

The Hot Spot and Enlightenment of the Research on the Subject Teaching Knowledge of Integrating Technology in China — — Bibliometric Analysis Based on Bicom

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Abstract: The TPACK has become a key factor to promote the professional development of teachers. This article uses Bicom bibliographic co-occurrence analysis software and SPSS20 software to count and analyze the high-frequency keywords of researches on TPACK . The results show that the research hotspots of TPACK are mainly focus on the TPACK, teacher ' s professional development, influence factors of information technology ability of normal students, teachers ' knowledge and instructional design under the integration of information technology and Curriculum, and TPACK ability of preservice teachers. While it should be noted that the localization of TPACK theory and the evaluation tools need to be further studied.

Keywords: TPACK; Bibliometric Analysis; Research Hotspot

1. Introduction

TPACK is a theoretical model to promote teacher professional development, which mainly describes the subject teaching knowledge structure that teachers should have in the information age. On the basis of Shulman ' s PCK, with technical knowledge, Mishar and Koehler proposed three core elements and four mutual aid elements of TPACK combined elements include CK, PK, TK, The four mutual aid elements include PCK, TCK, TPK, TPACK^[1].

In recent years, domestic and foreign scholars have analyzed the impact of TPACK on teacher professional development from various perspectives, and have achieved fruitful research results in the field of the integration of information technology and education and teaching. However, most of the current research results tend to understand TPACK from the subjective perspective of researchers. In order to deeply analyze the research hotspots and future development trends of TPACK in the integration process of education, teaching and information technology, this study used Bicom bibliographic co-occurrence analysis software and SPSS20 software to conduct statistical analysis on the publication date, published journals and high-frequency keywords of TPACK-related literature, aiming to draw the research map of TPACK. It provides reference for future related research.

2. Research results and analysis

2.1 Chronological distribution of literature

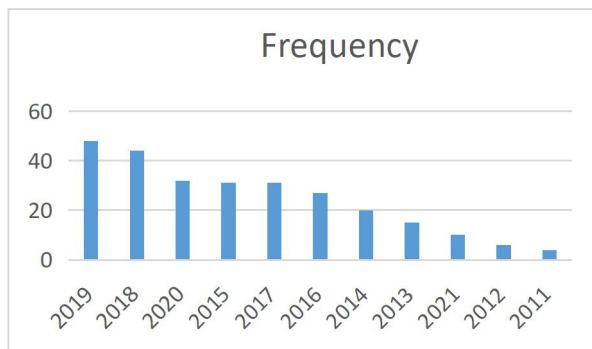


Figure 1. TPACK Chronological distribution of literature

Statistical analysis of the Chinese literature of TPACK (Figure 1), Chinese researchers have been paying attention to TPACK since 2011, and the research results show an increasing trend year by year, the number of researchers' research results on TPACK has increased significantly.

2.2 Literature high frequency keyword cluster analysis

In order to further understand the relationship between the high-frequency keyword "TPACK" and research hotspots, this study conducted cluster analysis on the similarity matrix of high-frequency keywords to obtain the clustering pedigree of these 15 keywords (FIG.2). As can be seen from the pedigree, the research on TPACK falls into five categories.

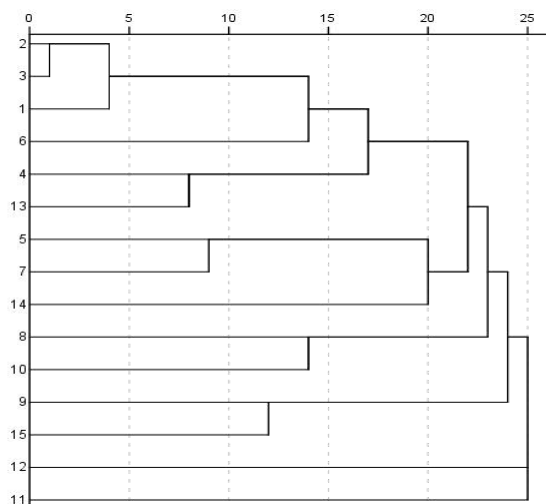


Figure 2. TPACK Cluster Pedigree Diagram of The Literature

2.2.1 TPACK and Teacher Professional Development Research

The concept of TPACK into China for the first time and detailed its internal structure. The research concluded that the knowledge framework of TPACK was composed of three basic elements and four comprehensive elements^[1]. Cheng Jianshan proposed the knowledge structure system of college English teachers based on the TPACK framework^[2]. Based on the current research status of TPACK for mathematics teachers, Dai Xiying proposed the teaching knowledge structure model of mathematics teachers integrating technology, and defined its connotation, element decomposition, relationship analysis and characteristics of TPACK teachers, so that its knowledge model could be better applied in mathematics teaching practice^[3]. Yan Zhiming and Li Meifeng constructed a teacher knowledge model with network topology structure, the Subject Teacher Knowledge Network with Integrated Technology, through logical reasoning method, which made its concept clearer and the

relationship between knowledge clearer, and changed the focus of teacher knowledge research from local to global [4]. TPACK knowledge framework is a dynamic and complex theory involving multiple factors. Scholars from different fields have constantly enriched and improved TPACK knowledge framework through research, so that it can play a guiding role.

TPACK knowledge framework theory has a specific purpose in guiding education and teaching. Teachers of different disciplines have different understandings of TPACK development strategies. Fan Lin and Zhang Xichun studied the professional development of English teachers based on TPACK and proposed the professional development strategy for English teachers, that is, English teachers should pay attention to the improvement of their basic knowledge literacy, develop the literacy of integrating knowledge elements and their situational creation literacy based on the concept of lifelong learning [5]. Xu Zhuoyu, LAN Guoshuai and Zhang Yichun took high school information technology teachers in four districts of Nanjing as the research objects. Based on the method of survey and research, they analyzed the overall status of information technology teachers' TPACK, and found that teachers lacked inquiry-based or interactive technology; Xu Chunhua, Fu Gangshan and Hou Xiaojun studied the TPACK level of university teachers through questionnaire survey, and believed that the TPACK level of Chinese higher teachers was at a medium level and the technical correlation level was low. Based on this, the development strategy was put forward. To sum up, researchers mostly combine quantitative and qualitative research, deeply explore the development status of teacher TPACK, analyze the underlying reasons, and propose to improve the level of teacher TPACK from the aspects of the state, society, schools and teachers.

2.2.2 Research on the influencing factors of information technology ability of normal college students

The deep integration of information technology and education and teaching, and the improvement of information technology literacy of normal university students have become the focus of school training of teachers in the future. Tang Shuhong and Jiang Xinchu explored the current situation and development strategy of information technology application ability based on TPACK theory by using the measurement scale of information technology application ability of normal university students, and believed that normal university students lack the theoretical knowledge of TPACK and their innovation ability is not good. Based on this, researchers believe that the project should be used to promote the improvement of ability and establish an interdisciplinary and cross-grade student learning community. Liu Yanhua, Xu Peng and Wang Yining through "TPACK pulse factor test scale" project analysis and factor analysis, environmental factor of arteries and veins of the TPACK in accordance with the macro. The micro level includes motivation, self-efficacy and other factors. They conducted analysis from macro, meso and micro levels and constructed the TPACK environment factor model.

2.2.3 Research on Teacher Knowledge and Teaching Design under the Integration of Information Technology and Curriculum

Information technology and curriculum integration refers to under the guidance of modern education theory, the information technology effectively applied to the curriculum teaching, realize the information resources, information method and subject course content, teaching form, teaching method optimization fusion, become and curriculum content and curriculum implementation highly harmonious organic part of. Zhou Ni research believes that the integration of information technology and classroom teaching mainly includes audition demonstration teaching, situational teaching, micro-teaching and other; Xu Rong analyzed the integration mode, strategy and prospect of information technology and continuing education curriculum, and provided reference for further promoting the healthy development of continuing education; Yang Jinbin studied the dilemma and countermeasures, proposed the only way of information technology and curriculum is ecological; Yan Zhiming and Xu Fuyin based on the rise and course of teacher knowledge basic research, analyzed the transformation of subject teaching knowledge (PCK) to subject teaching knowledge (TPACK), reflecting the importance of technical knowledge in the current teaching. In general, in the era of the deep integration of information technology and education

and teaching, the TPACK framework plays an important guiding role in the integration of teachers' knowledge and teaching design.

3. Research conclusions and enlightenment

3.1 Strengthening the "localization" study of the TPACK theory

With the gradual integration of information technology into education and teaching, the deep integration of teachers' technical knowledge, subject teaching knowledge and teaching method knowledge has become the only way for teachers' professional development at the present stage. However, TPACK was born in the United States, which is different from China's politics, economy and culture. Chinese scholars, while introducing TPACK theory, should strengthen TPACK localization research to meet the practical needs of Chinese teachers in the deep integration of information technology and education and teaching.

3.2 Strengthening the research of TPACK measurement and evaluation tools

In the relevant literature of TPACK research, it is not difficult to find that researchers often use questionnaire survey, in-depth interview, classroom observation and action research to collect data. When evaluating the specific application of TPACK framework theory, most appropriate modifications are made based on the international scale, and the scales are rarely independently developed in China. Therefore, in the research of TPACK evaluation tool, we should not only combine quantitative and qualitative research, but also combine subjective evaluation with objective evaluation to develop research scales suitable for China's educational national conditions.

3.3 Strengthen teachers' research on TPACK in practice

The framework theory of TPACK is difficult to cover the knowledge framework of each subject, and teachers need to define the TPACK framework according to the characteristics of each subject. According to the domestic TPACK related literature, it is found that most scholars explore the integration of TPACK and specific subject teaching from the theoretical level, and lack how teachers use the TPACK framework model for teaching in practical teaching. Therefore, the research of TPACK by teachers of various disciplines in practice is conducive to the improvement and development of TPACK discipline.

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