

# Visualization Analysis of the Current Research Status and Action Paths of Learning Spaces in China

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**Abstract:** The visualization analysis of the current research status and action path of learning space in China's "Ten Year Development Plan for Education Informatization" (2011-2020) clearly proposes to "promote the widespread application of subject tools and platforms, cultivate students' awareness and ability to learn, manage, and serve independently", that is, to achieve better self-learning and self-development of students through the help of information technology. Online learning space is a virtual learning environment based on the Internet. Nowadays, online learning space has become the main battlefield for teachers to teach and the preferred platform for students to showcase themselves. Based on the concept of cultivating students' innovation ability, combined with modern information technology, visual analysis tools such as UCINET and CITESPACE V are used to visually analyze the current situation and future direction of learning space, summarize its advantages and disadvantages, and promote its subsequent development and research.

**Key word:** Learning Space; Research Hotspots; Research Trends; visualization;

## Introduction

From 2015 to 2022, the Horizon Report of the American New Media Alliance proposed the reconstruction of learning space, the creation of flexible learning areas, the integration of physical and virtual learning Spaces, the integration of formal and informal learning Spaces, and hybrid learning Spaces for eight consecutive years, revealing that learning space has become one of the changing trends in the field of education. Its created learning space aims to better support students' flexible learning, proactive learning, collaborative learning, and finally deep learning. In March 2012, the Ministry of Education officially promulgated the "10-year Development Plan for Education Informatization (2011-2020)", and then in September, at the national education informatization work video conference, Vice Premier Liu Yandong proposed that the core goals and symbols of China's education informatization construction "Twelfth Five-Year Plan" are "three links and two platforms". One of the three links is the network learning space for everyone (referred to as "everyone"), which has led to the network learning space research upsurge. To sum up, this study aims to describe the current research status of learning space in our country, explore its future development trend, and apply to practical teaching with the help of existing research.

## 1. The definition of concept

For the concept of Learning Space (Learning Space) has been debated in the academic world, summed up nothing more than two points of view: one is the "environment", the other is the "system". "Environment theory" believes that learning space refers to the place used for learning, that is, it implies that learning can happen in any place, including physical space and virtual space. For example, Professor Zhu Zhiting believes that learning space is a learning environment where formal learning and informal learning, teaching and learning bilateral relations are fully interactive by using information technology (Zhu Zhiting, Guan Jueqi, Liu Jun, 2013). Scholars such as Guo Shaoqing advocate that learning space is a learning resource environment that integrates virtuality and reality by focusing on digital intelligence resources and educational resources through the continuous evolution and integration of emerging information technologies (Guo Shaoqing, Zhang Jinliang, Guo Jiong, He Xiangchun, Shen Junru, 2017). The "system theory" holds that the learning space is a system that provides personalized services for different users. For example, Zhong Shaochun proposed that it is an application system that provides personalized services for different educational users (Zhong Shaochun, 2014); Zhang Zishi et al believe that it is a system that provides personalized information services for different role subjects (Zhang Zishi, Jin Yifu, Wu Tao, 2015). Later, many researches add a lot of qualifiers on the basis of the previous ones, such as online learning space, mixed learning space, and technology-enhanced learning space, etc. In China, learning space, online learning space and future classroom are the main ones. Now, under the background of "Internet +", the research on learning space has shown a blowout development.

## 2. Research program design

### 1. Data source

Using CNKI(China National Knowledge Network) as the source database of journal literature data, and using "Learning space" as the title for search and analysis, a total of 1750 relevant journal literature articles were retrieved on January 6, 2022. By reading all the retrieved literature titles, abstracts, keywords and other information, and selecting the literature related to the field of education, preliminary data cleaning and screening were carried out, and irrelevant academic literature such as meetings, notices, and visits were excluded. Finally, 924 valid literature were selected as data samples.

### 2. Research tools

The bibliographic co-occurrence system Bicmob2, social network analysis software Ucinet and its own visualization tools Netdraw, Citespace V and Excel are used as research tools in this study. On this basis, the research should be carried out in combination with the sample literature content.



It is found that the journals published by learning space are mostly concentrated in the core journals in the field of education technology, such as China Audio-visual Education, Audio-Visual Education Research, Modern Educational Technology, Journal of Distance Education, etc. It can be seen from this that the study of learning space has changed from the original physical space design of architecture and library to the perspective of education. That is, the study of learning space is concentrated in the field of education, especially in the field of educational technology, which also better reflects the current reconstruction of learning space is bound to incorporate more technical elements, in order to better promote students' learning and teachers' teaching.

3. Publishing institutions and representatives

As shown in Figure 3-1, the institutions with a frequency of 6 or more publications on China's learning space research focus more on normal colleges and universities, and most of the institutions with the highest number of publications are key normal colleges and universities in China, such as East China Normal University and Central China Normal University. This also explains the reason why the study of learning space in China has become increasingly hot in the field of education in recent years.

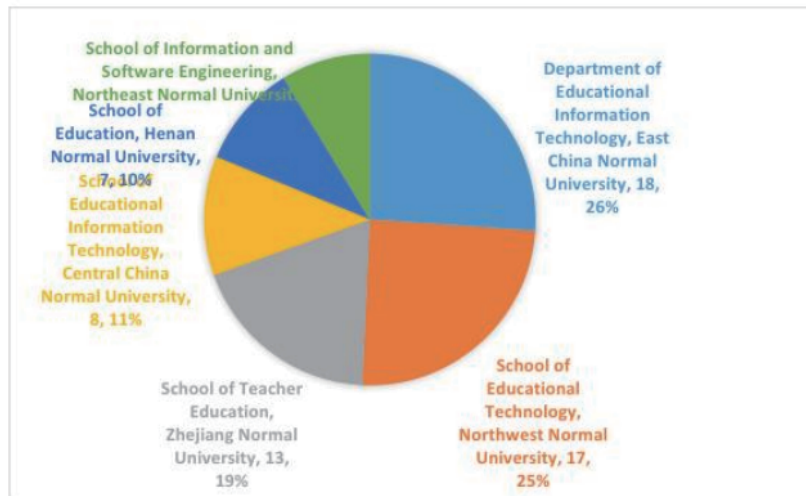


Figure 3-1 Source distribution of publishing institutions in learning space

Figure 3-2 shows the representatives of China's learning space research whose publication frequency is 6 or more, that is, the authors of high frequency. Among them, Xu Yafeng published 13 papers, ranking the first. He published the title "Future Classroom: Smart Learning Environment began to study learning space, from the initial framework design of learning space to the impact of learning space on students' learning, the impact on teachers' use, and then to the latest research on the change of learning space in the era of artificial intelligence, the articles published are in the core journals of education technology, promoting the study of learning space in China; In addition, Shen Shusheng, Li Yubin, Zhong Shaochun and others conducted research on learning space from multiple perspectives such as flipped classroom, education cloud, cloud computing, and smart campus. Zhang Jinliang, Guo Shaoqing and He Xiangchun are the long-term co-authors of the study, which explores the development of online learning space and school education from six dimensions.

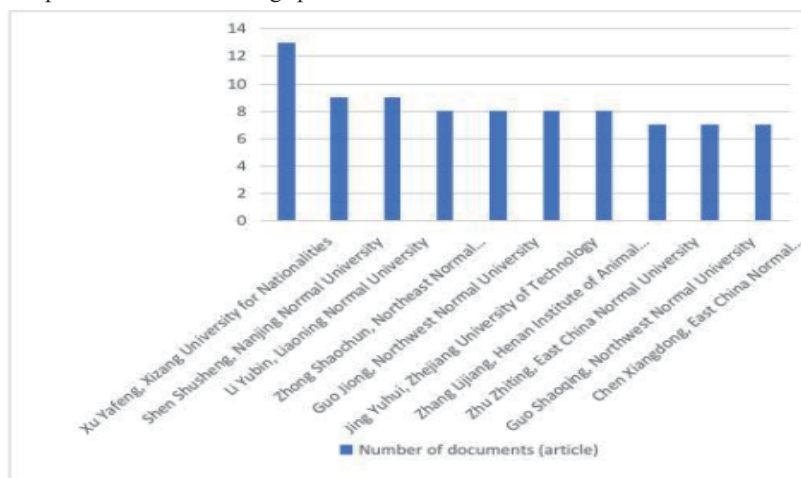


Figure 3-2 Publication distribution of authors with high productivity in learning space

4. Research content and hotspot analysis

In this paper, the social network analysis tool Ucinet6 is used to analyze the research hotspots of published journals in the learning space with keywords as the node. In order to ensure the centrality of the research, the data source threshold of the keyword co-word matrix is set to 3, and the resulting keyword co-occurrence network is shown in Figure 4.



## 4. Research trend analysis

In order to explore the stage development of China's learning space research, and then more accurately understand the context of China's learning space research, this paper takes the literature of nuclear journal C as the data source, and analyzes the literature with the help of CiteSpace V, as shown in Figure 7.

It can be seen from the figure that the corresponding keywords in different years, such as 2010 learning space design, 2013 personal learning space education informatization, 2014 network learning space, flipped classroom, Everyone, mobile learning, university library and teaching mode, 2016 knowledge sharing, smart learning space, smart education, cloud architecture, etc. After 2018, instructional design, empirical research, learning activity design, personal online learning space, autonomous learning, personalized learning, and artificial intelligence are the main research trends.

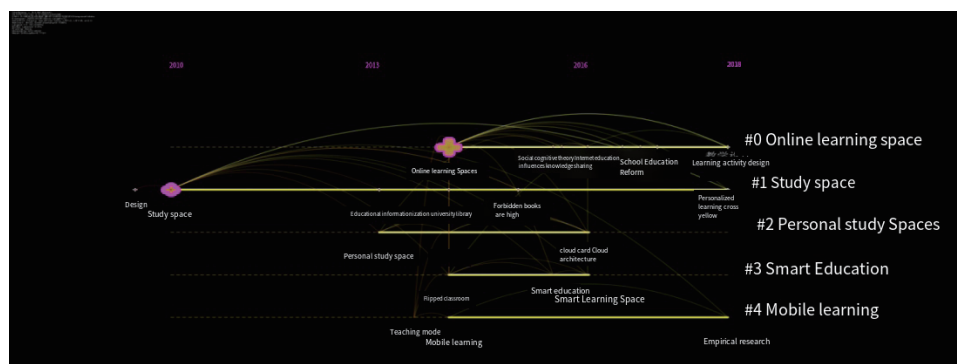


FIG. 7 Distribution map of keyword timeline

According to the research, the general distribution of the development stage of China's learning space research is as follows: From 2010 to 2013, it can be seen from the corresponding keywords that the study of learning space in this stage mainly focused on the design of physical learning space. Many studies mentioned the content of education informatization in China, which provided the foundation for the later study of online learning space; From 2013 to 2016, the upsurge period of online learning space research, in-depth analysis of the "three links and two platforms" behind the value implication, such as "everyone", in addition to pay more attention to the application of learning space in formal and informal places, such as "flipped classroom", "university library", "teaching mode", and actively explore the model of future classroom; Since 2016, the research on learning space has shown a variety of trends, and the research is more extensive, detailed and specific. For example, the intelligent learning space has been derived, and the reform of learning space has been studied from the perspective of artificial intelligence, indicating a development trend from the broad generalization level of the research theory to the research landing that is practical.

## 5. Summary and prospect

With the rapid development of technology, a new networked, virtualized and intelligent network learning space is bound to take shape. The construction of learning space, with the help of emerging information technology, will be more significant in research, and will change learners' learning mode, cognitive mode, educational relationship and learning ecology. It provides an open and free network learning environment for teachers and students, supports the combination of online and offline learning, promotes the interaction between teachers and students, teachers, students and families and schools, makes full use of information technology teaching means and network teaching platform, realizes the personalized development of teachers and students and the organization of collective wisdom development, improves the teaching effect and the quality of talent training. It will also be the key development direction of the in-depth application of education information technology in our country in the future.

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