

Lesson Study & Learning Study in China (1999-2021): Bibliometric Analysis Based on CNKI

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Abstract: This bibliometric study aims at exploring the publications on lesson study and learning study in China based on the CNKI database between 1999 and 2021. “Lesson study” and “Learning study” were keywords for searching relevant publications on August 11, 2021. There are 315 articles collected, excluding articles written in English. The BICOMB software is applied to extract the above data to count the top ten ranking publications and to construct lexical and co-occurrence matrices. The clustering tree generated from high-frequency keywords represents the relationship among the terms. Euclidean distance model presents the hotspot topics at present, potential issues in the future, and the themes undeveloped in four quadrants. Results indicated that 39 high-frequency keywords were screened. There are 4 major clusters representing important issues: lesson study in practice, research approach, teaching strategies, and teacher education. Hotspot topics for lesson study are Teaching reflection, Classroom observation, effective teaching, etc. A comparative study, language art in primary schools, pre-service teacher education, deep learning, and information technology are seen as potential issues in the future; whereas themes such as core literacy, task design, teachers’ professional development are gradually declining. This study was subject to some limitations. First, only bibliographic data taken from CNKI were selected; therefore, some relevant publications might not have been included in this study. Second, the data retrieved in August 2021 is insufficiently representative since it might lack the completeness of year-long data for the whole year of 2021. Third, Chinese is the main language for publications in CNKI, and other publications in English languages are not collected. The concepts of lesson study and learning study are sometimes used interchangeably; therefore, the results of this study can serve as a guide for researchers and readers. The significance and value of this study is to portray the development of lesson study and learning study in China by means of visualization techniques and bibliometric characteristics. The potential issues emerging from the data will contribute to future studies in this field.

Index Terms: Lesson study, learning study, Bibliometric study, Keyword Co-concurrence, BICOMB.

1. Introduction

The lesson study has been popularized and popular all over the world, especially in Asia since it closely integrates academic scholarships with the instruction to bridge teaching theory and practice to increase the teachers' professional knowledge, to improve their ability of problem-solving, and to promote their reflectiveness on teaching quality on a daily basis [1]. The lesson study is an important means to promote the frontline teachers’ professional development and teaching effectiveness in terms of educational research conducted in their classrooms [2]; there is a strong reciprocal relationship between a lesson study and real situations in teaching settings.

Slightly different from the lesson study, learning study is based on the variation theory and teachers’ collaboration to explore the appropriate teaching strategy for assisting students in learning difficulties [3]. Lesson study and learning study are intended to bring about improvements in teaching and learning [4], but the significant difference between learning study and other forms of action research is that it is based on the theory of variation [5].

In China, lesson study has become extremely popular with educational reformers due to varied factors and the most significant among them is the over-theorization of pre-service teacher education which results in the lack of professional abilities to cope with the dynamics in practice. Lesson study can make the best use of scarce resources

from the “best practices” of expert teachers to empower the teachers in China to conquer the challenge of the new curriculum reform since 2012 [6]. However, most front-line teachers fail to resort to the advantages of lesson study or learning study but their own experiences as usual while encountering difficulties under tremendous pressures from educational reforms even though lesson study and learning study have been implanted in China from Japan for years. This has been an urgent problem for teachers to be solved. Despite the raise of publications related to lesson study and learning study, there remains a paucity of research that makes a holistic evaluation of this topic necessary. To understand the development and evolution of lesson and learning study research in China, bibliometrics can serve as a time-effective research method for the literature review on lesson study and learning study by analyzing relevant publications. This bibliometric analysis of literature included in the China Net Knowledge Index (CNKI) may provide researchers with references for the current status of both lesson study and learning study, as well as for future research and practice by means of visualization techniques to efficiently locate the following questions:

1. What is the status quo of the distribution of Yearly Publications?
2. What are the core journals for lesson study and learning study?
3. What are the high-frequency keywords of lesson study and learning study?
4. What are the hot-spot themes based on the Dendrogram Cluster Analysis?
5. What are the developmental evolution of publications of lesson study and learning study by means of multidimensional scaling analysis?

2. Methods

Study design

This is the bibliometric analysis of the specific topic from literature databases. The bibliometric approach is regarded as a data-driven and quantitative method to portray a research field that allows wider coverage, therefore, the bibliometrics analyses high-frequency keywords, citations, and hot-spot themes from the scholarly literature which concern both lesson study and learning study from 1999~2021 according to bibliographic characteristics through BICOMB. The research procedure is shown in Fig. 1. As shown in Fig. 1, the CNKI is the main database; BICOMB is the bibliometric software for forming high-frequency keywords and lexical matrix; the SPSS is applied to perform hierarchical cluster analysis for dendrogram and multidimensional scaling analysis for Euclidean distance model.

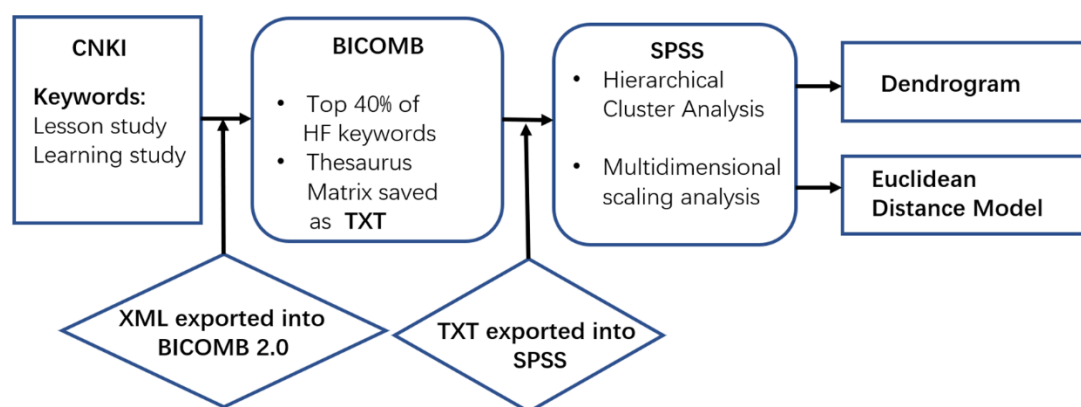


Fig.1. Research procedure of this study.

Data Collection

Criteria for Inclusion and Exclusion

Two keywords “lesson study” and “learning study” were used for the retrieval of relevant publications in CNKI. The initial time and the document types of the search were not limited, and the deadline was August 11, 2021. There were 314 articles, 266 lesson studies (2004-2001) and 48 learning studies (1999-2021), retrieved after excluding English literature. All exported data files were saved in xml format.

Data Analysis

BICOMB 2.0 (Bibliographic Items Co-occurrence Matrix Builder), a free bibliometric analysis software, can deal with the high-frequency keywords and annual publication volume statistics. Moreover, it can intuitively show the structure of the research field, hotspot topics, and predict the future trends of the research field by generating a

thesaurus matrix or co-occurrence matrix. SPSS v.23, commonly used for econometric analysis, was utilized to generate Euclidean distance model by performing multi-dimensional scale analysis of the thesaurus (lexical) matrix and dendrogram cluster tree hierarchical cluster analysis.

Ethics statement

Neither institutional review board's approval nor informed consent is required because it is a study based on the literature database.

3. Results

1. The Distribution of Yearly Publications

Table 1 presents the distribution of publications on lesson study and learning study on an annual basis between 1999 and 2021. A total of 314 articles were collected, including 266 articles about lesson studies and 48 articles about learning studies. The very first article about lesson study indexed in the CNKI was published in 1999 and the publication growth rate remained relatively stagnant from 1999 to 2011. This field of research continued to flourish from 2011 onwards, with one minor peak occurring in 2015 (31).

Fig. 1 clearly shows the publication volume of the corresponding literature; the growth rate of publications on lesson study reached 50 papers in 2020 (Fig. 2). The first article about learning study indexed in the CNKI appeared in 2003 and afterward the publication growth presented falling trends, with a minor peak at 2005. To be more specific, the volume of papers was only one found in seven years and even zero in three years.

Table 1. Yearly Output of Research on Lessons Study and Learning study

Year	No. of Articles		Year	No. of Articles	
	Lesson Study	Learning Study		Lesson Study	Learning Study
1999	2	0	2012	19	4
2003	0	2	2013	21	1
2004	1	1	2014	13	1
2005	1	6	2015	31	0
2006	4	2	2016	11	3
2007	3	3	2017	26	4
2008	4	6	2018	29	0
2009	2	5	2019	20	3
2010	3	1	2020	50	1
2011	9	4	2021	15	1

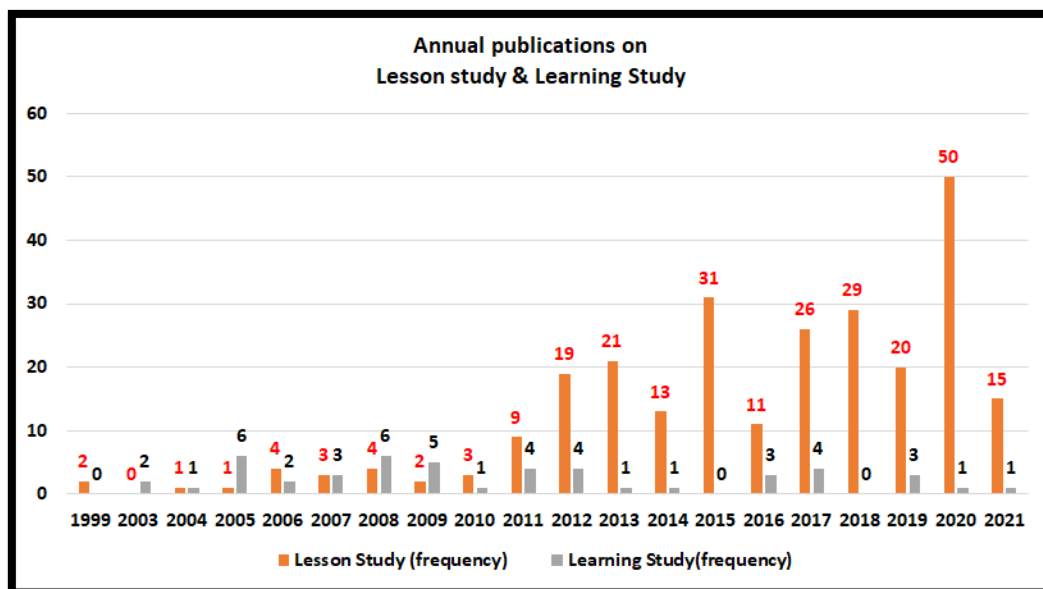


Fig.2. Annual Publications on Lesson Study & Learning Study.

2. The Distribution of Articles published in different sources

A total of 314 articles were published in 163 sources. Four Lesson Study core journals with the most publications in order are the *Journal of Mathematics Education* (10), *JiangSu Education Research* (6), *Teacher Education Research* (6), and *China Audiovisual Education* (5). Nanjing Normal University ranked first (17), followed by Hua Dong Normal University (11), San Dong Normal University (7), and Tianjin Normal University (7). There are a large number of university researchers who carry out specialized research on Lesson studies and most publications appear in theses instead of academic journals. A total of 48 articles on Learning study are published in 34 sources. Apparently, the number of articles in each source is less than 5, and only one academic thesis comes from Capital Normal University. Both *JiangSu Education Research* and *Research in Education Development* published 5 papers, the most articles (Table2).

Table 2. The Sources of Publications on Lesson Study and Learning Study

	Lesson Study	<i>f</i>
Journals	Journal of Mathematic Education	10
	JiangSu Education Research	6
	Teacher Education Research	6
	China Audiovisual Education	5
Theses	Nan Jin Normal University	17
	HuaDong Normal University	11
	YangZhou University	8
	SanDong Normal University	7
	TianJin Normal University	7
	HeBei Normal University	5
	Learning Study	<i>f</i>
Journals	JiangSu Education Research	5
	Research in Education Development	5
	Modern Education Technology	2
	Journal of Shandong Normal University	1
	Journal of Shanxi Normal University	1
	Journal of ShenYang College of Education	1
	Journal of TaiZhou University	1
	Ceramic Science and Art	1
	Journal of TianJin Normal University	1
	Capital Normal University	1
Theses	Capital Normal University	1

3. High-frequency Keywords

Using BICOMB 2.0, 987 keywords were extracted from the total articles to retain the more representative high-frequency keywords by screening with common meanings. The keywords with a cumulative frequency of interception of more than 40% of the total frequency were selected as high-frequency keywords [7]. In Table 3, 39 high-frequency keywords about lesson study with frequency more than 3 were selected and occurred 421 times, accounting for 42.65% of 987 times of the total keyword occurrence. Lesson study ranked first (217), followed by teacher's professional development (31), action-based lesson study, (17), pre-service teacher (11), and teacher education (8).

Table 3. High frequency keywords of Lesson study

#	Keywords	<i>f</i>	#	Keywords	<i>f</i>	#	Keywords	<i>f</i>
1	Lesson Study	217	15	Lesson research	5	29	Text reading	3
2	Teacher's Professional Development	31	16	Effective Teaching	5	30	PE teacher	3
3	Action-based lesson study	17	17	Teacher Practical Knowledge	5	31	Sample Lessons	3
4	Pre-service teacher	11	18	School-based teaching research	4	32	Teacher cooperation	3
5	Teacher education	8	19	Japan	4	33	Hou-jiang Huang	3
6	Pedagogical Content knowledge	7	20	Teaching design ability	4	34	Information technology	3

7	Primary School Mathematics	6	21	Strategy	4	35	Teaching reflection	3
8	Action research	6	22	Normal University students	4	36	Teacher Learning Community	3
9	Comparative study	6	23	Teacher professional growth	4	37	Task-based design	3
10	Teaching and Research activities	6	24	Classroom Observation	3	38	Practical knowledge	3
11	Professional Development	6	25	Mode	3	39	Deep Learning	3
12	Teachers' career development	5	26	Core competence	3	Total		421
13	Reading reflection	5	27	English teacher	3			
14	Primary School Language arts	5	28	Lesson analysis	3			

Table 4 presents the 20 high-frequency keywords of Learning study with frequency above 2 were listed and presented 61 times, accounting for 32.8% of the total 186 times. Learning Study ranked first (12), followed by School-based learning study (6), and Teacher professional development (4).

Table 4. High frequency keywords of Learning study

#	Keywords	f	#	Keywords	f
1	Learning Study	12	12	Learning Strategy	2
2	School-based Learning Study	6	13	Learning science	2
3	Teacher Professional Development	4	14	Learning Research	2
4	Understanding Learning	3	15	Inquiry-based learning	2
5	Theory of Variation	3	16	University-School partnership	2
6	Learning Variation theory	3	17	School-based Action Research	2
7	Teaching Exploration	3	18	Self-Regulated Learning	2
8	Curriculum Practice	3	19	Teacher education learning	2
9	Industry-University cooperation education	2	20	Industry-University Research	2
10	Action Research	2	Total		61
11	Teacher Learning	2			

4. Dendrogram Cluster Analysis

Hierarchical cluster analysis was performed to cluster the high-frequency keywords on Lesson study and learning study, which was inputted into SPSS 23 as variables, between-group average linkage method was applied to sort those keywords into groups to identify the homogeneous groups of keywords according to selected characteristics. Two dendrograms, as a result, were shown in Fig. 3 and Fig. 4 respectively to distinguish and classify between the categories of keywords. The dendrogram provides a better understanding of the high-frequency keywords in the mainstream academic studies on a subject [8], for example, Lesson Study and learning studies in this current study. Figure 3 shows 7 categories: teacher's professional development, action research, action-based lesson study, pre-service teacher, teacher education teaching reflection, deep learning, and teacher's professional and practical knowledge. Fig. 4 presents four categories: curriculum practice research of Learning Study, learning science and Learning Research, School-based cooperative research and Theoretical research, and Research on learning strategies.

5. The Multi-Dimensional Scale Analysis

Multidimensional scale analysis is the processing for a group of individual different data being exported into spatial composition to retain the relative relationship of the data [9]. The keywords divided into four quadrants of the Euclidean distance model to map the hotspot research topics, using SPSS v23. The keywords of the four quadrants are analyzed in the counterclockwise direction to describe the development, evolution, and future tendency of research in a specific field. As shown in Fig. 5, Field 4, 5, and 6 regarding pre-service teachers and normal university students are located in the first quadrant, which represent a leading subject, mature and stably developed, with high density and centrality values. Field 5 is an underdevelopment theme because some keywords located in the second and the fourth quadrants are poorly connected with the far distance between them. Keywords of Field 2, 3, and 6 in the second quadrant represent the themes mature but not hotspot at present. The keywords of Field 1 in the first and third quadrants and most in the fourth quadrant, which means the internal maturity of this theme is insufficient and undeveloped. Field 2 focusing on action research of Lesson study is located in the third quadrant, indicating that this field is peripheral, undeveloped, and gradually declining in the entire research network.

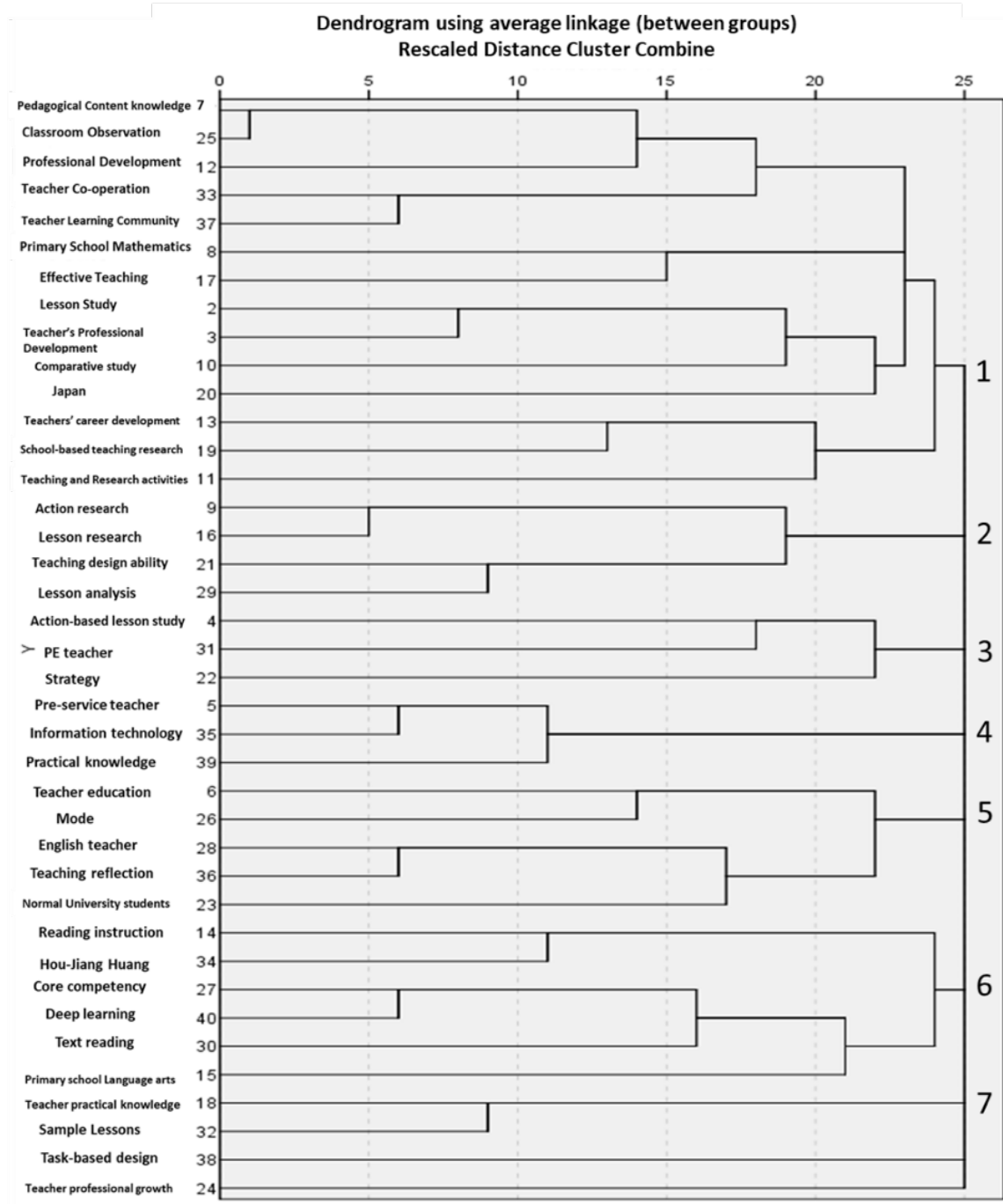


Fig. 3. 1999-2021 Dendrogram Using Average Linkage (Between Groups) Cluster of Lesson Study

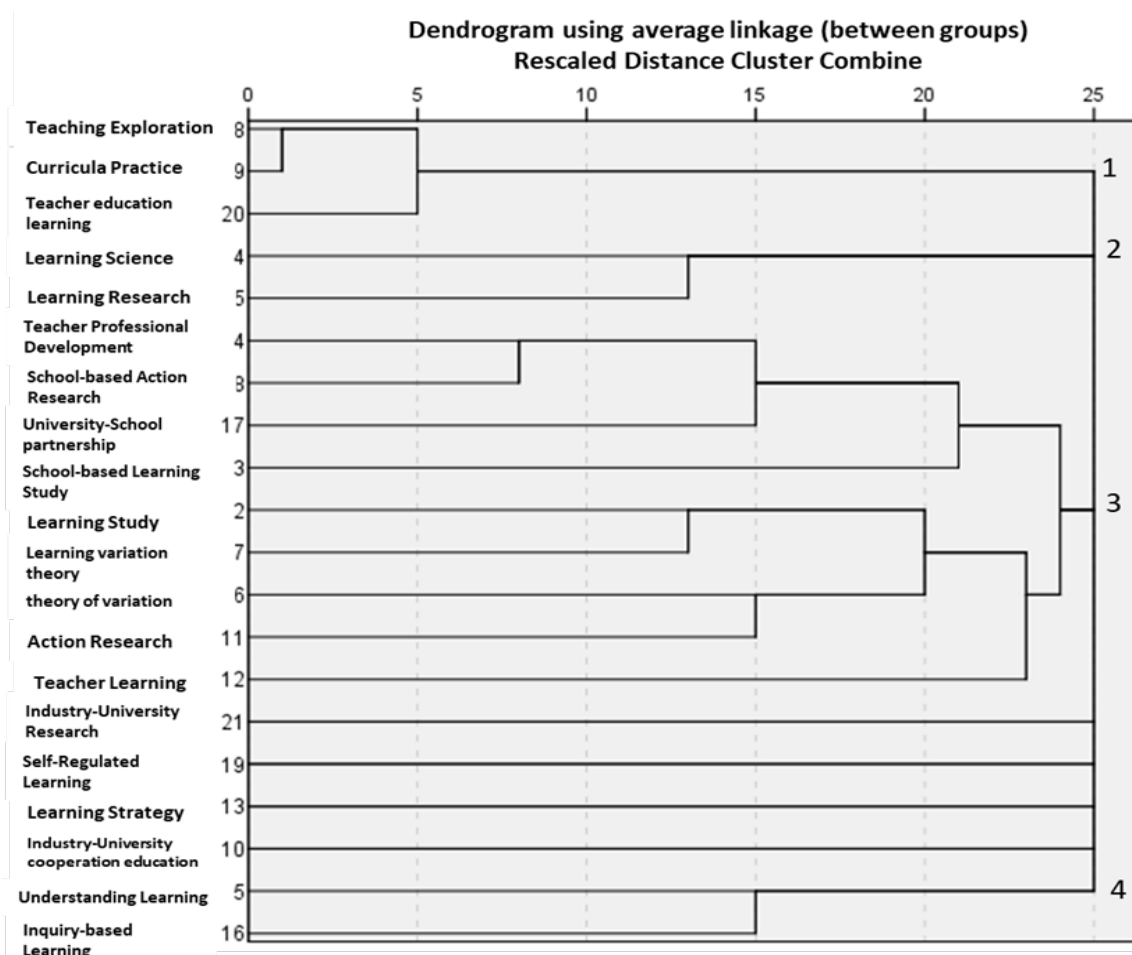


Fig. 4 2003-2021 Dendrogram Using Average Linkage (Between Groups) Cluster of Learning Study

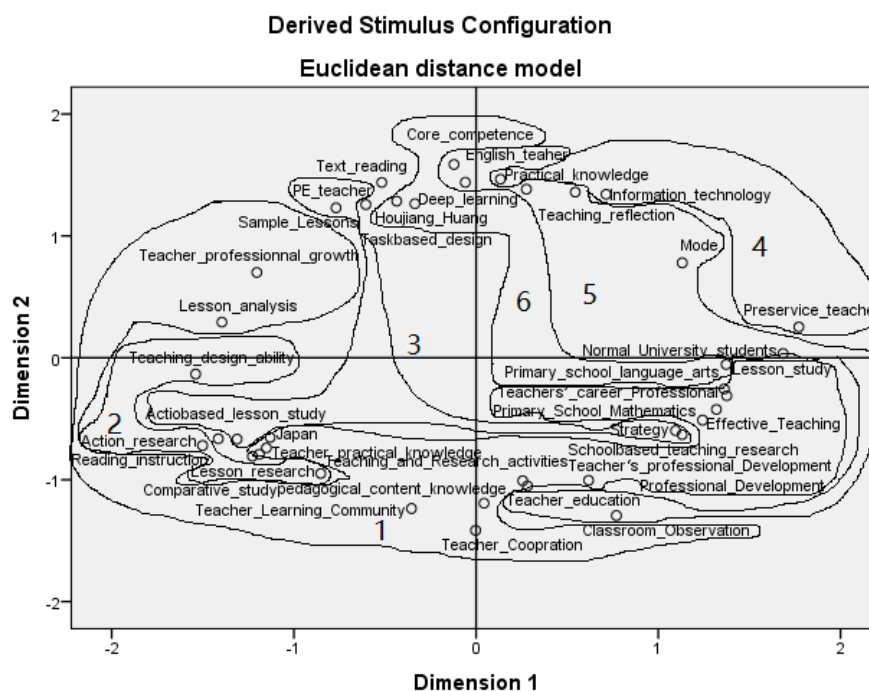


Fig. 5. The result of multidimensional scaling analysis of Lesson study

Curriculum practice research of Learning Study in field 1 is located in the second quadrant, which is of great importance and has certain development space in the future (Fig. 6). Field 2 is located in the first and third quadrants and the distance between keywords is far away, loosely structured, and vulnerable to the influence and evolution of other fields. Field 3 is almost located in the first quadrant but part in the second quadrant. Industry-University Research, Learning Science, and Learning Strategy are located in the fourth quadrant, which means specialized institutions study them for further development.

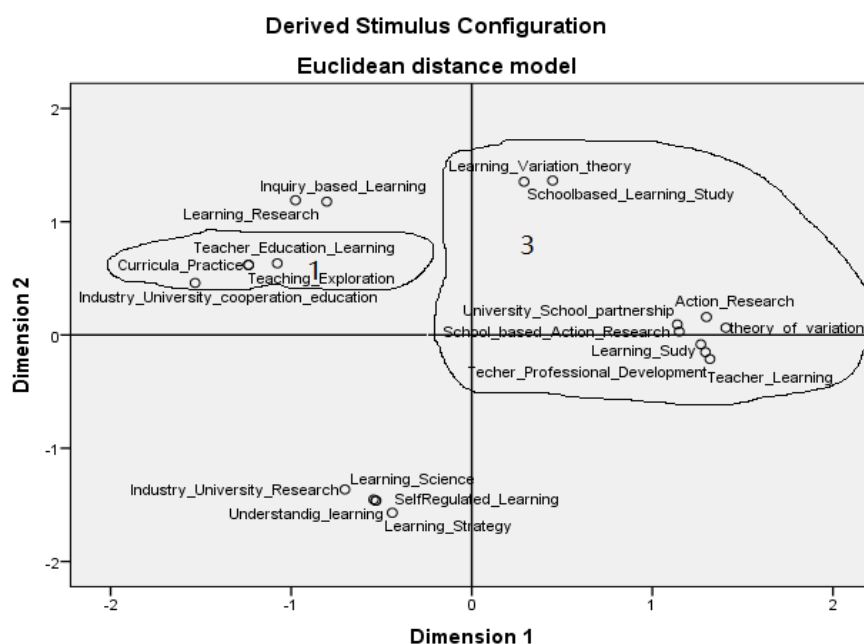


Fig. 6. The result of multidimensional scaling analysis of learning study

4. Discussion

Based on the results of this bibliometric study, there are four meaningful points worth being addressed in detail in the following.

- *Domestic Scholars Pay More Attention to Lesson Study*

Compared with the research on learning studies, domestic scholars in China pay more attention to Lesson study advocated by the World Association for Lesson Study in 2006 [10]; however, sustained attention is not paid to this field. From 2003 to 2021, the yearly publications are less than five and even zero in several years. Due to the national curriculum reform policy launched currently, lesson study has been spreading all over China as a most important school-based professional development activity and has become a hotspot pedagogical theme since 2001. The curriculum reform is to change the predominant model of knowledge transmission to a constructivist learning model with more student participation and self-initiated collaborative inquiry. Since the tradition of polishing class in domestic schools and the major objective of lesson study have several characteristics in common, so more and more scholars begin to pay attention to this field.

- *Themes of Lesson Study Research shift from science to Liberal arts*

Currently, research themes of lesson study are mainly on science subjects, especially mathematics. It is evident in the top journals, for example, *Journal of Mathematics Education*, publishing 10 related articles. The lesson study practice in mathematics provides Chinese teachers and students with beneficial experience and promising results echo the previous studies by researchers all over the world. From Figure 3, the hotspot research theme of lesson study has shifted from mathematics in field 1 to text reading in field 3, mainly referring to the more prominent subjects of language learning.

- *Lack attention to Students' learning growth*

Lesson study trains teachers' ability to reflect on teaching through the circular process of teaching lessons, summarizing and reflecting, revising lessons, and teaching revised lessons again, so as to improve teachers' professional

teaching skills. It can be said that lesson study is the most effective way to improve teachers' professional abilities [11] and an effective way to develop normal university students' abilities to learn from teaching practice [12], which is also one of the important goals of pre-service teacher education. However, the existing studies still focus on the professional development of in-service and pre-service teachers and pay little attention to the students' learning growth. Regarding the student-centered approach, lesson study serves as overarching guidance [6] to provide both teachers and students with a better pedagogical mode, which is a curriculum reform requiring not only how teachers teach but also how students learn well [2]. Moreover, experiencing a positive learning experience in early grades may affect the long-term learner's experience; recently, virtual reality (VR) devices provide videos and games like real-world experience increased further development in learning [13]. Teachers are responsible to improve students' competences with effective pedagogical strategies [14]. Little attention is paid to students' competency might lead to low academic achievement and low personal qualities. Therefore, Chinese scholars may consider how they can assist students in academics and personalities based on daily teaching.

● *Lack of Theoretical Research in lesson study and learning study*

Learning study is collaborative action research guided by the variation theory, also known as the theory of variation, which is put forward in the real educational practice, and thus its practical significance to education and teaching is more far-reaching. At present, there are few researches on mathematical variation instruction in China and lack a large-scale experiment [15]. Lesson study has the dual characteristics of practice and research to be carried out in action for changing classroom teaching practice [16]. In a nutshell, a theory should be based on practice, and theoretical research can make the practice more valid and reliable.

5. Conclusion

This bibliometric study aims at exploring the publications on lesson study in China based on CNKI database between 1999 and 2021. The results can be summarized as follows:

In the amount of the published literature, it can be seen that the volume of published literature on Lesson study is generally on the rise and will still be increasing, compared with research on Lesson study in China [17]. More academic studies of Lesson study are published in Master theses and Ph.D. dissertations rather than core journals. The dendrograms show that lesson study aggregates seven fields on the professional development of primary school mathematics teachers [18], language art in primary schools [19], pre-service teacher education, deep learning, and information technology; whereas, fields of learning study focus on School-based Learning Study and Teacher Professional Development especial the Theory of learning. In view of the current research focus and developmental trends, researchers are recommended to strengthen the theoretical research, pay more attention to students' learning, and explore how lesson study contributes to the construction of a learning community in all levels of schools.

This study was subject to some limitations. First, only bibliographic data taken from CNKI were selected; therefore, some relevant publications might not have been included in this study. Second, the data retrieved in August 2021 is insufficiently representative since it might lack the completeness of year-long data for the whole year of 2021. Third, Chinese is the main language for publications in CNKI, and other publications in English languages are not collected. Based on the stated limitations, further research may expand the database scope to include other retrieval systems, such as SSCI and SCI-E, SCOPUS, ERIC, PubMed® and etc. to cover as much information as possible. Further, the whole year's data for 2021 can be extracted to update the completeness of this study.

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Conflict of Interest

No potential conflict of interest relevant to this article was reported.

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