

# The Knowledge Map Analysis about the Theme and Trend of Classroom Study in Higher Vocational Education in China

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**Abstract :** The article searched the periodical literature of classroom research for Higher Vocational Education in CNKI. And used knowledge atlas analysis and other research methods to draw knowledge maps of high-frequency keywords relationship maps and keyword co-occurrence maps based on data analysis software of Bicom2、Ucinet and Citespace, and got seven research themes of the classroom of Higher Vocational Education in China. Finally the paper proposed the research trend of classroom research in higher vocational colleges using centrality analysis and multi-dimensional scale analysis Atlas of SPSS.

## 1. Introduction

Classroom research starts early and there are many research results. According to Chinese National Knowledge Infrastructure (CNKI), there are more than 170,000 periodical articles on classroom research. However, classroom research in higher vocational education starts late and there are fewer research results, with the total of only 9066. The literature of classroom research in higher vocational education only accounts for 4% of the literature of classroom research. In addition, there are more than 280,000 periodical articles titled "Higher Vocational Education" in CKNI, and the literature of classroom research only accounts for 2.4% of the literature of higher vocational education. It can be seen that classroom research in higher vocational education has been marginalized in the classroom research system and the higher vocational education research system. In order to further understand the current situation of classroom research in higher vocational education, based on the CNKI periodical database, this paper used Bicom2, Ucinet, Citespace and other data analysis software to extract high-frequency keywords and draw multi-dimensional knowledge maps of classroom research in higher vocational education, and analyzed the theme and development trend of classroom research in higher vocational education in China from the perspective of data visualization.

## 2. Data sources

Based on the periodical database of CNKI, all periodical literature was retrieved by "TI= classroom and TI= higher vocational education". As of September 2019, a total of 9066 valid periodical articles were retrieved, as shown in Figure 1.



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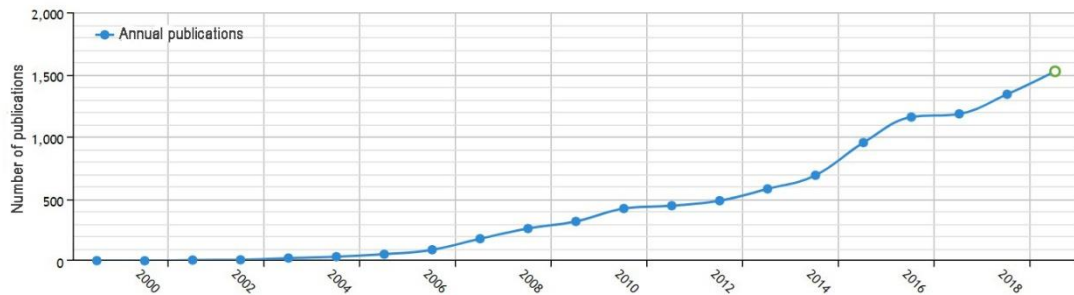


Figure 1 Annual distribution of literature of classroom research in higher vocational education

### 3. Bibliometric analysis of classroom research in higher vocational education

#### 3.1. Distribution of research disciplines

There are three main research disciplines involved in the literature: foreign languages (2433 articles), vocational education (2254 articles) and education theory and education management (1154 articles).

#### 3.2. Distribution of cooperation among literature authors

The author's cooperation network was visualized by using the function of "Author" of CiteSpace software. As shown in Figure 2, Xie Zhaoyang, Yu Jingbo and Liu Yifan are prominent in the cooperation network, but the research authors have less cooperation, forming only a three-person cooperation network: Dong Shuhua, Du Huimin and Zhao Ying, and three two-person cooperation networks: Gao Aifang and Wang Weiping, etc.

#### 3.3. Distribution of cooperation among research institutions

The cooperation network of research institutes was visualized and analyzed by using the function of "Institution" of CiteSpace software. As shown in Figure 3, the layout of the research force of classroom research in higher vocational education has been formed, such as Huanggang Vocational and Technical College and Taizhou Vocational and Technical College. According to the contribution of research institutes to classroom research, there are 15 research institutes that publish more than 30 articles, and Wuhan Vocational and Technical College publishes the most.

#### 3.4. Distribution of periodicals

The top five periodicals that publish the literature are all non-core periodicals, and the top 20 periodicals that publish the literature include only "Education and Vocation" and "Vocational & Technical Education Forum" two core periodicals. Only 328 of the articles retrieved are from core periodicals, accounting for 3.9% of all the articles.



Figure 2 Map of author cooperation



Figure 3 Map of research institutions cooperation

#### 4. Data analysis of keywords in classroom research

High-frequency keyword analysis can reflect the research topics in the field of research. This paper used Bicomb2 software to extract keywords from 9066 research papers, and got 5847 keywords, with a cumulative occurrence frequency of 21812. It combined the similar keywords, such as "English in higher vocational education", "English Teaching in Higher Vocational Education ", "English Classroom Teaching", "College English", "Public English", and so on. It will appear more than 40 times. The 32 keywords with the occurrence frequency of more than 40 times were defined as high-frequency keywords, and the cumulative occurrence frequency was 43.75%, as shown in Table 1.

Table 1 High-frequency keywords with a word frequency threshold of 40 (part)

Keywords	Frequency	Percentage	Accumulated percentage
Vocational school	2013	9.2289	9.2289
English	1612	7.3904	16.6193
Flipped Classroom	1347	6.1755	22.7948
classroom teaching	887	4.0666	26.8614
learning model	491	2.2511	29.1124
Classroom	368	1.6871	30.7996
strategy	266	1.2195	32.0191
reform	259	1.1874	33.2065
Micro lesson	208	0.9536	34.1601
student	204	0.9353	35.0954

Classification analysis shows that classroom research in higher vocational education mainly embodies in English teaching research, classroom teaching mode research (flipped classroom, teaching mode), teaching strategy and method research (teaching strategy, teaching method, independent learning, problem, information technology, informatization, etc.), teaching reform research (reform, practice, application, innovation, classroom management), teaching resources research (micro-class, MOOC, etc.), classroom subject research (students, interests, etc.) and classroom evaluation research (effective teaching, teaching quality, teaching effect, efficient classroom, etc.).

#### 5. Social network analysis of high-frequency keywords

The social network relationship map can analyze the relationship between keywords. Based on the extraction of high-frequency keywords, the co-occurrence matrices of 32 high-frequency keywords were generated by Bicomb2. The co-occurrence matrices were transformed into DL-type formats by software Ucinet. Then, based on NetDraw, a visualization tool for social network analysis, the high-frequency keyword social network relationship map of single-mode vocational classrooms was generated, as shown in Figure 4.

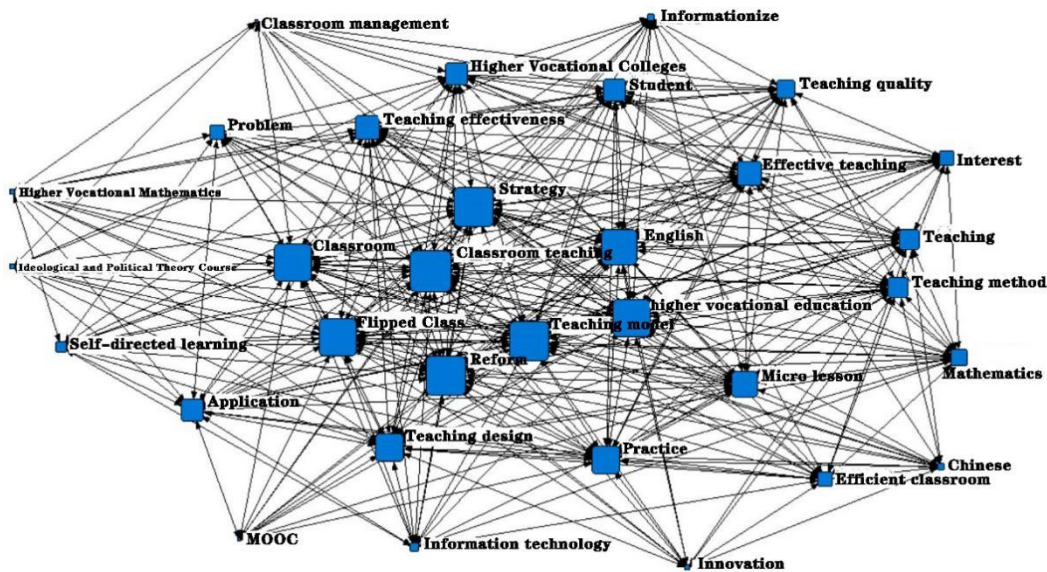


Figure 4 Social network relationship map of high-frequency keywords of higher vocational classroom

As can be seen from Figure 4, the relationship between high-frequency keywords in classroom research in higher vocational education can be described as the following four points:

#### 5.1. High-frequency keywords basically come from a core area.

The keywords includes "classroom teaching", "English", "higher vocational education", "reform", "strategy", "teaching model", "classroom teaching", "classroom" and "flipped classroom". These keywords have a large area of nodes, reflecting the high status of keywords in the network, and basically represent the current hot spot of classroom research.

#### 5.2. The distance between nodes indicates the closeness

The distance between nodes indicates the closeness between them such as the short distance between "classroom teaching" and "strategy" and between "teaching model" and "reform", which reflects their high co-occurrence frequency and close relationship in the literature.

#### 5.3. Some keywords are at the edge of the whole network relationship map

The keywords such as "MOOC", "information technology", "innovation", "classroom management" and "informatization" are at the edge of the whole network relationship map. The links between them and the high-frequency keywords in the core area are fine and few in number, which means that the classroom in higher vocational education pays less attention to the research of informatization teaching.

#### 5.4. The overall analysis of the map shows that the relationship between all the keywords is relatively loose

The relationship reflects that the classroom research system of higher vocational education is not yet mature, the current research is not deep enough, and a centralized research system has not been formed. With the implementation of "Internet + Education" and "Classroom Revolution", there is still room for classroom research in higher vocational education.

### 6. Visualization analysis of keyword clustering

CiteSpace software was used to plot the knowledge map of keywords, which can further classify topics of classroom research in higher vocational education. In CiteSpace, Time slicing was set as "from 1999 to 2019", year perlicie was 2, and "Keyword" was selected in Node Types function. The node threshold setting was "Top 50 per slice" and the other setting was default. After data operation, automatic

clustering analysis and visual presentation, the keyword co-occurrence map as shown in Figure 5 is obtained.

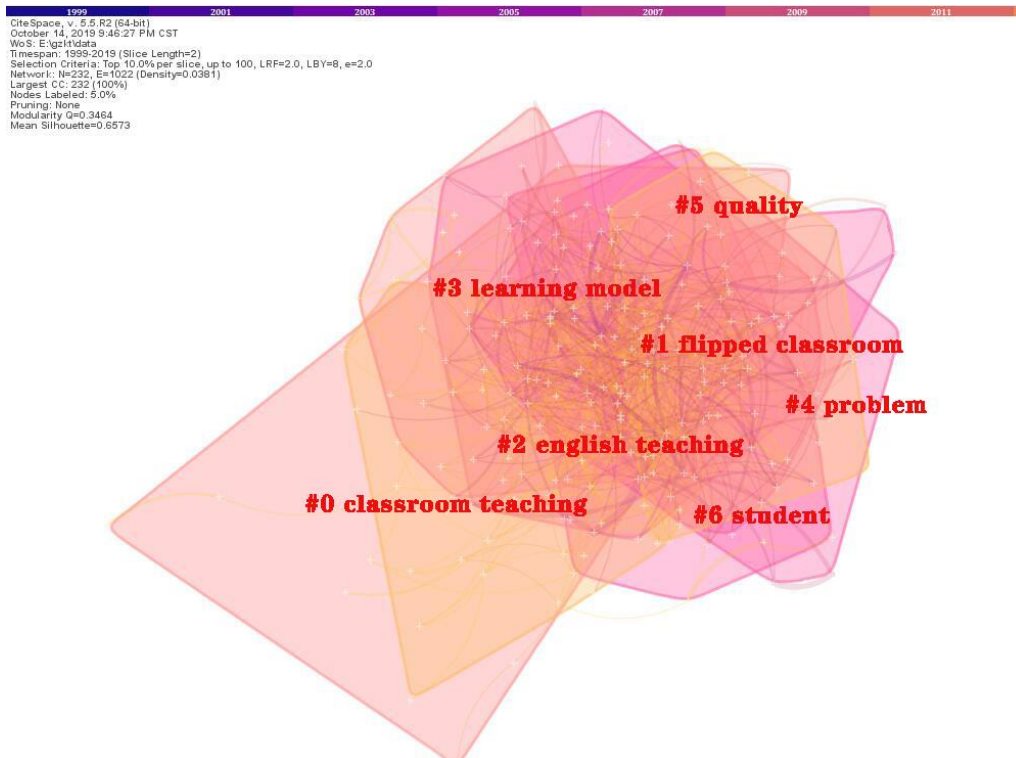


Figure 5 Keyword clustering map of higher vocational classroom

In the keyword co-occurrence map shown in Figure 5, seven clusters are formed. Based on the above keyword analysis and literature citation analysis, seven research topics in the field of classroom research in higher vocational education are obtained.

### 6.1. Research on the reform and methods of classroom teaching

The theme of this study is represented by high-frequency keywords such as "classroom teaching", "reform" and "teaching methods". Classroom reform is a continuous topic. There are some representative scholars and viewpoints. From the perspective of constructivist learning theory, based on examples, Xiong Su and others elaborated that the classroom teaching design in the teaching practice of colleges and universities, such as creating constructive situations and organizing collaborative learning, enabled students to actively participate in learning activities and effectively promoted the teaching reform of colleges and universities. [1] Guo Fuchun and others put forward the innovative practice of classroom teaching in higher vocational education based on wisdom education. They promoted the innovation of classroom teaching in higher vocational education by constructing the full-field learning environment, ubiquitous learning resources, generative learning activities, experiential learning services, and intelligent learning evaluation. [2] Wu Bifang and others discussed the reform and practice of action-oriented classroom teaching methods with the help of case method, discussion method and scenario simulation method. [3]

### 6.2. Research on flipped classroom

Flipped classroom is a new research topic in recent years. To be exact, it is a kind of classroom teaching mode and is a product of teaching reform under the environment of "Internet+". This topic belongs to both the research theme of teaching reform and the theme of classroom teaching mode. However, this paper classified the flipped classroom as a separate research category. As soon as the concept of flipped classroom was introduced, it became the research hotspot rapidly. The article "Research on Flipped Classroom Teaching Model" written by Zhang Jinlei and other writers opened the prelude of the flipped



classroom research. Since then, a large number of researchers have carried out research and practice on the flipped classroom from different perspectives. Kong Delan, taking "Accounting Foundation" course of higher vocational education as an example, explored the implementation path of the efficient flipped classroom by reconstructing the teaching content, deepening the extension of teaching organization, and integrating educational technology systems. [4] Wang Zhaohua combined the flipped classroom with the micro-class, took the "Generic Cabling" course of higher vocational education as the practice object, carried out the teaching practice reform research, and constructed the micro-class teaching mode based on the flipped classroom. [5] Compared with other levels of education, the research on flipped classroom in higher vocational education is not deep enough, mainly involving theoretical research such as concepts, practical exploration of flipped classroom in curriculum, etc.

### *6.3. Research on subject or course classroom in higher vocational education*

The research focus is represented by such high-frequency keywords as "English", "Vocational Chinese", "Vocational Mathematics", "Ideological and Political Theory Course" and "classroom management". Among the research topics, English classroom research occupies a dominant position. Among the literature searched, 2680 articles are about English classroom research. Yu Ping has carried out the practical research of flipped classroom in vocational English teaching. It was pointed out that the problems of how to implement the flipped classroom in large class, how to improve the ability of teachers, how to cultivate students' independent learning ability, how to manage the time before class and in class, and how to support the technical equipment need to be solved. [6] Based on the theory of educational ecology and the analysis of the imbalance of English classroom ecology in higher vocational colleges, Zhao Yu believed that independent learning mode can effectively reduce students' anxiety in English learning, improve students' interest in English learning and classroom participation ability, and realize the benign ecological operation of English classroom in higher vocational colleges. [7]

### *6.4. Research on classroom teaching and learning mode*

The representative keywords of this research theme are "teaching mode", "independent learning", "cooperative learning", "task-driven" and "teaching design". The research content is more specific, including the construction, practice and evaluation of teaching or learning mode based on a classroom or curriculum. The representative scholars and opinions are as follows: Yao Dongmei put forward the interactive classroom teaching mode to promote the effective classroom teaching, and elaborated the strategies of implementing the interactive classroom teaching mode from the aspects of teachers and students carrying out classroom dialogue on an equal footing. [8] Based on the investigation of personality characteristics of higher vocational students, Yang Haizhen constructed five new classroom teaching modes: cooperation mode of appreciation competition, training mode of media extension, discussion mode of open communication and innovation mode of situation exploration. [9] In order to enable students to be active in the classroom and truly implement the effectiveness of the classroom, Yu Jian constructed a "five-push" teaching mode, namely, to promote learning interest by situation, to promote learning thinking by questioning, to promote learning judgment by discussion, to promote learning application by practice, and to promote learning cooperation by grouping. [10]

### *6.5. Research on the problems and countermeasures of classroom teaching*

The representative high-frequency keywords are "strategy", "problem", "countermeasure" and "classroom". This research theme adheres to the problem-oriented approach and involves many aspects of classroom teaching, such as problems and countermeasures of classroom introduction, causes analysis of classroom problems, problems and countermeasures of multimedia teaching, problems of classroom interaction, students' innovative training and teaching reform, problems and strategies of teaching effectiveness, problems of the creation of information-based learning environment, strategies of teaching emotion regulation, problems and countermeasures of the second classroom, countermeasures of classroom reconstruction, etc. The study of classroom problems and countermeasures is helpful to improve the classroom in higher vocational education and optimize the classroom teaching structure.

### 6.6. Research on classroom evaluation and teaching quality

Classroom evaluation is another research topic of classroom research in higher vocational education, which further optimizes classroom teaching through evaluation and diagnosis. The representative high-frequency keywords are "teaching quality", "teaching effect", "effectiveness", "efficient classroom" and "evaluation system". Aiming at the "integration of theory and practice" classroom in higher vocational education, Liu Ping et al. established a three-level evaluation table of classroom teaching from the perspectives of teachers (managers, peers) and students from five dimensions such as teaching objectives. [11] From the perspective of quality assurance, Zhao Ling raised the problems of single evaluation subject at present. On this basis, he put forward the teaching evaluation strategies of cultivating a positive teaching quality culture, rebuilding a new evaluation structure, specializing in the design of index system, integrating the whole process with transparency, and combining "traditional approach" with the innovation of new platform. [12] The research content of this topic mainly includes the construction of classroom teaching evaluation system, classroom evaluation practice, evaluation status quo and problem analysis in higher vocational education.

### 6.7. Research on classroom subject in higher vocational education system

The representative keywords are "higher vocational", "higher vocational education", "higher vocational and professional college", "higher vocational students". The research focused on the particularity of higher vocational education level and the study of students' learning behavior, quality education, professional accomplishment and vocational ability in this special education system. On the basis of investigation and research, Ma Yan analyzed the relationship between classroom teaching and students' professional quality, and put forward how to construct a classroom teaching mode with vocational quality training with vocational characteristics under the mode of combining work with study. [13] On the basis of investigating 32 higher vocational colleges in the east, middle and west of China, Chen Yan proposed to create classroom learning environment focusing on students' perception, strengthen the management of classroom learning environment in higher vocational education, and balance the relationship among physical environment, institutional environment and psychological environment. [14]

## 7. Multi-dimensional scaling analysis on the trend of classroom research in higher vocational education

In order to further determine the development trend of classroom research in higher vocational education in China, this paper drew a multi-dimensional scale atlas of classroom research in higher vocational education based on the multi-dimensional scaling analysis function of SPSS, as shown in Figure 6. The following three conclusions are obtained.

### 7.1. The development trend of classroom research in the future is generally diversified, basically forming two research groups.

The first is the research group in the lower part of the atlas. According to the keywords involved, this group is named as the application practice and strategy research of classroom teaching reform based on effective teaching (teaching model, teaching method, teaching design, etc.). It mainly carries out theoretical and practical research on teaching mode and teaching method in higher vocational classroom, reforming classroom teaching. The second is the research group in the upper part of the atlas. According to the distribution of keywords involved, this group is named as the innovation research in the efficient classroom of various disciplines in higher vocational education under the informational environment.

### 7.2. The keywords "flipped classroom", "higher vocational" and "English" are far away from the coordinate origin and the two research groups.

It can be concluded that these keywords will gradually fade out or become a research topic in the future research, which is basically consistent with the topic classification of current higher vocational classroom research proposed above.

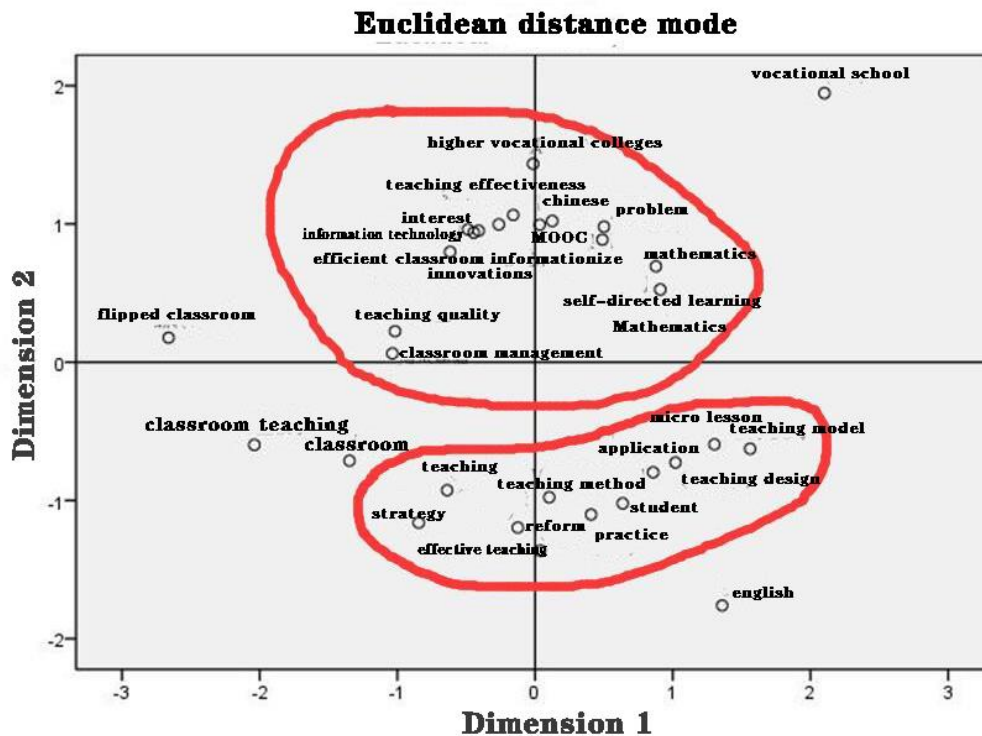


Figure 6 Multidimensional scaling analysis atlas of higher vocational classroom

### 7.3. The development trend of some keywords

By comparing Figure 6 and Figure 4, it is found that the keywords "MOOC", "Information technology", "innovation", "classroom management" and "informatization" in Figure 4, which are at the edge of the whole network relationship map, have been involved by the second research group in Figure 6. It can be seen that with the further development of "Internet+Education", it will become a new trend of classroom research in higher vocational education to create an information-based teaching and learning environment by means of information technology and digital resources, to promote classroom teaching management by means of information technology, and to construct an "Internet+classroom" ecological environment. It includes the research of new innovative ideas of classroom teaching, the research of innovative information-based classroom teaching mode, the innovation of interactive activities of classroom learning, the innovation of process and result assessment system based on information technology, and the research of online and offline mixed teaching based on MOOC, etc.

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