Original Paper

Research Hotspots and Reflections on Student Information Awareness Literacy in the Past Decade

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Abstract

In the context of the digital transformation of education, the cultivation of students' information technology ability and literacy has become a key topic of attention in educational reform. Information awareness requires students to have a certain ability to obtain information and information resolution, which is a necessary key ability for students in the "Internet plus" era. In order to explore the current development status of information awareness literacy in China and grasp its future development trends, the scientific knowledge graph analysis method was adopted to sort out the research results of Chinese researchers in the field of student information awareness literacy in the past decade. Through visual analysis and literature reading, it was found that research on information awareness literacy focuses on the cultivation of core literacy and the study of cultivation strategies, and there is relatively little research on its own. The demand for student information sensitivity and resolution will become increasingly high in the future, so research on information awareness literacy should receive more attention from people.

Keywords

Information awareness, Knowledge graph, Visual analysis

1. Introduction

In 2014, the Ministry of Education proposed to build an information literacy system for the development of core literacy among students in various stages. After three years of research, "Core Literacy for the Development of Chinese Students" elaborates on the core literacy that Chinese students should possess in the new era from three dimensions, making core literacy a key research object for scholars in the education industry. With the establishment of curriculum plans and standards for regular high schools and compulsory education, corresponding subject core competencies have been proposed for each subject. In the era of digital transformation, science and technology are developing rapidly. As a core

discipline for cultivating students' digital abilities, the information technology discipline has been renamed as information technology, and the focus has shifted from information literacy to digital literacy. The demand for student cultivation has also been upgraded to the core literacy of the information technology discipline. In 2022, with the goal of cultivating students' digital literacy and skills, the Ministry of Education issued the "Compulsory Education Information Technology Curriculum Standards", renaming "Information Technology" to "Information Technology" and officially establishing the four core competencies of the curriculum. Information awareness, as a basic element, is placed first. Among them, the concept of information awareness is described as sensitivity and judgment towards information (Wu, Guo, Li, et al., 2023). Before the reform, the core "information literacy" of information technology discipline was cultivated, and its structural model included three major components: "information awareness, information ability, and information ethics", with information awareness being the precursor. From the comparison of the connotations of information literacy and core literacy, it can be found that information awareness has always been the focus of computer courses, and as a prerequisite for cultivating other literacy, it plays a crucial foundational role.

With the rapid development of science and technology, students are more and more exposed to electronic devices at an earlier age. According to a survey by CNNIC, the Internet penetration rate of minors in China will reach 96.8% in 2021 (Research Report on Internet Use of Minors in 2021). At the moment of Internet popularization, facing massive data and information, there are great hidden dangers in network security. Even adults with a certain sense of discrimination and ability are easily confused, while minors with strong curiosity and willingness to accept new things are more likely to be deceived. Therefore, the cultivation of students' information awareness literacy should receive universal attention from the educational community. In view of this, based on literature analysis, this study investigates the current status of information awareness research in China, explores research trends and prospects, identifies potential shortcomings, and provides reference for the future development of student information awareness literacy.

2. Data Sources and Research Methods

This study selected China National Knowledge Infrastructure (CNKI) as the source database. As information awareness is a literacy that needs to be developed for every age group, "information awareness" and "students" were selected as the main search terms. After screening, it was found that some articles only mentioned information awareness and did not delve into it in depth. Therefore, "information awareness" was added as the key search term, with a time limit of 2013-2023. A total of 235 articles were selected, and manually excluded literature unrelated to education and teaching, resulting in 229 valid articles. Export these 229 articles as samples in Refworks format, including title, author, source, and keywords.

2.1 Research Methods

This study adopts a bibliometric research method, mainly using the information visualization tool

CiteSpace developed by Dr. Chen Chaomei for data analysis. Firstly, based on the visualization analysis data, the research literature on student information awareness literacy in China in the past decade is sorted out. According to indicators such as publication volume, research authors, research institutions, key co-occurrence and clustering, and prominent words, the clustering distribution of research hotspots is determined. The development status and trend analysis is carried out around clustering and prominent words, and future prospects for the development of information awareness literacy are proposed.

3. Basic Situation of Research on Student Information Awareness

3.1 Trend Analysis of Publication Volume

The research on information awareness in our country started not too late. The earliest research on information awareness literacy available on CNKI was published in 1988, indicating that information awareness literacy has been the focus of educational researchers since the 1980s and has continued to this day. Due to the changes in demand brought about by the changing times, this article chooses to conduct a literature search on student information awareness research in the past decade on CNKI, and uses Excel to draw a trend chart of publication volume (as shown in Figure 1). According to the chart, there was a slight fluctuation in the number of publications on information awareness research from 2013 to 2017, and it continued to rise for the following three years until reaching its peak of 37 articles in 2020, followed by a slight decline. The data shows that although research on information awareness literacy has always existed, it has not received sufficient attention, with an average annual publication volume of no more than 30 articles. After the introduction of core competencies at the end of 2016, the research volume has significantly increased, indicating that the introduction of disciplinary core competencies has driven research on information awareness literacy. However, the research volume has gradually decreased since 2020, which may be related to the fact that research on information technology disciplinary core competencies has entered a low period.

Figure 1. Trend of the Number of Publications on Information Awareness Research

3.2 Analysis of Research Authors and Institutions

3.2.1 Analysis of Research Authors

To explore the collaborative relationships among authors in information awareness research over the past decade, this article visualized the author relationship network using CiteSpace and obtained a knowledge co-occurrence graph of authors in information awareness research, consisting of 220 nodes and 56 connections, as shown in Figure 2. From the chart data, it can be seen that the number of articles published by authors in the study of information awareness is not high, and only two authors have published the most. Therefore, there is no core author in China's information awareness research, indicating that although there have been long-term participants in the study of information awareness literacy, there is a high mobility of scholars involved. Most scholars have only conducted shallow research, which is also related to the lack of a corresponding research system established in this study. In addition, overall, the nodes are very scattered and there are few connections, indicating that the authors of information awareness research have fewer connections. Among the authors who have published two articles, Yang Xin and He Yueguang have collaborated twice, while Wu Kailie, Zhang Junyue, and Chen Yu have no cooperative relationship. The above analysis indicates that educational researchers have not realized the important significance of information awareness in the comprehensive development of students' physical and mental health and adaptation to social changes in the information society. Most scholars only pay attention to this topic at a certain point in time before conducting a brief discussion. Therefore, while emphasizing the importance of information awareness in cultivating student quality in core literacy, more educational scholars need to participate in relevant research, build a network of author cooperation relationships, conduct in-depth exploration and thinking, and enrich the connotation and practice of information awareness research.
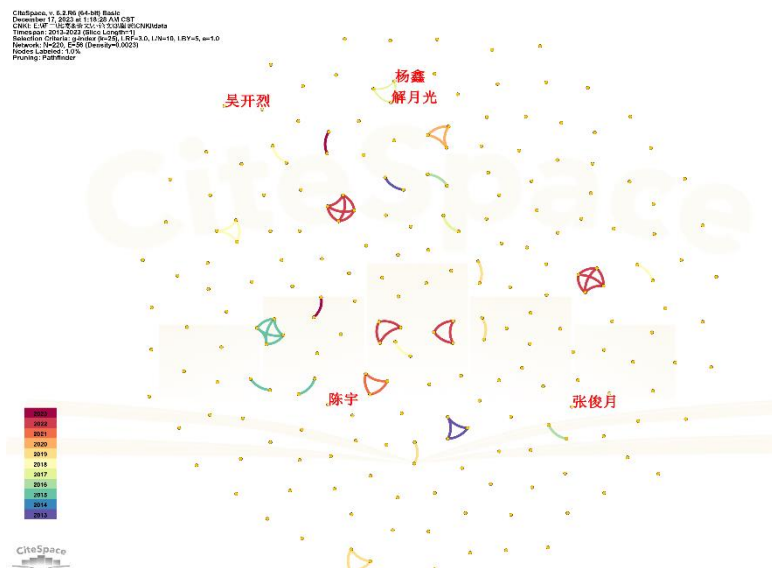

Figure 2. Author Co-occurrence Chart

3.2.2 Analysis of Research Institutions

In CiteSpace software, Time Slicing was set to "2013-2023", with one year as a time slice. Node Types selected "Institution" for visual analysis, resulting in 228 nodes and 16 connections. Finally, a knowledge graph of institutional co-occurrence was constructed (as shown in Figure 3). Through the observation of the graph, it can be found that Guangxi Normal University, Jiangsu Baoying Middle School, and Inner Mongolia Normal University are particularly eye-catching. Data statistics show that these institutions all have a publication volume of 3 articles, making them the three institutions with the highest attention to information awareness. At the same time, the categories of institutions in the graph cover a wide range, including middle schools, universities, hospitals, and sports bureaus. This indicates that information awareness is widely needed in society, and students in any field need to possess this literacy, highlighting its important significance in cultivating student quality. However, the results of institutional co-occurrence analysis and author co-occurrence analysis have the same problem, that is, there are many participants, but the research is relatively scattered, and there is a lack of cooperation among institutions. Therefore, we want to promote the development of information awareness research. Further collaboration among various institutions and their researchers is needed, Build a complete information awareness research system, enhance research on information awareness literacy, and thus improve the information awareness research system.
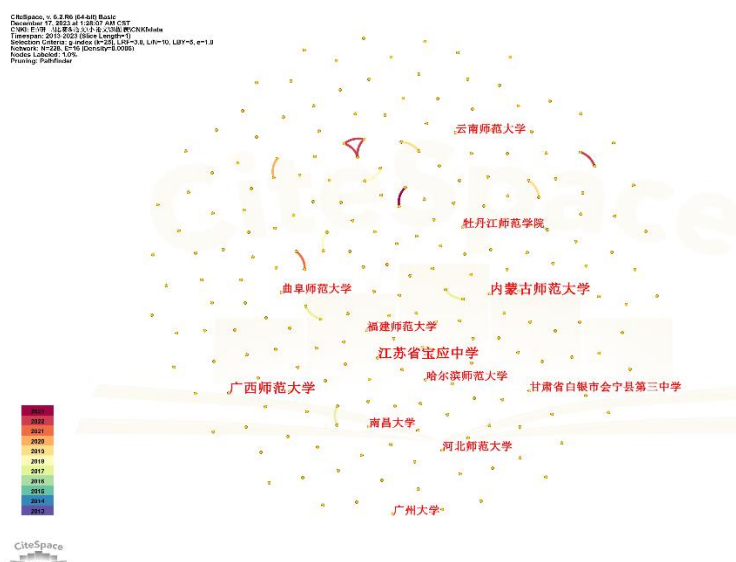

Figure 3. Institutional Co-occurrence Chart

4. Research Hotspots and Trends in Student Information Awareness

4.1 Keyword Co-occurrence Analysis

Most keywords reflect the central idea and core theory of the article, and are a highly summarized summary of the research content. This article selected Keyword in CiteSpace software and drew a keyword co-occurrence graph as shown in Figure 4. A total of 220 nodes and 433 connections were

obtained, with a network density of 0.018. The top ten frequently occurring keywords in student information awareness literacy research over the past decade were also counted (as shown in Table 1). According to the analysis of the graph, there are a total of 5 keywords with centrality>0.10, which constitute the basic elements of research on student information awareness in the past decade. In addition to "information awareness", the three nodes with large nodes and high centrality ranking are "information literacy", "core literacy", and "information technology". It can be seen that information meaning is closely related to these three aspects, further indicating that it has always been a focus of research on information subject literacy. Meanwhile, "information ability", "information ethics", and "information awareness" belong to the subcategories of information literacy, while "computational thinking" and "information awareness" belong to the subcategories of core literacy. This indicates that they are often studied together with similar concepts, emphasizing that as students, they should have basic literacy, which is an important prerequisite for cultivating other literacy. Finally, the keywords "teaching strategy" and "cultivation" both represent exploring various teaching strategies and integrating them organically into subject teaching to effectively cultivate students' information awareness, which has also been an important topic of research on student information awareness in the past decade.
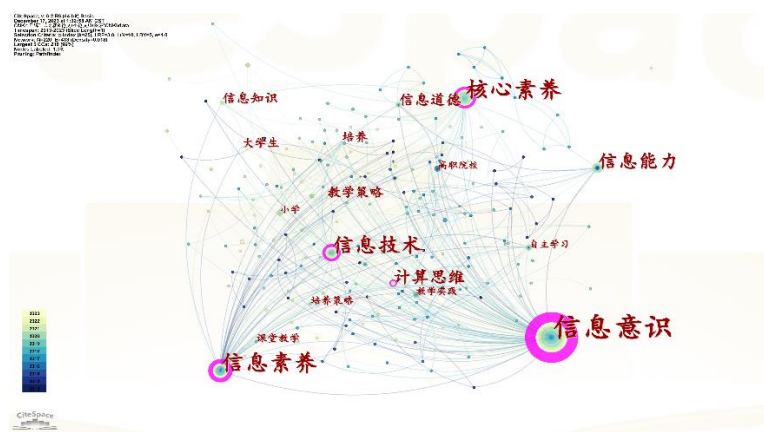

Figure 4. Keyword Co-occurrence Graph

Table 1. Top Ten Keywords

Ranking	Keyword	Frequency	Centrality
1	Information awareness	178	1.29
2	Information literacy	58	0.48
3	Core competencies	55	0.26
4	information technology	39	0.28
5	Information capability	28	0.02
6	Computational thinking	18	0.11
7	Information ethics	12	0.06

8	Information knowledge	9	0.00
9	Teaching strategies	8	0.01
ten	culture	7	0.02

4.2 Keyword Clustering Analysis

Based on the co-occurrence map of keywords, cluster analysis was conducted to obtain the keyword cluster map, as shown in Figure 5. A color block represents a cluster area, with a Q value of 0.6468>0.03, indicating a significant and scientific structure of clustering analysis. An S value of 0.9281>0.7 indicates a high level of reliability in clustering. Based on the content of the article, high-frequency vocabulary, and keyword clustering, the following two research hotspots can be roughly summarized:

4.2.1 Research Based on the Needs of Cultivating Core Competencies

Before 2017, the training goal of the information technology discipline was to cultivate students' information literacy. Information awareness, as a basic element of information literacy, received attention from some educational researchers. However, after the new curriculum standards were proposed, the training needs of information technology courses shifted from information literacy to core literacy, and information awareness remained as a training element, often studied together with core literacy and the other three indicators[0] Compared to the hot research topic of computational thinking literacy, which is a common concern, research on information awareness as a single literacy is relatively scarce.

4.2.2 Research on Strategies for Cultivating Information Awareness

With the constantly changing demand for talent cultivation, educational concepts have also adapted to the development of the times, giving rise to diverse teaching models and strategies. As an essential literacy for students in the digital age, research on the cultivation strategies of information awareness is very extensive. Huang Nan pointed out that the strength of information awareness affects the degree of information demand, so it is necessary to combine it with professional courses and use Bloom's goal guidance theory to enhance learning motivation through feedback of efficacy and success. Lin Benzhao and Zhou Song proposed teaching strategies that can be used to solve problems, and at the same time, information sharing can be carried out to maximize the value of information and cultivate students' information awareness. Ji Chengyan believes that interesting classroom activities can stimulate students' interest in learning information knowledge, thereby promoting the formation of information awareness and literacy. Song Xuelian also pointed out that in order to effectively enhance students' information awareness, it is necessary to build a real scenario to create a teaching atmosphere, strengthen the research-oriented teaching activities, and encourage students to actively use their brains to think during the learning process.
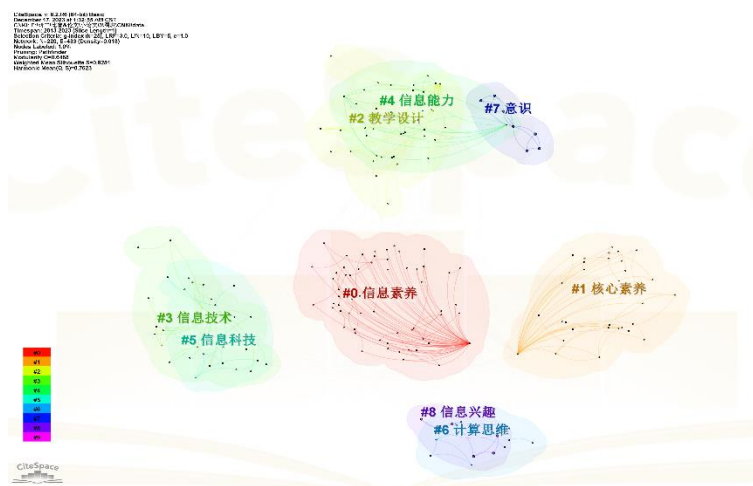
Figure 5. Keyword Cluster Graph

Table 2. Keyword Cluster Table

Cluster name	Frequency	Other keywords included
Information literacy	59	Information technology, core competencies, etc
Core competencies	32	Information literacy, education, etc
instructional design	29	Core competencies, instructional design, etc
information technology	22	Cultivation strategies, influencing factors, etc
Information capability	16	Information knowledge, information ability, etc
Information technology	10	Information technology, interaction, etc
Computational thinking	9	Computational thinking, information technology, etc
consciousness	8	Strengthening, utilizing, etc
Information interests	6	Information interests, task driven methods, etc

4.3 Analysis of Research Hotspots

In CiteSpace software, select "Burstness" and set the Minimum Duration value to 2 to display the temporal changes of the 10 representative keywords in information awareness research over the past decade. The higher the intensity of the emergence, the more important the keyword is. Firstly, the keyword with the highest intensity of emergence is "information ability", followed by "core literacy" and "information literacy", and the intensity is all greater than 3, higher than other emergence words, indicating that these three aspects of research belong to hot topics in information awareness research. Secondly, it can be observed from the graph that the hotspots of information awareness research in the past decade have gone through two stages: research based on information literacy (2013-2016) and research based on core literacy (2017-2023). Researchers in the information literacy stage are paying more attention to the cultivation of information awareness among vocational college students, which

may be related to the high level of attention paid to the information subject in information vocational colleges. Therefore, after the country emphasized the development of educational informatization, basic education and higher education institutions have also begun to attach importance to the cultivation of information awareness. In addition, early scholars focused more on the theoretical level of information awareness research, and only in 2019 did they attach importance to the study of cultivation strategies. However, after 2021, it may be due to the need for a large amount of teaching practice to verify information awareness cultivation strategies, and due to external factors, related research is difficult to implement, so research in this area has lagged behind in the past two years.

Top 10 Authors with the Strongest Citation Bursts

Authors	Year	Strength	Begin	End	2013 - 2023
信息素养	2013	3.42	2013	2016	
信息道德	2013	2	2013	2015	
高职院校	2013	1.2	2013	2016	
信息能力	2013	4.49	2014	2015	
信息知识	2015	1.06	2015	2016	
小学数学	2017	1.48	2017	2018	
核心素养	2016	4.26	2019	2020	
培养策略	2019	1.34	2019	2021	
高中	2020	1.25	2020	2021	
大学生	2015	1.18	2021	2023	

Figure 6. Keyword Emergence Chart

5. Research Outlook

This study borrows a scientific knowledge graph to clearly and intuitively sort out the current situation, hotspots, and development trends of research on information awareness literacy of Chinese students in the past decade. The conclusions and prospects drawn from the analysis are as follows:

5.1 The Research System for Student Information Awareness Literacy is not yet Mature

At present, research on information awareness literacy is not sufficient, and there is no core author as the main force to support this research. At the same time, the relationship between information awareness researchers is not close, so there is still a large gap in the overall research of information awareness. However, in the continuous development of the digital age, the strength of students' information discrimination ability not only affects their learning efficiency and effectiveness, but also has certain constraints on their ability to cope with network emergencies. In order to meet the needs of society and students' own development, the specific implementation path and method strategy of information awareness cultivation cannot be separated from the exploration and practice of researchers. Therefore, research on information awareness literacy requires not only policy support, but also a large number of educational researchers to actively participate in the research practice of information awareness, Build a proprietary framework system for researching information awareness literacy.

5.2 Utilizing Diversified Teaching Strategies to Help Cultivate Students' Information Awareness

With the proposal of core literacy, the research on information awareness has shifted from higher vocational colleges to primary and secondary schools and ordinary institutions of higher learning, and more schools have paid attention to the cultivation of students' information awareness. At the same time, the innovation of teaching models and the development of diversified teaching concepts have promoted the application of various teaching methods in teaching practice. The research on the cultivation strategy of information awareness has also increased. Although it has declined in the past two years, in the current digital transformation, intelligent education requires students to be able to skillfully use electronic equipment and use the Internet to obtain the knowledge they need. Therefore, the strength of students' ability to obtain information and distinguish will greatly affect students' learning results, and thus affect the cultivation of students' core literacy. In the future, how to use diverse teaching strategies to efficiently promote the development of student information literacy will continue to be an important topic of concern in the field of education.

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