

# Visual Analysis of Vocational Skill Competition Based on VOSviewer

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**Abstract.** The evaluation criteria and technical specifications of the World Skills Competition have an important impact on stimulating the skills competition in China. This paper searches the articles with the keywords “China Vocational College Skills Competition” and “World Skills Competition” in the CNKI database. The retrieved literature is analyzed by the visual software VOSviewer. Creating a knowledge map of authors, keywords and research trends. By comparing the World Skills Competition with the Chinese Vocational Skills Competition, this paper expounds the positive influence of the World Skills Competition on the Chinese vocational college skills competition, so that the World Skills Competition can promote the development of China’s vocational education effectively.

**Keywords:** World Skills Competition; Chinese Vocational College Skills Competition; Visual Analysis; Knowledge Graphs

## 1 INTRODUCTION

The World Skills Competition is the Olympic in the vocational skills competition. It is currently the world’s most influential skills competition [1]. The purpose of the World Skills Competition is to expedite vocational education and training [2]. In its 50 years of development, the World Skills Competition has had an important impact on the socio-economic development of the Member States and regions of World Skills Organization [3]. On October 7, 2010, China was approved by the World Skills Organization to become a member of the 53rd World Skills Competition, which is also an important platform for China’s vocational education and vocational training to enter the world and carry out technical exchanges with other countries.

The World Skills Competition boosts the teaching reform of vocational education in China. Chinese Vocational College Skills Competition has also brought a positive impact on Chinese vocational education since its establishment [5]. The skills competition standardizes the operation skills of vocational college students and improves their comprehensive quality [6]. However, there are few skilled students who can stand on the stage of the World Skills Competition. China needs more international high-quality skilled talents [7].

At present, China is paying more and more attention to vocational education. Despite the growing impact of the skills competition, the use of visual analysis technology for systematic research is less. Therefore, through the visual comparison between the World Skills

Competition and the Chinese Vocational College Skills Competition, this study expands China's influence in the field of vocational training. It becomes an urgent problem to be solved in the development of vocational education.

## **2 RESEARCH METHODS**

### **2.1 Research Tools**

VOSviewer is a software tool for constructing and visualizing bibliometric network. The software is developed by the R&D Center of University of Leiden in the Netherlands [8]. These networks contain researchers, individual publications, authors. They can be constructed based on relationships such as citations, bibliographic coupling, co-citations, etc. [9].

The purpose of keyword co-occurrence analysis is to find the research content and structure in the discipline field. In general, the more keywords appear together, the more similar the research area they represent [10].

### **2.2 Data Source**

In this study, CNKI database (China National Knowledge Infrastructure database) is used as data sources. Taking the "World Skills Competition" and "Chinese Vocational College Skills Competition" as the retrieval themes. In view of the results of CNKI, the information such as meetings and newspapers are mainly excluded.

### **2.3 Analysis Method**

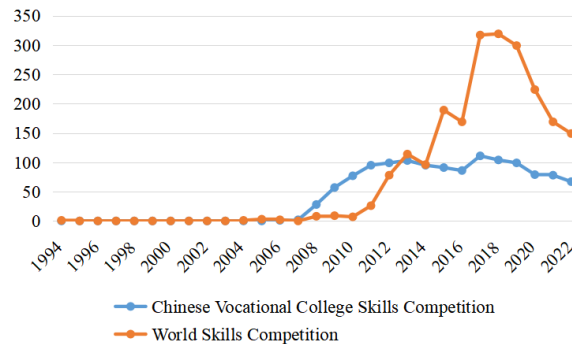
The software used in this paper included Microsoft Excel and VOSviewer. Draw annual paper trends using Microsoft Excel. Using VOSviewer to analyze source journals, authors, participating institutions, countries, and keywords [11]. The purpose is to draw the author relationship network diagram, institutional cooperation network diagram and keyword clustering diagram.

## **3 STATISTICAL ANALYSIS OF LITERATURE**

### **3.1 Comparative Analysis of Literature Numbers and Years in Two Competitions**

The changes in the number of published literature can reflect the research focus in this field in recent decades to some extent, as well as the degree of development in this field. The number of published papers in each year of all the literature comes from the official websites of CNKI. The plotting function in Excel is used to draw a line chart.

The annual trend of the number of published papers on the World Skills Competition and the Chinese Vocational College Skills Competition in CNKI database are shown in Fig. 1.



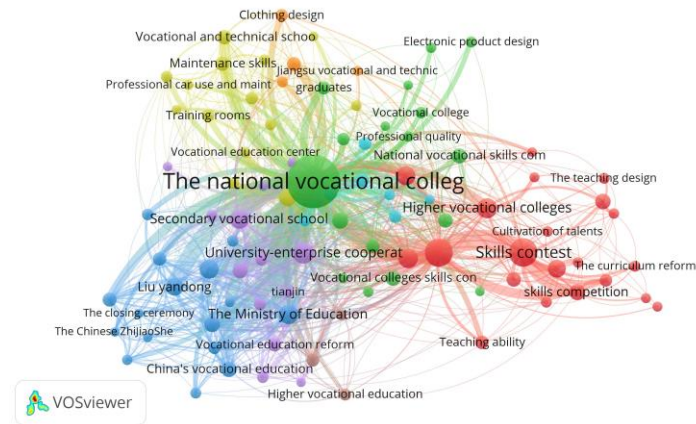
**Fig. 1.** Annual Trend of Research Papers on World Skills Competition and Chinese Vocational College Skills Competition in CNKI Database

From the development trend of **Figure 1**, it is not difficult to find that from 1994 to 2002, China began to pay attention to the research of World Skills Competition. Since 2003, papers on Chinese Vocational College Skills Competition began to appear, and then grew rapidly. From 2008 to 2019, the total number of papers in skill competition increased first and then decreased. Research articles on the World Skills Competition were few and did not increase until 2010, which is consistent with the fact that China joined the World Skills Competition Organization in 2010. Articles on the World Skills Competition reached the highest level in 2018, and then the research trend began to decline.

In order to promote the development of domestic skills competition, Domestic scholars should increase the study of the World Skills Competition and study the concept of the World Skills Competition to improve the development of the domestic skills competition.

### 3.2 Hot Spot Analysis of Skill Competition Research

Keywords are the core idea of an article, which can reflect the hot spots and trends of this study to some extent. Using VOSviewer software to visualize the keywords in the skills competition. We now use VOSviewer for further analysis. The visualization indicates the topics covered related to the skills competition.

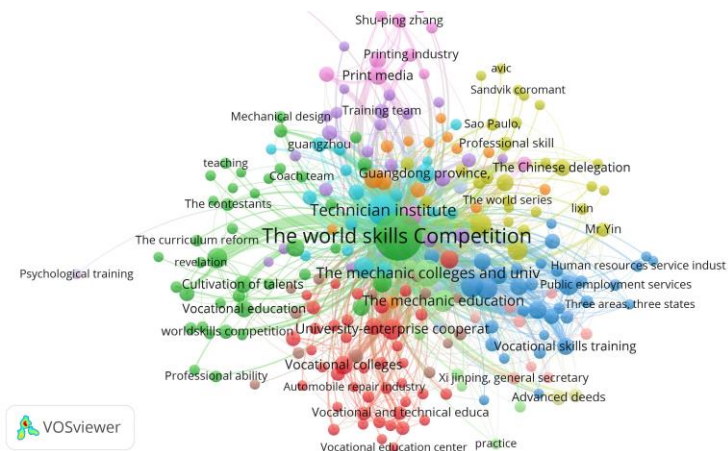


**Fig. 2.** Keywords Relationship Diagram of Chinese Vocational College Skills Competition

In the visualization shown in **Figure 2**, each cluster has a color (i.e., purple, green, blue or yellow), indicating the group assigned to the cluster. In this way, the vocational skills competition related literature is subdivided into broad sub-fields. It is obvious that the research hotspots in **Figure 2** are mainly clustered into four types of colors. The whole graph is centered on keywords represented “Chinese Vocational College Skills Competition” by green nodes. The hot research topics such as “students”, “skills”, “teaching reform”, “Tianjin”, “secondary vocational schools” and “teaching ability” are also clearly presented in **Figure 2**, which can better guide scholars and researchers to clarify the research direction.

Next, we visually analyze the keywords of the literature on the study of World Skills Competition in CNKI database. **Figure 3** shows the theme of the World Skills Competition in CNKI database. The visual clustering diagram is shown in **Figure 3**.

It is obvious that the research hotspots are centered on the keywords of “technician colleges” and “vocational college”. The hotspots of “school-enterprise cooperation”, “vocational education reform”, “integration of industry and education”, “quality of personnel training” and “Chinese delegation” etc.



**Fig. 3.** Keywords Relationship Diagram of China in the Study of the World Skills Competition

Through the analysis of **Figure 2** and **Figure 3**, it can be seen that there are many overlaps between the research hotspots of the Chinese Vocational College Skills Competition and the World Skills Competition, but there are also shortcomings. The research of the World Skills Competition is more balanced and more mature.

Through literature reading and analysis of knowledge graph, domestic research on World Skills Competition mainly focuses on two aspects: (1) Research on the influence of World Skills Competition on vocational education. (2) Research on teaching reform guided by the World Skills Competition. The development of the World Skills Competition has promoted all kinds of skills competitions at the municipal, provincial and national levels in China.

#### 4 Research Summary

This study counted the articles of Chinese academic researchers' study about World Skills Competition and Chinese Vocational College Skills Competition. Through visual analysis of their research status, research hotspots and research trends, we draw the following conclusions.

Researchers and research institutions should strengthen cross-regional cooperation and accelerate the construction of skills competition research community. To form academic influence, skill competition research must form regional research community.

The Chinese Vocational College Skills Competition is closely related to the adjustment of industrial structure and the process of industrialization. The work-integrated learning docking mechanism of the national vocational college skills competition is helpful to advance the modern teaching system of vocational colleges. Skills competition can stimulate students' sense of victory, to improve their ability of autonomous learning. Further research is needed to form an evaluation method based on professional teachers, practical guidance teachers, and experts from enterprise. Combined with the evaluation mechanism of students' mutual evaluation and students' self-evaluation.

China still needs to actively participate in and study the world skills competition. Expanding Chinese influence in the field of vocational training is conducive to cultivating high-skilled talents at the international level. In addition, we should learn from the experience of the World Vocational Skills Competition and strengthen the norms of various vocational skills competitions in China. This measure is conducive to changing people's traditional ideas and improving the social status of skilled talents.

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