Analysis of the number of documents issued

From the change trend chart of the number of documents published in Fig. 1, it can be concluded that the number of documents published after 2000 has a slight downward trend, the change tends to be flat from 2000 to 2005, and the overall upward trend after 2004, reaching the maximum of 476 in 2019, with an obvious downward trend in 2020, the number of documents published in middle school geography teaching and research in 2020 is 366. In 1995, the "3 + 2" examination mode was implemented in all the unified examination subjects of general colleges and universities across the country, with the abolition of geography in liberal arts and biology in science. After 1999, Guangdong Province took the lead in trying out the "3 + X" college entrance examination reform program, and geography returned to the subjects of the college entrance examination[16]; Therefore, this paper selects the starting time of the period as 2000. Since 2004, the Ministry of Education has begun to promote independent proposition across the country. By 2006, 16 provinces and cities across the country have implemented independent proposition[17]; In 2014, China's college entrance examination reform kicked off, and the "3 + 2 + 1" college entrance examination model began to be implemented in China[18]; There is a close relationship between the number of papers and the reform of the college entrance examination. Because the selection of some majors in universities must require the selection of science subjects such as physics, the number of students who choose physics and chemistry in the new college entrance examination is higher than that of geography, the number of students who choose geography subjects is reduced, and the corresponding literature on geography teaching and research in middle school is also reduced.

3.2. Changes in the number of middle school geography teachers over the years and their urban-rural distribution

As can be seen from Fig. 2, the R^2 of the linear model fitted by the least square method is 0.978, and the number of middle school geography teachers shows a significant upward trend from 2000 to 2020. From 2009 to 2017, the growth rate was relatively slow. In terms of quantity, the number of middle school geography teachers in China was 148523 in 2000 and 267214 in 2020, nearly doubling in these 20 years.

In terms of the urban-rural distribution of middle school geography teachers over the years, as shown in Table 1, the number of geography teachers in urban area, town, and village middle schools in 2004 was 43434, 70219 and 64917 respectively; In 2020, there were 113617, 126295 and 27302 people respectively.

From 2004 to 2020, the number of middle school geography teachers in urban and town areas showed an increasing trend, while that in rural areas showed a downward trend. In terms of spatial distribution, the number of middle school geography teachers in rural areas has been higher than that in urban areas in 2004 and lower than that in urban areas in 2020. The sum of urban areas and towns has always been higher than that in rural areas. Since the statistics on the official website of the Ministry of education were not divided into urban areas, towns, and villages before 2004, the data displayed here began in 2004.

Table 1
Urban and rural distribution of middle school geography teachers over the years

Time/year	Urban area / person	Town / person	Village / person
2004	43423	70219	64917
2005	44276	79963	62315
2006	42404	87266	63403
2007	48170	90205	60061
2008	49727	94084	52765
2009	50344	97427	57511
2010	52009	101284	55434
2011	71132	104369	37434
2012	74511	108243	34095
2013	77131	109414	32211
2014	81683	111328	31104
2015	84109	113535	29741
2016	88659	114184	28137
2017	93830	117109	27218
2018	99641	119259	26765
2019	106053	121920	26914
2020	113617	126295	27302

3.3. Changes in academic qualifications of middle school geography teachers over the years

Judging from the changes in the academic qualifications of middle school geography teachers since 2000 (see Table 2), the number of middle school geography teachers with graduate education shows an upward trend, with the total proportion rising from 0.18% in 2000 to 7.09% in 2020; The proportion of Bachelor degree or below has decreased year by year; The proportion of teachers with college degree in the total number of teachers decreased from 59.83% in 2000 to 8.93% in 2020, and only 0.07% of teachers with high school degree in 2020. This is related to the relevant provisions on teacher qualification in China. The applicant must have a bachelor's degree or above in geography as stipulated by the Chinese government. The higher the level of education, the stronger the research ability. Therefore, the overall research ability of middle school geography teachers in China is improving year by year.

Table 2
Changes in academic qualifications of middle school geography teachers over the years

Year	Graduate / person	Percentage of total	Under-graduate / person	Percentage of total	Associate Bachelor / person	Percentage of total	High school graduation / person	Percentage of total
2001	276	0.18%	43412	27.74%	93608	59.83%	18441	11.79%
2002	360	0.22%	50525	30.59%	96833	58.62%	16967	10.27%
2003	480	0.28%	59653	34.71%	96693	56.27%	14646	8.52%
2004	595	0.33%	69966	39.18%	95497	53.48%	12230	6.85%
2005	881	0.47%	82547	44.25%	93082	49.90%	9836	5.27%
2006	1071	0.55%	94725	49.06%	89260	46.23%	7858	4.07%
2007	1485	0.75%	107259	54.05%	83239	41.95%	6313	3.18%
2008	1932	0.98%	118568	60.32%	76797	39.07%	5083	2.59%
2009	2547	1.24%	129396	63.03%	69334	33.78%	3941	1.92%
2010	3269	1.57%	139048	66.62%	63271	30.31%	3094	1.48%
2011	4211	1.98%	149026	69.99%	57325	26.92%	2332	1.10%
2012	5108	2.36%	158141	72.93%	51758	23.87%	1811	0.84%
2013	6261	2.86%	164796	75.33%	46227	21.13%	1436	0.66%
2014	7337	3.27%	174136	77.79%	41678	18.60%	937	0.42%
2015	8680	3.82%	180661	79.45%	37381	16.44%	641	0.28%
2016	10130	4.39%	186864	80.90%	33510	14.51%	467	0.20%
2017	12063	5.07%	195873	82.25%	29913	12.56%	297	0.12%
2018	14018	5.71%	204242	83.14%	27145	11.05%	254	0.10%
2019	16229	6.37%	212718	83.46%	25726	10.09%	211	0.08%
2020	18945	7.09%	224214	83.91%	23862	8.93%	191	0.07%

3.4. Comparative analysis of the total expenditure of national education funds over the years and other countries

The proportion of education investment in GDP is one of the important indicators to measure the level of a country's education investment. The research shows that when the per capita GDP reaches US \$800–1000, the lower limit of the proportion of public education expenditure in GDP is 4.07% – 4.25% [19]. China's per capita GDP has exceeded 800 US dollars in 1998 and has now exceeded 1000 US dollars, but the proportion of public education funds in GDP is only 4.22%. It is lower than the average level of 5.1% in the world. According to the statistics of UNESCO's world education report in 1998, China uses 1.18% of the world's education funds to train 18.45% of the world's students, while the investment in basic education is less. The outline of *China's education reform and development* issued by the CPC Central Committee and the State Council in 1993 stipulates that the proportion of national financial education expenditure in GDP will reach 4% by the end of this century. Despite the great efforts made by governments at all levels, the proportion of national financial expenditure on education in GDP was 2.87% in 2000 and 2.82% in 2005. Compared with the same caliber, there is a large gap in the level of education investment between China and most countries in the world. It was not until 2012 that the proportion of China's education funds in GDP exceeded 4%, which was 12 years later than expected. In recent 20 years, Chinese governments at all levels and all kinds of governments have been making continuous efforts, and the investment in education funds has shown an increasing trend every year (see Table 3). Taking 2017 as an example (as shown in Fig. 3), China's public education expenditure accounted for 4.1% of GDP. At the same time, some developed countries in northern Europe such as Norway, Denmark, and Sweden and Finland accounted for 7.9%, 7.8%, 7.6% and 6.4% respectively, far higher than the world average. Among developing countries, Brazil's public education expenditure accounts for 6.3% of GDP, higher than that of developed countries such as Britain, Australia, South Korea, and Japan. The proportion of public education investment in China is lower than that in most countries or even some developing countries, which also leads to the problem of insufficient investment in the field of basic education.

Table 3
Total expenditure of national education funds over the years

Year	Total national education expenditure (100 million U.S. dollar))	Public expenditure on education (% of GDP)
1996	356.32	2.44
1997	398.75	2.49
1998	464.48	2.55
1999	527.47	2.79
2000	606.23	2.87
2001	730.43	3.19
2002	863.10	3.32
2003	977.80	3.28
2004	1140.71	2.79
2005	1325.97	2.82
2006	1545.91	3.01
2007	1913.32	3.32
2008	2283.87	3.33
2009	2599.18	3.59
2010	3080.99	3.66
2011	3759.41	3.93
2012	4362.12	4.28
2013	4782.44	4.16
2014	5167.02	4.10
2015	5690.35	4.26
2016	6124.92	4.22
2017	6703.52	4.14
2018	7267.52	4.11
2019	7903.05	4.04
2020	8352.83	4.22

3.5. Analysis of output value of experimental equipment in urban and rural middle schools over the years

The statistics of the Ministry of Education on the total output value of middle school experimental equipment began in 2013 (see Table 4). Since 2013, the output value of middle school experimental equipment in urban, towns areas, and rural areas has shown an increasing trend over the years. The total output value of experimental equipment in urban middle schools is greater than that in towns, and that in township middle schools is greater than that in rural areas. This

also reflects that the research funds of middle school geography teachers in urban and towns areas are higher than those in rural areas.

Table 4
Output value of experimental equipment in urban and rural middle schools over the years

Year	Total output value of experimental equipment (10,000 U.S. dollar)	Urban Area (10,000 U.S. dollar)	Counties & Towns Area (10,000 U.S. dollar)	Rural Area (10,000 U.S. dollar)
2020	1123729.98	538927.72	466870.36	117931.27
2019	1047627.39	492548.39	442098.90	112901.36
2018	979965.39	451333.16	419417.45	109214.77
2017	908116.67	414485.13	392023.08	101608.47
2016	830033.91	375686.43	359324.48	95023.00
2015	758679.67	340786.31	329750.05	88143.31
2014	712401.63	319706.03	307353.46	85342.15
2013	679390.89	306133.00	293140.76	80117.13

3.6. Analysis of document source and issuing organization

From figure a in Fig. 4, the geographical spatial distribution of the top 20 sources of documents is more in the north than in the south, more in the east than in the west, and figure b can be seen that the geographical spatial distribution of the top 100 issuers is concentrated in the East and scattered in the West. The top 20 literature sources were all provincial capital cities and big cities above provincial capital level, which were basically consistent with the level of social and cultural development. The three journals that contribute the most to the literature sources are: *Middle school geography teaching reference*, *Geography teaching* and *Geography education*. The number of papers published is 862, 334 and 303 respectively, as shown in Fig. 5. In terms of geographical location distribution, *Middle school geography teaching reference* is in Xian, *Geography teaching* is in Shanghai, and *Geography education* is in Chongqing. It can be seen from Schedule 1 that most of the document issuing institutions are normal universities and middle schools. The urban-rural distribution is shown in Fig. 6, with urban, county town, and township account for 73%, 22% and 5% respectively. The researchers in towns and counties are significantly lower than those in cities.

3.7. Analysis of the author's document volume and cooperation relationship map

Xu Baofang has the largest number of articles in geography teaching research field, with 11 articles, followed by Zhang Weiqing, Hao Xingwu, Zhu Xuemei and Li Jiaqing, who have published 7 articles. Zhang Jiahui, Zhang Guanghua, Hu Baoqing, Zhong Xiaomin and other authors published 6 articles, while other authors all published less than 6 articles, and most authors published 1 article (see Fig. 7).

3.8. Analysis of author cooperation

CiteSpace software is used to analyze the author's cooperative relationship within the nine-year scale (see Fig. 8). For the research in the field of middle school geography teaching in the nine-year scale, only Xu Baofang and Duo Hong

have cooperative relationship, and the cooperative relationship is not close enough. Other authors are in the state of separate research.

3.9. Keyword analysis of domestic and foreign literature

The final 5309 Chinese journal documents were imported into CiteSpace software, check the keyword analysis option, select the time for 2000–2020 (slice length = 1), selection criteria: g = index (k = 25), run the analysis, and K cluster the analysis results (see Fig. 9).

From the point of keywords appear frequency, geography teaching appear frequency for 1123 times, to 728 in middle school geography, high school for 506 times. The most frequent occurrences of these three keywords were more than 500 times. In addition to the main keywords related to middle school geography teaching, the keywords with high frequency included geography classroom 201 times, teaching 182 times, geography teacher 138 times, application 116 times, geography things 114 times, classroom teaching 111 times. These keywords appeared more than 100 times.

According to the key words for the first time in the year (see Table 5),it can be concluded that the first year when geography teaching, middle school geography, geography, junior middle school, teaching, geography discipline, geography teachers, middle school and geographical things appeared was earlier in 2000; high school, application, strategy and other keywords first appeared in 2005 and later; key words such as core literacy, teaching strategy, effectiveness and efficient classroom first appeared in 2010 and later. In the early stage of the research, the main concern was geography teaching, geography itself and how middle school geography teachers carried out teaching in middle school geography classroom. The research level involved was relatively shallow and only existed on the surface of geography teaching; After 2005, the research level goes deep into strategy and application; After 2010, with the continuous advancement of the new curriculum reform, the research level of middle school geography teaching is more in-depth. The research level is not only focused on how to improve students' performance, but also reflected in the core quality and efficient classroom.

The basic idea of *Geography curriculum in the geography curriculum standard of senior high school (2017 edition and 2020 Revision)* is to cultivate students' necessary core literacy of geography; Constructing the geography curriculum with the core quality of geography as the leading; Innovating the learning methods of cultivating the core literacy of geography; Establish a learning evaluation system based on the development of core literacy of geography[20]. With the promotion of the new curriculum reform, the attention to the core literacy is getting higher and higher. Middle school geography teachers pay more attention to how to better cultivate students' core literacy of Geography in middle school geography teaching. After 2010, the focus of middle school geography teaching research has gradually penetrated from the middle school geography classroom to the development of students themselves, from the implementation of specific things to human development.

Table 5
Keyword analysis of domestic literature

Order number	Key word	Frequency	Year of first occurrence	Order number	Key word	Frequency	Year of first occurrence
1	Geography teaching	1123	2000	21	Teaching strategy	66	2010
2	Middle school geography	728	2000	22	Geography Course	66	2001
3	High school	506	2008	23	Teaching model	61	2000
4	Geography	432	2000	24	Culture	60	2001
5	Junior high school	333	2000	25	Local Geography	58	2002
6	Geography classroom	201	2001	26	Information technology	58	2003
7	Teaching	182	2000	27	Learning interest	56	2004
8	Department of geography	157	2000	28	Middle school student	50	2000
9	Geography teacher	138	2000	29	Environmental education	48	2000
10	Middle school	118	2000	30	GIS	47	2000
11	Application	116	2005	31	Effective teaching	47	2010
12	Geographical things	114	2000	32	Regional geography	47	2000
13	Classroom teaching	111	2002	33	Interest	46	2000
14	Competence Education	99	2000	34	Multi-Media	46	2000
15	High school geography	90	2000	35	Effectiveness	43	2012
16	Teaching method	85	2000	36	Instructional design	39	2002
17	Strategy	80	2007	37	Geography Learning	39	2003
18	Core literacy	78	2017	38	Map	39	2010
19	Junior high school geography	67	2000	39	Efficient classroom	33	2013
20	New curriculum reform	66	2003	40	Method	30	2001

After searching the literature on middle school geography teaching in web of science, excluding the retrieval error and the literature on middle school geography teaching in China, 45 results are obtained. The key words of the search results

are visually analyzed (see Fig. 10), through the analysis of key words (see Table 6), it is found that the main themes of foreign literature on geography teaching in middle schools are GIS, demography, and geography of homeland (Dokdo education in Japan and South Korea is classified into geography of homeland). In addition to geography, the most frequent keywords are demography and GIS.

In the key words of geography teaching research literature of middle schools at home and abroad, the research topics include regional geography, GIS, environmental education, map and so on. There were 47 literatures on regional geography in Chinese, accounting for 0.89% of the total, and 3 literatures in English, accounting for 6.67%. With GIS as the research subject of Chinese literature accounts for about 0.89% of the total documents, accounts for about 12.77% of the total literature in English literature. Number of middle school geography teaching about GIS research literature abroad significantly more than the domestic. On environmental education with 48 references in Chinese, English 2 references, respectively 0.90% and 4.44% of the total number of documents. There are 39 Chinese literatures on maps, and only 2 English literatures.

Compared with domestic research literature, foreign research emphasizes science and technology to promote teaching, video-based virtual reality and e-learning are mentioned in recent research literature. Domestic and foreign studies also emphasize curriculum and reform and other related issues. By comparison, foreign research on middle school geography teaching focuses more on the application of science and technology in teaching.

Table 6
Key words analysis of foreign literature

Order number	Key word	Frequency	Year of first occurrence	Order number	Key word	Frequency	Year of first occurrence
1	Education	19	2003	11	Environmental education	2	2002
2	Geography	6	2001	12	Teaching strategy	2	2002
3	Choice	6	2001	13	Evaluation reform	2	2007
4	Geography of homeland	5	2014	14	Student	2	2010
5	Curriculum	3	2004	15	Assessment methods	2	2019
6	Regional geography education	3	2003	16	Teaching method	2	2013
7	Population education	3	2000	17	Geographical names education	1	2007
8	WebGIS	2	2008	18	Question strategy	1	2007
9	E-learning	2	2014	19	Technology enhanced learning	1	2020
10	Map	2	2002	20	Video-based virtual reality	1	2020

4. Conclusion

Analyze the dispatch number, found in 2005, before issuing number change is leveling off, after 2005 post trend of the spike in the number of changes occur, reach a maximum of 476 articles in 2019, after 2019 decline trend.

Of calendar year since the middle school geography teacher's number and distribution of urban and rural areas were analyzed, and the results showed that the number of calendar year since the middle school geography teachers is on the rise; On the distribution between urban and rural areas, urban and township middle school geography teachers combined number has been higher than that of rural middle school geography teachers, rural general decline, the number of high school geography teachers in 2004 to 64917, the number of rural middle school geography teachers in 2020 to 27302. However, due to the differences in economic development, a large number of people move to cities and towns. Some parents send their children to cities for better education, which leads to the loss of rural population, the reduction of school-age students in rural middle schools, and the merger or closure of rural middle schools. As a result, geography teachers in rural middle schools have declined in the past 20 years. On the education funds, even though nearly 20 years, the government of education funds investment increasing every year, but China's education funds rate has been below the world average GDP, it also led to the foundation education insufficient budget devoted to this problem.

By analyzing the educational background of middle school geography teachers and the fixed output value of middle school experimental equipment over the years, the results show that the number of teachers with graduate degree is increasing, and the number of teachers with bachelor's degree or below is decreasing. In terms of the total output value of experimental equipment in middle schools, middle schools in cities are higher than towns, and towns are higher than villages. This shows that, overall, the research ability of middle school geography teachers in China is improving. At the same time, it also reflects the lack of research funds for middle school geography teachers in rural areas.

The analysis of literature sources and issuing institution, it is found that the three journals of *Middle school geography teaching reference*, *Geography teaching* and *Geography education* have the largest number of papers and make the greatest contribution to the research of middle school geography teaching. In terms of geographical spatial distribution, it shows a state of more in the north and less in the south, and the top 20 literature source coordinates are in the provincial capital and large cities above it. The sending institutions are mostly normal universities and middle schools, which are concentrated in the East and scattered in the West. In terms of the distribution of document issuing agencies in cities, counties and townships, the number of documents issuing agencies in cities and counties is significantly more than that in townships. This may be that in the research of middle school geography teaching, the research funds of middle school geography teachers in cities and counties are higher than those in villages and towns, and the research level of teachers in cities and counties is higher than that in villages and towns.

To analyze the author's number of published papers and cooperation relationship, the author with the largest number of articles in the field of geography teaching and research in middle school is Xu Baofang, whose number of articles is 11, followed by Zhang Weiqing, Hao Xingwu, Zhu Xuemei and Li Jiaqing, whose number of articles is 7, and the others are less than 7. In terms of cooperative relationship, there are only one cooperative teams within the nine-year scale, and the cooperative relationship is weak.

Analyzing the key words, geography teaching, middle school geography, geography, junior middle school, teaching, geography subject, geography teacher, middle school, geography things and so on were the research hotspots as early as 2000; Core literacy, teaching strategies, effectiveness and efficient classroom became the research focus after 2010;

In depth teaching, big data, smart classroom, analysis, situation creation and group cooperation have been the research hotspots in the past two years; The level of research no longer stays on how to improve students' performance, but gradually reflects in the aspects of core literacy and in-depth teaching. The research hotspots in foreign journal literature are GIS, demography, and geography of home, etc. the latest research hotspots are science and technology promoting teaching and video based virtual reality.

Facing the decreasing trend of the number of geography teachers in rural middle schools, it is necessary to revitalize rural education and improve the teaching quality of rural middle schools, so that rural middle schools will no longer lose students because the teaching quality is lower than that of urban middle schools. At the same time, geography has always been regarded as an adjunct in the concept, and the degree of attention is not high. Therefore, in the future geography teaching, we should cultivate students' interest in geography and change the concept of traditional geography as an adjunct.

In terms of research level, the overall research level of geography teachers in rural middle schools is significantly lower than that in county and urban middle schools. In terms of research funds, rural middle schools are significantly lower than those in counties and cities, so we should give more support to rural middle school geography teachers in the future financial allocation. At the same time, in terms of teachers' further education, we should give more opportunities for rural middle school geography teachers to improve their research level and research ability.

Declarations

Ethics approval and consent to participate: This paper does not take human experiments and / or use human tissue samples.

Consent for publication: The author declared consent to publication.

Availability of data and materials: All data generated or analyzed during this study are included in this published article [and its supplementary information files].

Competing interests: The authors declare no conflict of interest.

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Figures

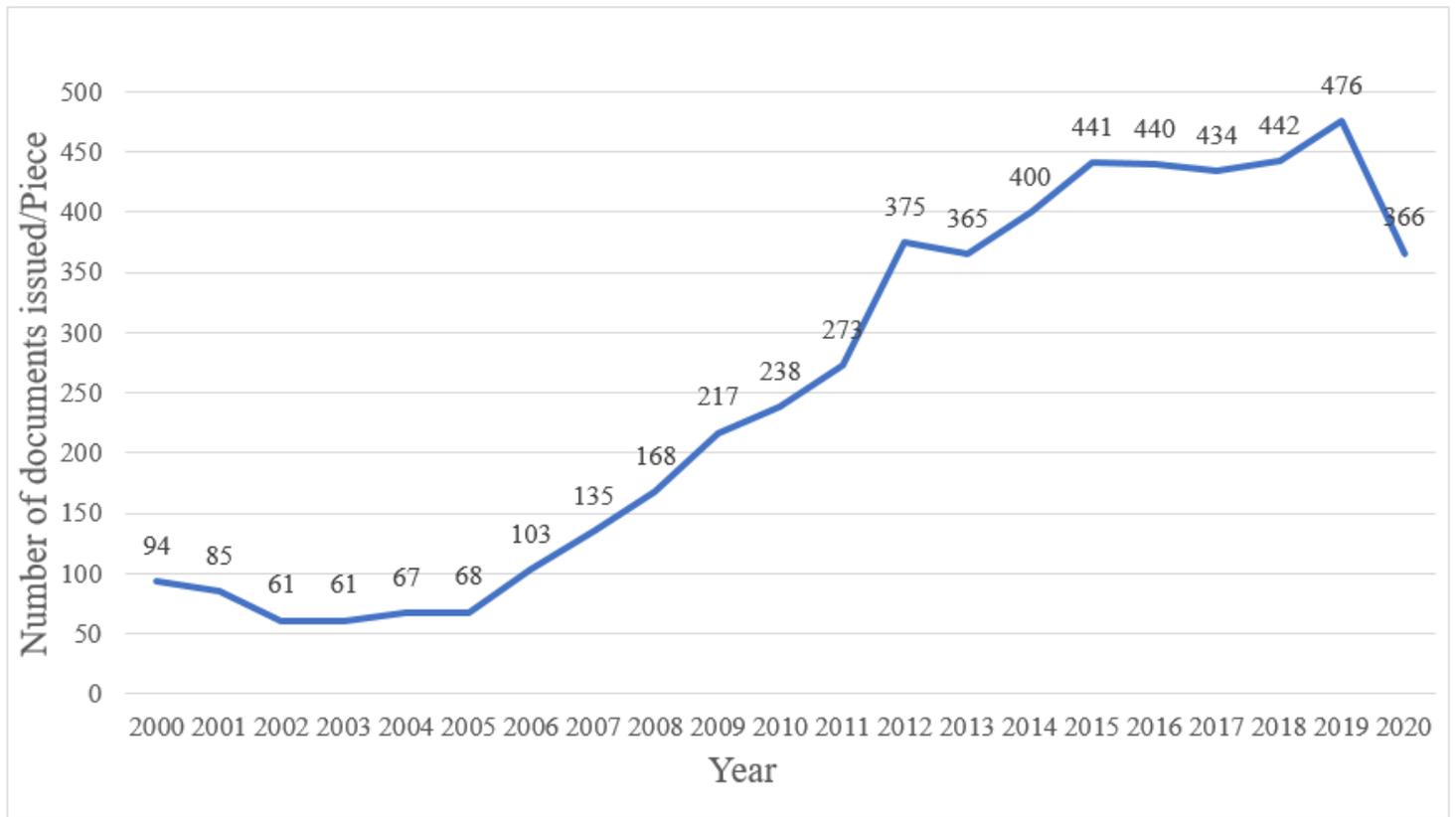


Figure 1

Number of documents published on geography teaching research in middle schools over the years

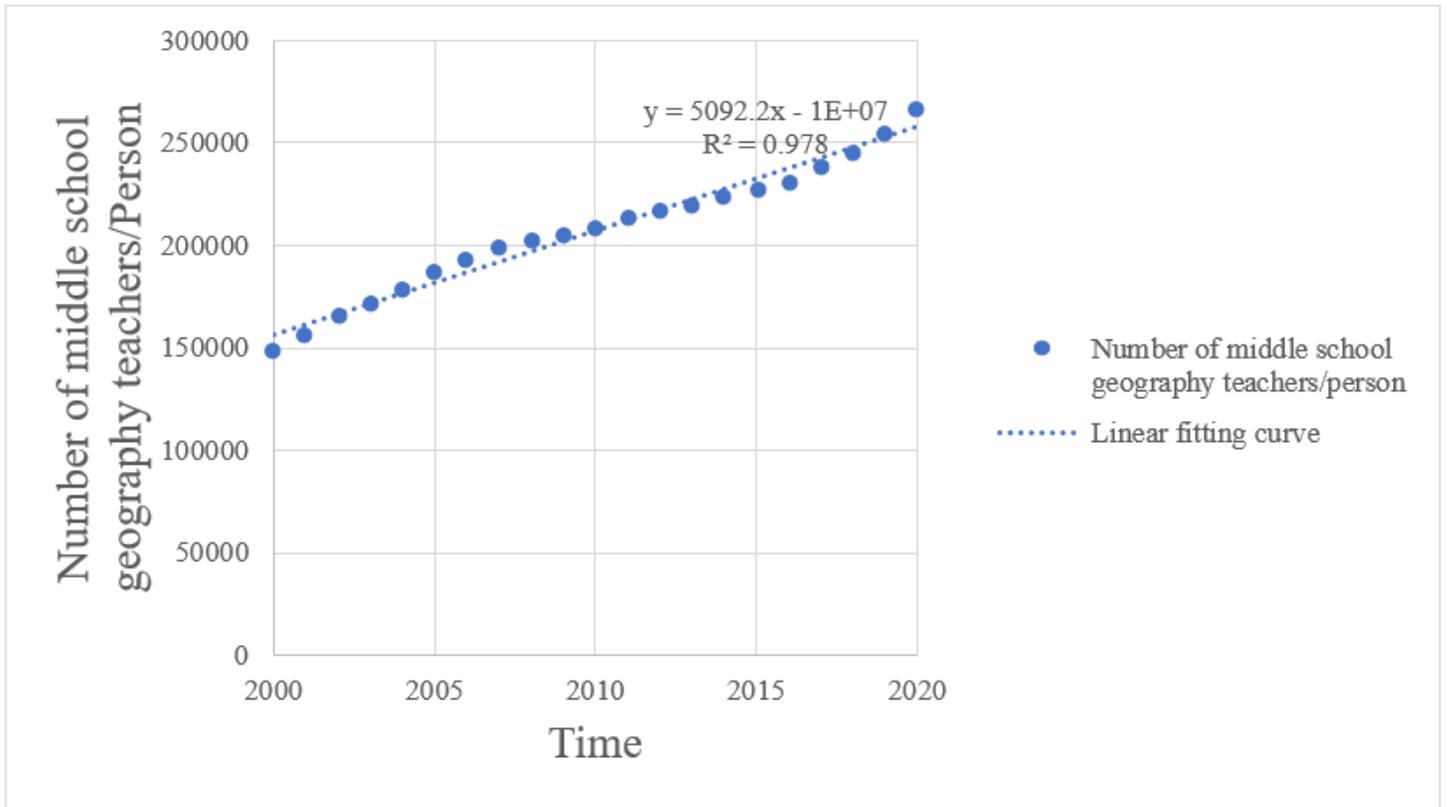


Figure 2

Change trend of the number of middle school geography teachers over the years

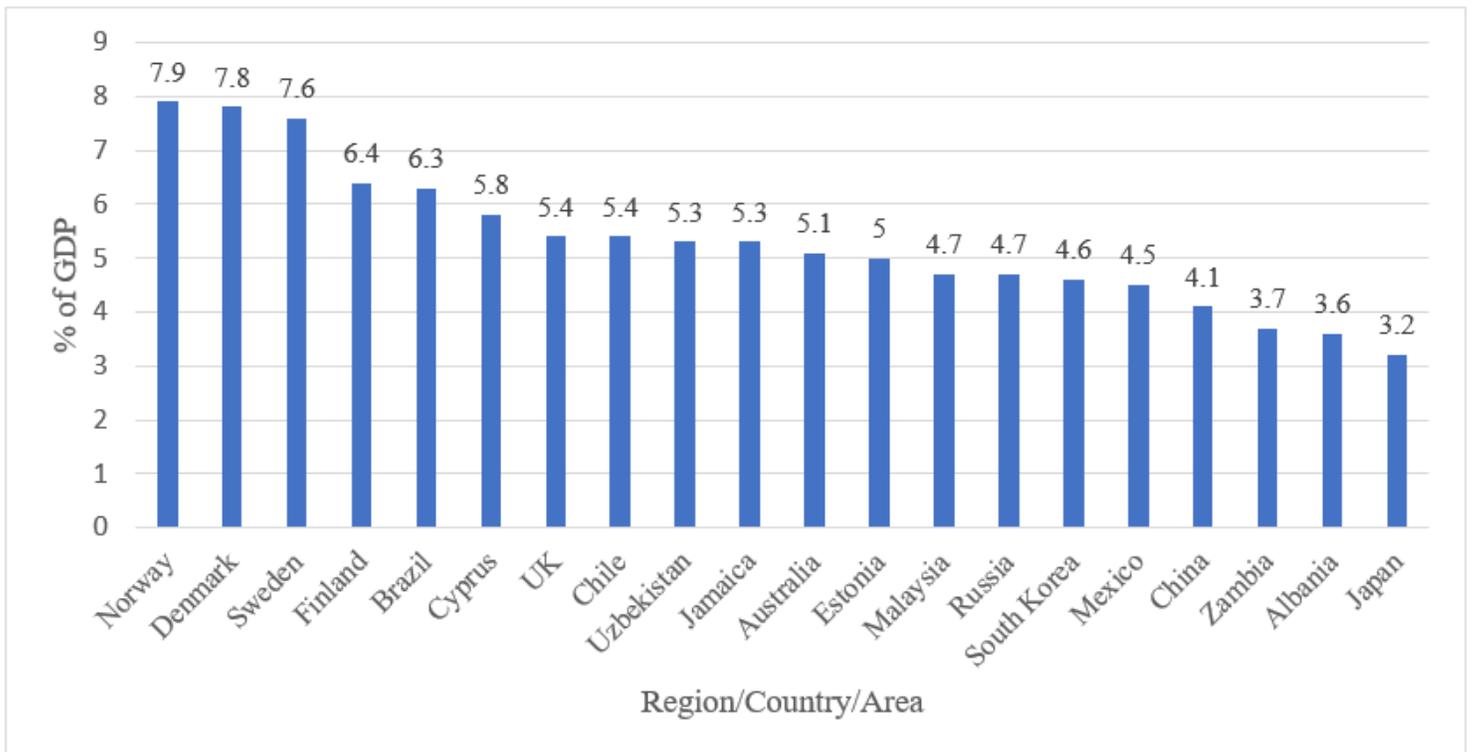


Figure 3

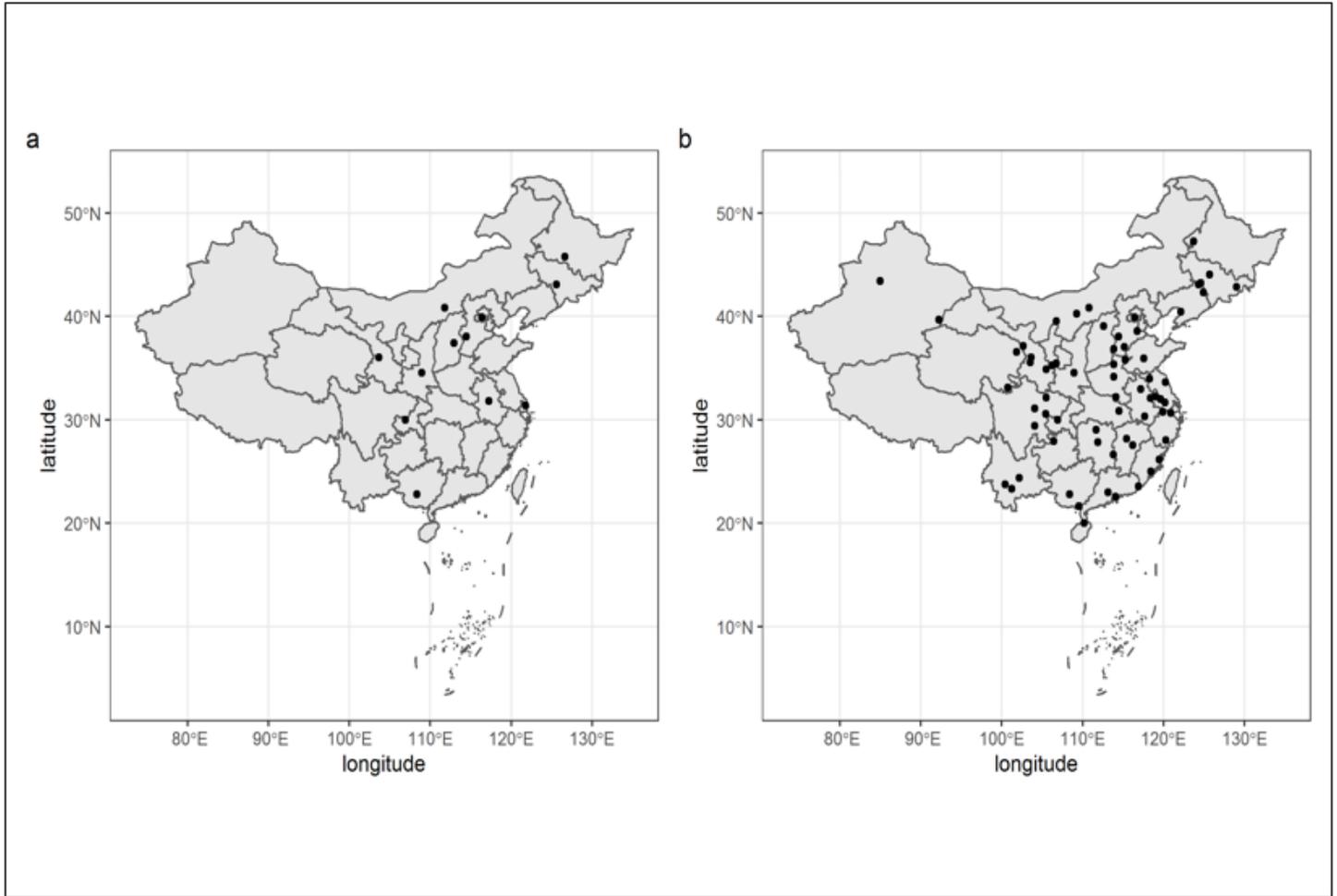


Figure 4

Geographical and spatial distribution of document sources and issuing institutions

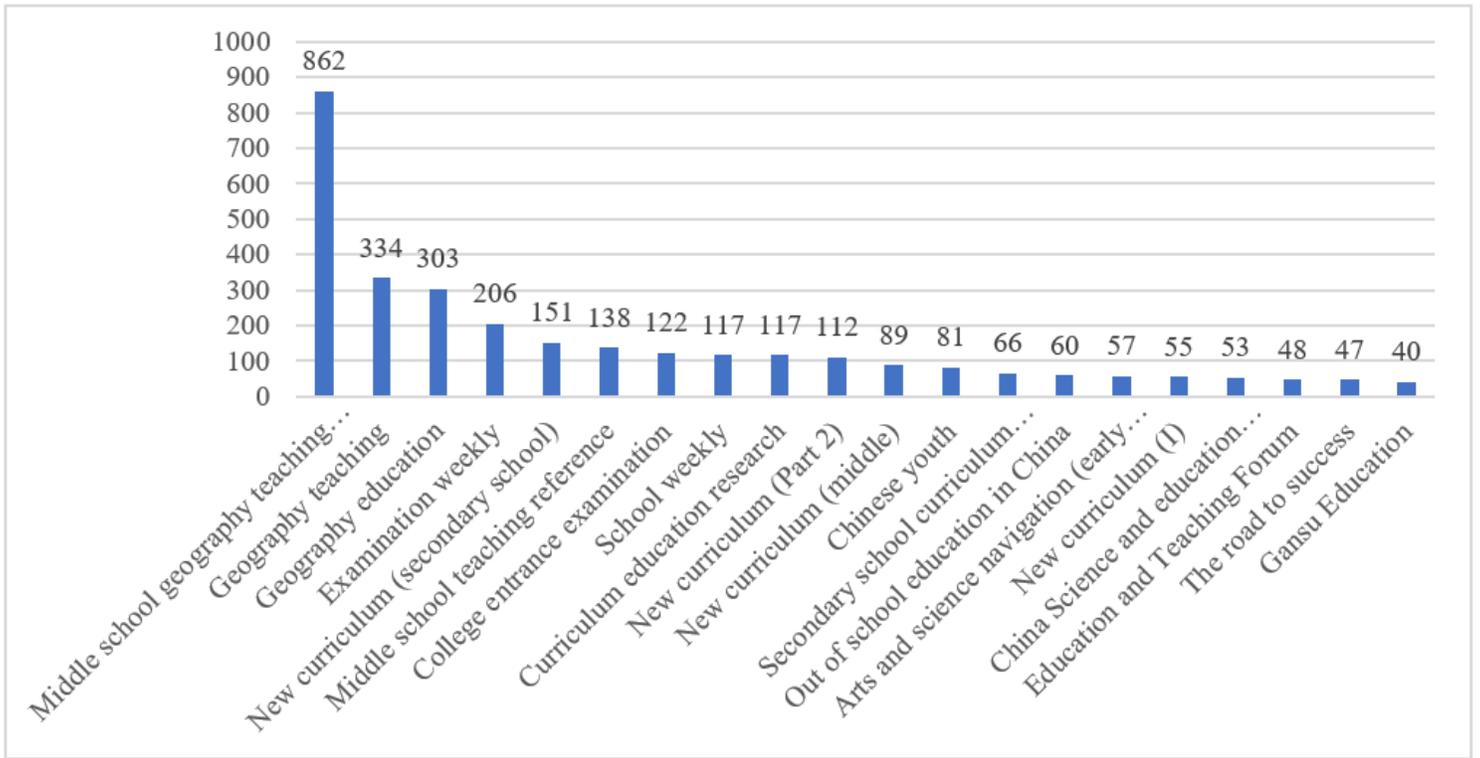


Figure 5

Top 20 in the number of literature sources

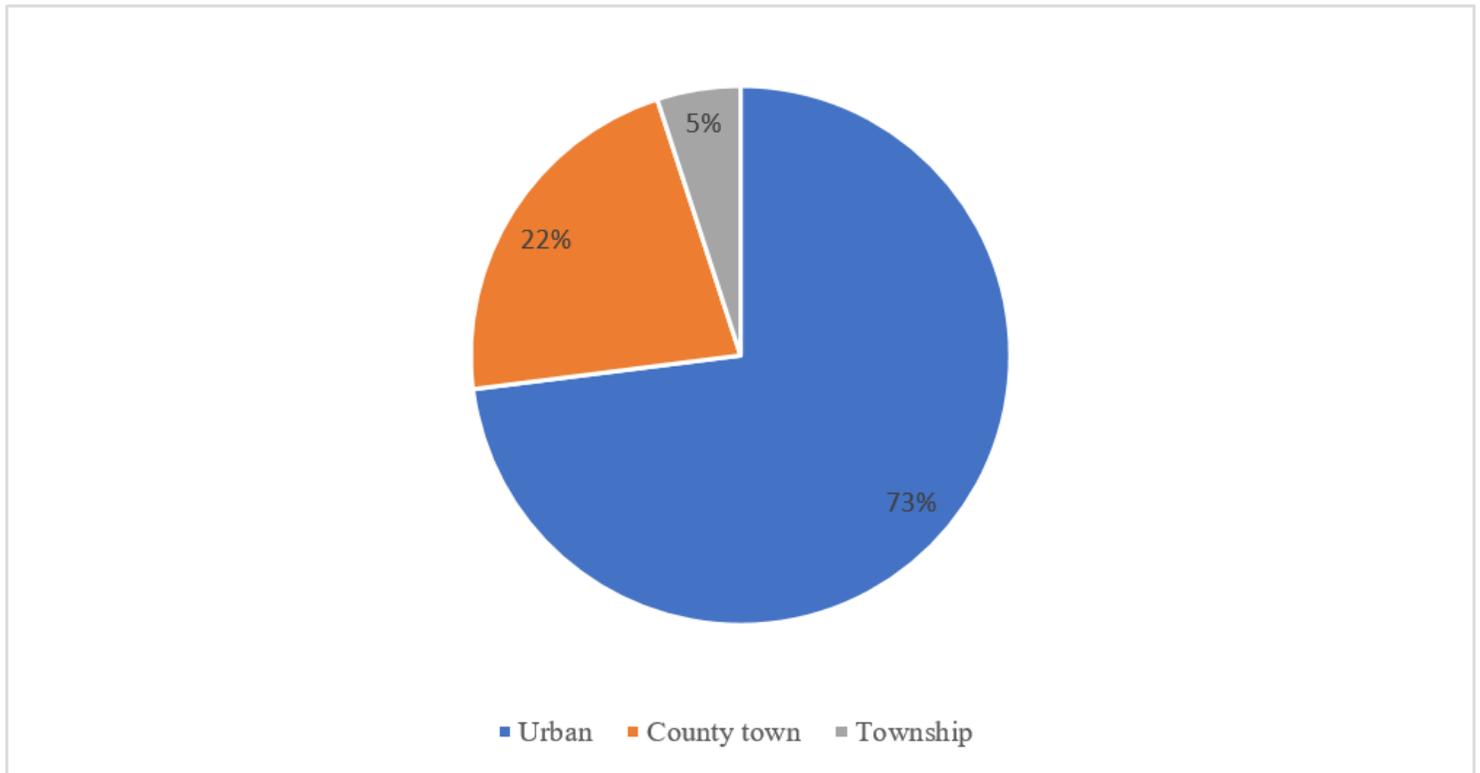


Figure 6

Proportion of document issuing institutions in cities, counties, and townships

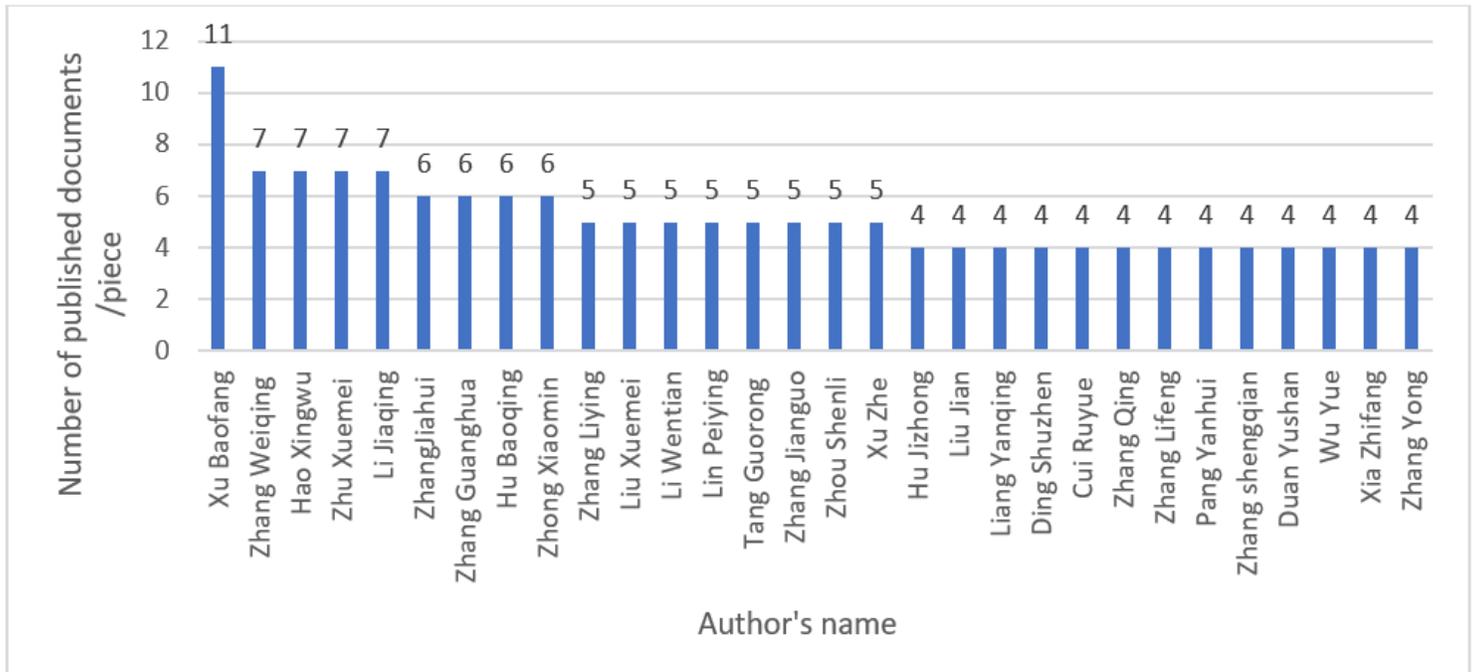


Figure 7

Ranking of authors



Figure 8

Author collaboration map

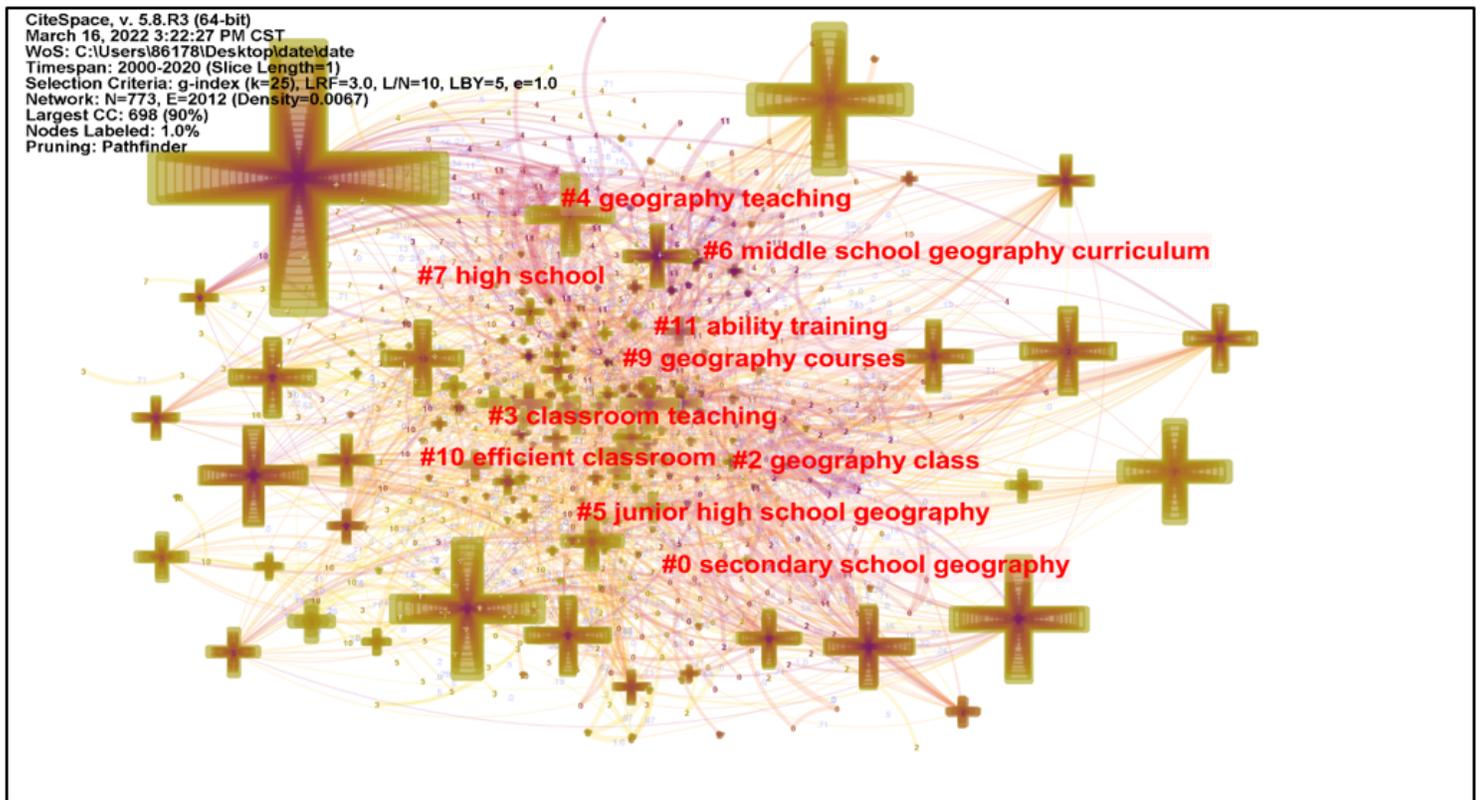


Figure 9

Keyword Atlas of Chinese Literature

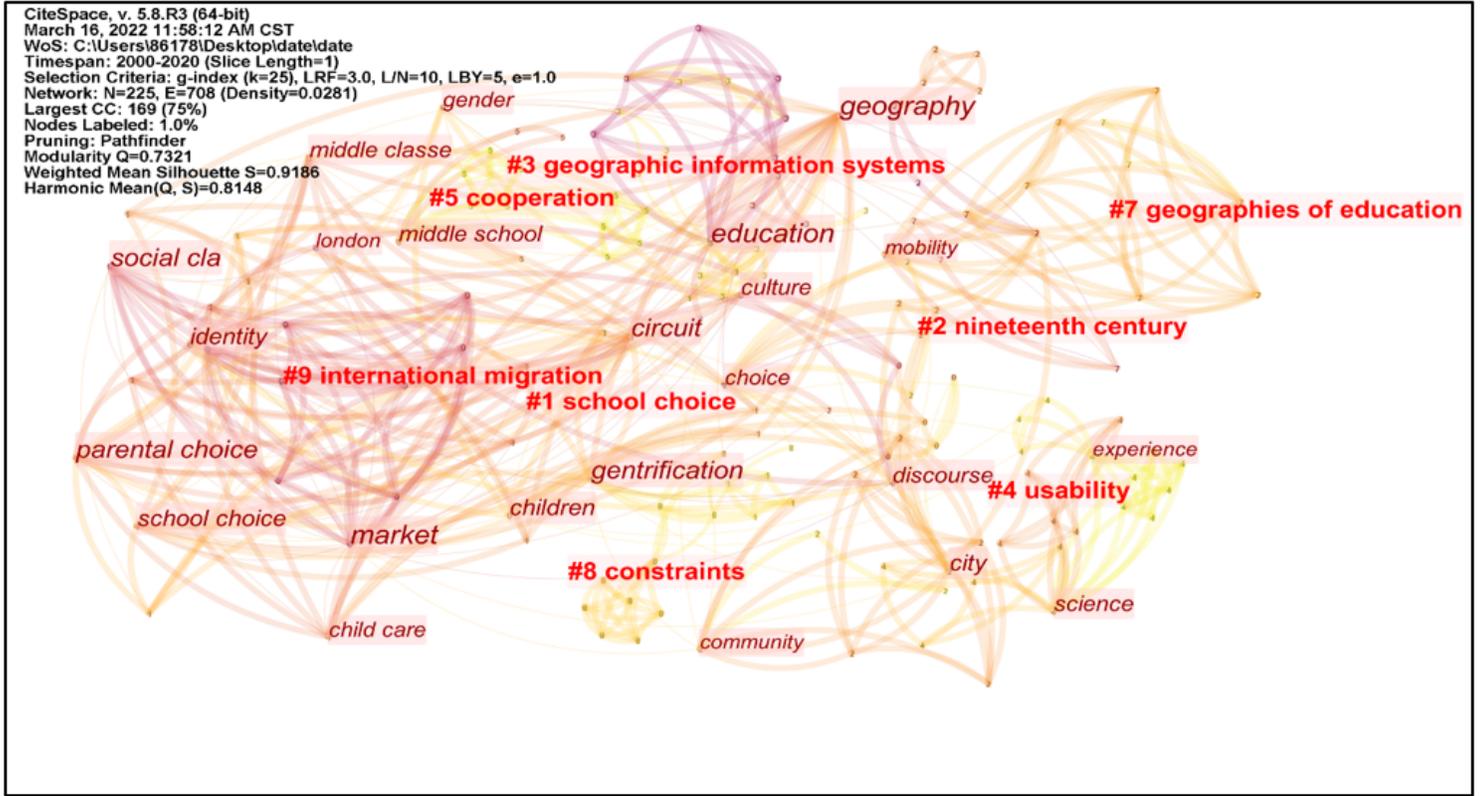


Figure 10

Keyword Atlas of English Literature

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