

# A CiteSpace-based Analysis of Ecology of Education (2003-2022)

**Junfang Mu\*, Liran Peng, Shaoxuan Geng, Yuexin Gao**

School of Foreign Studies, Hebei University, Baoding, China.

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**Abstract:** As a new interdisciplinary research, educational ecology has a history of only about 50 years. While the research on ecology of education shows a vigorous development trend. In order to have an overall understanding of the research trend in this field, this article uses the Web of Science core database to examine the development of ecology of education. At the same time, CiteSpace is employed to visualize the maps of scientific knowledge in this field. This article clarifies the overall framework of the research on ecology of education in the past 20 years and shows the latest research progresses and trends, hoping to bring some enlightenment for the future research of educational ecology at home and abroad. The main conclusions are as follows: (1) The number of researches in the field of ecology of education has increased; (2) Various factors in the whole ecosystem influence and restrict each other, so all aspects of social life will affect the whole ecosystem and the subsystems. As a subject concerned with personal growth, sustainable development, and environmental harmony, ecology of education is closely related to ecological research from other fields, such as urban ecology, political ecology, social ecology, and industrial ecology. (3) Ecology of education advancing with the times. In addition, relevant research in this field has changed from a relatively simple analysis of education-related issues from an ecological point of view to diversified analyses focusing on educational subjects and processes.

**Keywords:** CiteSpace, Ecology of Education, Research Hotspot, Corpus

## 1. Introduction

Ecology of education is one of the trends in human ecology. The inter-discipline integrating natural, social sciences, and the humanities, which studies the interaction between a human being as individual, social systems, and the multidimensional environment from the holistic perspective, viewing education as the facilitator of the sphere, process, result, and development of human activity in the aspect of human and environmental quality.

The ecology of education was born in the West. Since the 1930s, due to the explanatory dilemma of existing educational theories and the strong expansion of ecological theories, Willard Water Waller and others began to introduce ecological theories into the field of education and proposed the concept of “ecology of classroom” (Fan Guorui and Wang Jiaqiang, 2007) [1]. Later, the relationship between educational theory and ecological theory was further developed by Eric Ashby and others. In 1976, Lawrence Arthur Cremin, the dean of the Teachers College of Columbia University, formally put forward the term “ecology of education” in his book *Public Educational*, which opened a new era in the study of educational history (Deng Xiaoquan and Du Chengxian, 2009) [2]. And John Eggleston, a British scholar published his book *The Ecology of the School*, which marked the systematic formation of the theory of educational ecology.

With the development of ecology of education, it has become more and more influential in the field of education and has been paid more and more attention by scholars all over the world. Since the 21st century, ecology of education has developed rapidly, and the research fields have been continuously expanded, with more colorful research contents. It has gradually developed into interdisciplinary research that combines with other fields. From the basic point of view, the theory of ecology of education advocates

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the use of ecological principles, overall linkage thinking, and systematic balance thinking to solve educational problems (Tian Xianpeng, 2016) [3]. In the ecological environment, individuals and groups interact with each other. All the elements in the education system not only form a certain structure in the internal interrelation and interaction. Moreover, energy, material, and information are exchanged inside and outside the education system, which has multi-dimensional characteristics (Ling Ling and He Zubin, 2005) [4].

However, the amount of research on ecology of education is still limited. Especially the research trends of quantitative analysis, the research in this field from macro analysis is relatively few. CiteSpace is a visual analysis software that can be employed to visualize a large number of literature data and identify the hotspots and frontiers in specific fields. In this research, CiteSpace was used to systematically sort out and analyze the data on educational ecology literature collected in the core database of the Web of Science from 2003 to 2022. It is necessary to carry out research to display the main focuses and development processes in the field of ecology of education.

## **2. Research Methods and Source of Corpus**

### **2.1. Methodology**

In this study, the information visualization application software CiteSpace 6.1.R 6, developed by Chen Chaomei in 2006, was used to analyze 3429 papers on ecology of education. Through CiteSpace, visualization graphs of knowledge covering “the number of publications”, “most prolific authors, institutions and countries”, “co-citation references and journals”, “co-occurrence of keywords”, “keywords clusters” and “citation bursts of keywords” can be made. Meanwhile, the data and parameters related to the graphs can be obtained. Chen Chaomei and other scholars (2015) [5] said that each node indicates a project, such as a keyword, a country, an author, an institution, etc., while a link denotes a co-occurrence and cross-reference of nodes. The researchers can consider the basic situation of a particular field by in-depth analysis of the co-citation data of publications. CiteSpace also presents the knowledge structure in a visual way, thus helping researchers to find the development context, frontier, and future trends of the field.

### **2.2. Source of Corpus**

The corpus source in this research is chosen from the Web of Science (WOS) core database including the Social Science Citation Index (SSCI), SCI-Expanded, ESCI, as well as Arts and Humanities Citation Index(A&HCI). WOS includes more than 9000 high-impact academic journals, and its authority and importance have been widely recognized by the international academic community.

The data retrieval strategy used in this research is: ‘Subject= “ecology of education” “educational ecology” “education ecology” AND ‘Time of Entry=January 1, 2003 to December, 2022’. After the articles, reviews, and proceedings papers of the past 20 years about ecology of education were retrieved, there were 3429 valid ones obtained through removing duplicates by CiteSpace. Finally, the data is downloaded and saved in plain text document format to provide the basis for further CiteSpace data analysis.

## **3. Results and Discussion**

### **3.1. Analysis of the Number of Publications**

The annual number of published papers in a specific research field and its changing trend can reflect the research situation in this field. To fully grasp the quantitative statistics and visually show the dynamic movement of ecology of education, this article analyzes the related articles in the WOS database in the past 20 years with CiteSpace 6.1.R 6 as the research tool. (Figure 1)

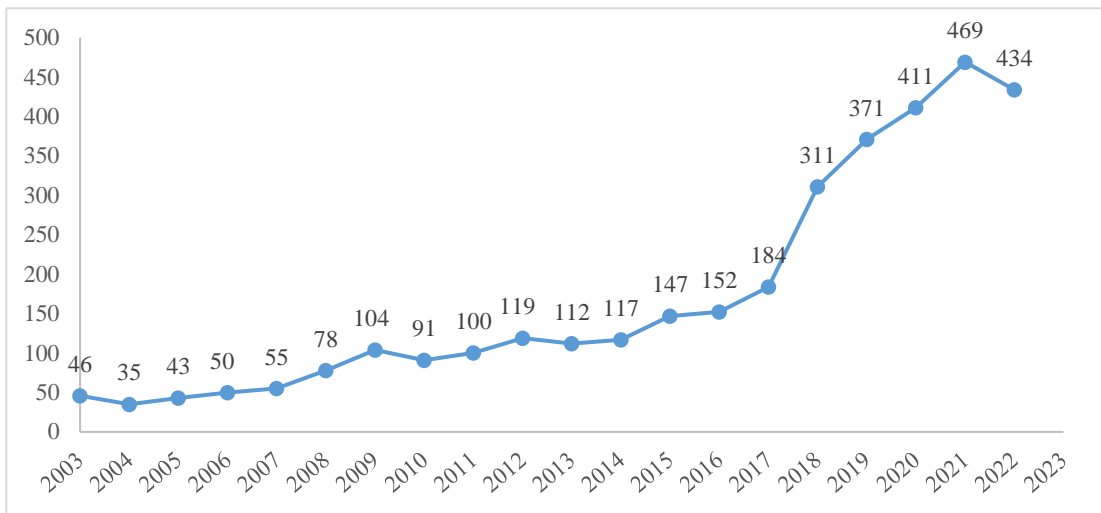


Figure 1. Number of publications in terms of ecology of education (2003-2022)

From Figure 1, the number of publications about ecology of education from 2003 to 2022 has shown an increasing trend as a whole. From 2003 to 2007, the published articles fluctuated within a narrow range. On the whole, the number of publications is relatively small. Since 2009, except for 2010, the number of publications has exceeded 100, and the increasing trend in 2018 is obvious, nearly twice that of the previous year. However, in 2022, the overall number of publications showed a relatively downward trend. However, as can be seen from Figure 1, the number of publications on ecology of education shows an increasing trend. Nevertheless, there is still a lot of room for research and development in this field.

### 3.2. Analysis of Authors and Institutions

The authors and institutions maps are used to show the cooperative relationship between the authors and institutions in a certain research field (Mu Junfang and Ma Rui, 2022) [6]. By analyzing the research status of prolific authors and institutions, their research capabilities would be captured which is of great importance to evaluate the evolution of an academic area.

To probe into the situation of authors and institutions of ecology of education, network analysis of authors and institutions in terms of ecology of education is drawn in Figure 2 and Figure 3 respectively.

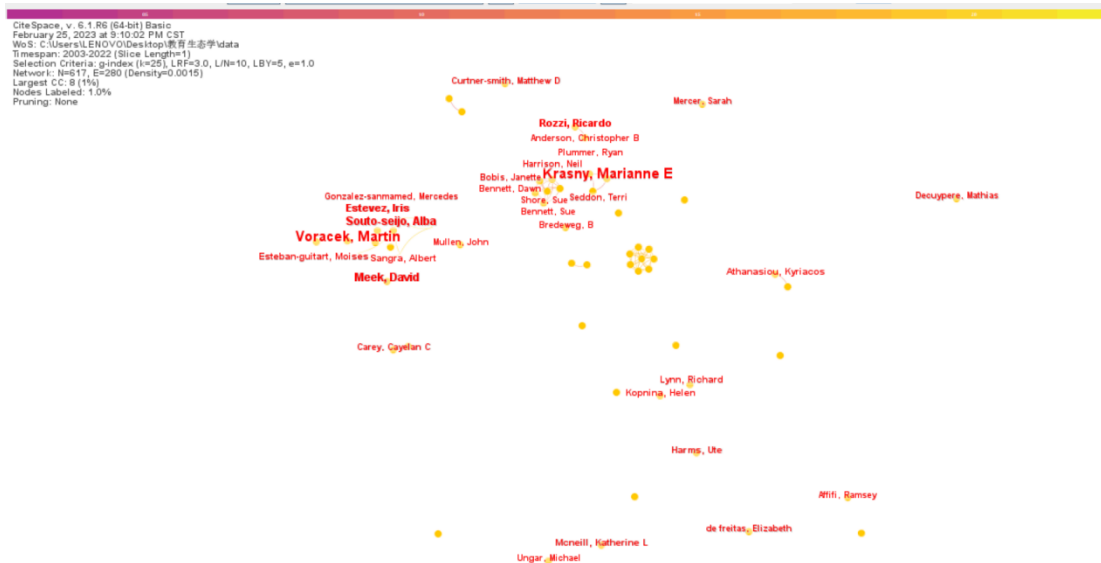


Figure 2. Network analysis of authors in terms of ecology of education (2003-2022)

The obtained literature data was imported into the CiteSpace 6.1.R6 system. The time period was set as 2003 to 2022 and the time slice was set to 1 year. The node type was selected as ‘‘Author’’, and other parameters were the system default values. Then the author co-occurrence network map was obtained (Figure 2). Generally speaking, the more nodes in a graph, the stronger research cooperation between authors in this field. From Figure 2 it can be seen that there are 617 node types and 280 node links. The network density is 0.0015. This indicates that although the number of authors in the study of ecology of education is relatively large, most of them are based on individual independent research. As can be seen from the scattered nodes, the cooperation between researchers is not enough. Marianne Elizabeth Krasny and Martin Voracek ranked in the top two and published 10 papers. David Meek and Souto-seijo follow them with 6 publications. Most authors published about 2 papers.



Figure 3. Network analysis of institutions in terms of ecology of education (2003-2022)

Change the node type to ‘‘institution’’ and keep other parameters, forming Figure 3. Through the closely linked nodes and numerous links, it is found that various institutions are intensively distributed. There is an obvious cooperative relationship between them and many research exchanges and sharing among them. The top three prolific institutions are Michigan State University, Cornell University, and Colorado State University, which published 43, 36 and 33 papers respectively. Obviously, the top publishing institutions in foreign countries are well-known universities. While in China, the Chinese Academy of Science published the most papers on ecology of education. In addition, universities such as Peking University and Chinese University of Hong Kong have also made some progress in this respect. Chinese Academy of Science is the highest academic institution of natural science, the highest advisory institution of science and technology, as well as the comprehensive research and development Center of natural science and high technology in China. High-quality publications of it represent the latest research trends. Through analysis, it can be concluded that research on ecology of education is developing. The trend of international cooperation is increasingly obvious. The research on ecology of education has an important position and influence in the world.

### 3.3. Analysis of Visual Network Map of Hot Topics in Ecology of Education

#### 3.3.1. Analysis of Co-occurrence of keywords



Figure 4. Network analysis of keywords in terms of ecology of education (2003-2022)

Table 1. Top 26 keywords in terms of ecology of education (2003-2022)

Rank	Keywords	Frequency	Rank	Keywords	Frequency
1	ecology	503	14	behavior	90
2	education	386	15	health	90
3	science	205	16	attitude	89
4	environmental education	183	17	social ecology	83
5	student	149	18	school	81
6	knowledge	140	19	community	74
7	impact	134	20	perception	73
8	higher education	130	21	sustainable development	72
9	management	117	22	perspective	71
10	conservation	115	23	biodiversity	71
11	model	106	24	framework	70
12	climate change	101	25	diversity	70
13	children	91	26	policy	70

Keywords are a high-level summary of the object and content of the article, which can reflect the basic aspects of the research area (Li Jie and Chen Chamoe, 2016) [7]. Through analyzing keywords, the research focuses and development trends are found. Import the database into the CiteSpace system, set the node type as keywords, and keep the other parameters unchanged, thus forming a visualization map of co-occurrence of keywords in the ecology of education (Figure 4). The nodes are keywords that are selected by frequency. The bigger the node, the darker the font color, the higher the frequency of keywords, and the higher the topic popularity. The links indicate the connections between them. And the thickness of the links refers to the closeness of the links between keywords. In order to get a deeper understanding of the research hotspots displayed by the keywords, some high-frequency keywords of ecology of education that appear more than 70 times are drawn, as shown in Table 1.

Apparently, in the research of ecology of education, keywords such as “ecology”, “education”, and “science” appear quite frequently. Besides, according to Li Jie and Chen Chaomei, centrality is an indicator to measure the importance of nodes in visualizing the network. The centrality of “ecology” is 0.18, which means that it plays an important role in the research of ecology of education.

### 3.3.2. Analysis of Keyword Clusters

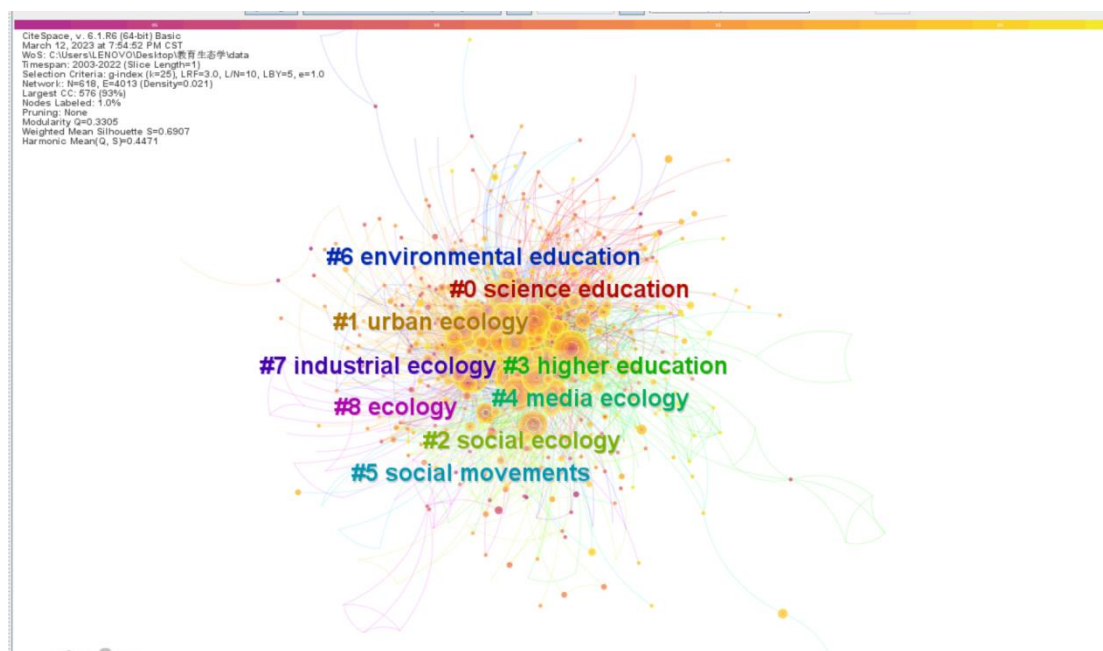


Figure 5. Visualization map of keywords clusters of ecology of education (2003-2022)

Clusters analyses of keywords collect all the related nodes of keywords and extract clusters (Figure 5). The visualization map of keywords clusters could highlight cutting-edge researches in terms of ecology of education. In Figure 5, from #0 to #8, with the increase of the number of clusters, there are more and more articles in the cluster, and the size of the cluster is also increasing.

It is of great significance to explore the application and value of ecological principles in the field of ecology of education. Ecology can provide us with a comprehensive, integrated, and holistic way of thinking, which can effectively optimize the development path of educational ecosystems. The world is intrinsically connected, with interactions between organisms and the environment. And there is also mutual communication between the educational ecosystem and the external environment. Therefore, we can explore the development of the educational ecosystem from different ecological perspectives, such as political ecology, social ecology, and urban ecology. The interdisciplinary research combining educational ecology with other disciplines will surely enrich and promote the stable development of ecology of education.

Science education is an important activity in the field of education to cultivate talents with purpose. Cluster #0 is science education, including keywords such as “science”, “education”, “belief”, and “strategy”. Science exists in every aspect of daily life, and science education is especially crucial for human beings to understand scientific concepts in their natural and social environments. Science education not only teaches children problem-solving skills but also motivates them to pursue scientific thinking throughout their learning. For instance, Katherine L. McNeill and Meredith Houle Vaughn discuss how the climate change curriculum can support students to develop critical thinking, including a deep understanding of scientific concepts (McNeill and Vaughn, 2012) [8]. Through their study, it can be found that after participating in the course students have a deeper understanding of the science behind global climate change. With the increase of scientific knowledge, their enthusiasm for participating in environmental protection has also been significantly improved. Science education is an activity in which students and teachers take part. Under scientific and effective strategies, science education can be carried out smoothly. And science education promotes the harmony between human beings and nature.



Cluster #1 is about urban ecology which is highlighted by keywords such as “management”, “government”, “sustainability”, “landscape”, and “biodiversity” so on and so forth. Urban ecology is a subject that studies the relationship between the life system and the environmental system in urban space. With the advancement of urbanization, the allocation of resources in urban areas is facing challenges and needs the participation of the government or other forces. According to Marwa Talib Rahma and Khansaa Ghazi Rasheed Al-Neaimi, “the interventions in the urban environment at the local and global level require the urban designers to use ecological principles to arrange the urban space elements so as to minimize the negative impact on the urban environment (Marwa and Khansaa, 2020) [9].” From the research of Zuzana Drillet, Tze Kwan Fung, Rachel Ai Ting Leong, Uma Sachidhanandam, Peter Edwards, and Daniel Richards (2020) [10], the residents hold different opinions on ecosystem services and disservices brought by different vegetation types. Therefore, urban designers need to mediate conflicts between urban space and resources as well as the preferences of various stakeholders, so as to make more informed decisions in creating and optimizing ecosystems and providing multifunctional urban landscapes. In addition, in the process of urbanization, the ground has hardened and the architectural landscape has increased, which has led to the disappearance of the habitats on which many animals depend and the decrease of biodiversity. Under reasonable management, a balanced and sustainable urban ecosystem will be formed. The urban ecosystem, as a macro-ecosystem, includes different subsystems. Schools are subordinate institutions of a city and naturally form a part of the urban ecosystem. When the urban ecosystem outside the school changes, it will inevitably affect the educational ecosystem as well. Both of them are interrelated and influence each other. For example, the number of school-age children in urban areas and the spatial distribution of schools will affect the research and development in the field of ecology of education.

The major keywords under cluster #2 social ecology are “impact”, “children”, “behavior”, “environment”, “context” and so on. The environment includes the social environment and the human environment. Children’s growth and behavior are influenced by the environment. Behavior can be understood as anything a person does, including actions and reactions to the environment. At the same time, human behaviors also impact the environment. The ecological environment in which humans live affects human existence and development. Social ecology is to study how individuals interact with the surrounding environment and respond to it, and how these interactions affect the whole society and the environment. Social ecology advocates paying attention to social and environmental issues. The behaviors that children develop as a result of their interactions in society and the environment reflect different historical backgrounds, personality traits, and psychological conditions.

Higher education is an important research area of ecology of education. Cluster #3 higher education includes “value”, “motivation”, “experience”, “program” and other keywords. Different from primary education, higher education is not compulsory, and students’ subjectivity is more obvious. After entering the 21st century, the talent cultivation of colleges and universities has undergone profound changes, which requires higher education to pay more attention to the ecological construction of education in the process of talent cultivation, maintain the dynamic balance of the development process of the ecological system of higher education and cultivate high-quality talents (Li Wenbin and Sun Jun, 2011) [11]. In the background of rapid economic development and in-depth globalization, the contradiction between man and nature, economic development, and environmental protection is becoming increasingly prominent. In order to popularize environmental knowledge, enhance citizens’ environmental awareness, and improve their sense of environmental responsibility, environmental education must be incorporated into higher education to improve the environmental education system. Based on this, the most fundamental thing is to let students establish the correct value identity and integrate theory with practice. With the motivation to protect the environment, they will consciously put more practice into it.

Cluster #4 media ecology is closely related to new media, big data, and the internet. Beyond that, “culture”, “youth”, “school” and “family” are some major keywords. With the progress of science and technology, network media are becoming more and more popular. Farooq A. Kperogi said that “social media platforms have exploded in the past decade and have become the stage of discursive democracy, social interaction, and digital dissidence in various parts of Africa (Farooq and Kperogi, 2022) [12].” This phenomenon is very common not only in Africa but also around the whole world.

Especially after the epidemic, online education has stepped onto the stage with a high profile. The media is becoming an important

tool in the education system. “Big data” refers to a large number of diverse information in our lives, which is growing at an unexpected speed every day, exceeding the capabilities of traditional data processing software. Big data collects and analyzes data in new ways. Its quantity is huge, its variety and the source are diversified, and its data is accurate and reliable. Combining big data with education will promote further development and reform of education, optimize teaching methods, and improve education quality. Diane M. Styers, Jennifer L. Schafer, Mary Beth Kolozsvary, Kristen M. Brubaker, Sara E. Scanga, Laurel J. Anderson, Jessica J. Mitchell, David Barnett, and other scholars (2021)[13] formed an interdisciplinary team and developed a flexible learning activity to provide students with experience in using large-scale ecological data to cultivate data science skills and an understanding of macroecology and biodiversity concepts at multiple spatial scales. While, with the users of online media becoming younger and younger, there are also many problems. Young people are caught in the torrent of mixed information, and they are easily misled by wrong values. Therefore, family education and school education should complement each other to help young people distinguish between true and false information and establish correct values.

Cluster #5 social movements have “political ecology”, “climate change”, “power”, “critical pedagogy”, “institution” and others. Major social movements, whether natural or man-made, such as climate change, will have a serious impact on all levels of human society. Political ecology is a field that applies the concepts and methods of political ecology to analyze environmental issues and critically studies the relationship between nature and society, especially the power relationship that affects the availability of natural resources, so as to reveal differences and unfairness in the distribution of costs and benefits. Political ecology can effectively demonstrate how unequal relations within and between societies affect the natural environment, especially in terms of political policies. Meek, Bradley, and others (2017) [14] hold that the political ecology of education draws attention to how the distribution of power and resources among interconnected political and cultural entities mediates various teaching processes and related knowledge systems. Facing social movements, all kinds of powers should play their roles. For instance, realizing the seriousness of climate change, Sultan Jaber, the President-designate of the 28th Conference of the Parties to the United Nations Framework Convention on Climate Change, stressed the need for the international community to unite and do more to address the energy dilemma and climate change in “The Cambridge Energy Week”. Besides, there are a lot of institutions and agencies that take part in the action of dealing with climate change. For example, USAID plays an important role in mitigating climate change and coping with its impacts. It cooperates with more than 45 countries to implement ambitious emissions reduction measures, transition to renewable energy, protect key ecosystems, build resilience against the impacts of climate change, and promote capital flows to climate-positive investments. Moreover, for children, having a critical thing is of great importance when they should have a deep and objective understanding of a thing. From this point of view, educators should attach importance to critical pedagogy.

Cluster #6 is environmental education which is mainly composed of the keywords “care”, “attitude”, and “perception”. Environmental education is an educational process dealing with the relationship between human beings and the surrounding natural environment. Environmental education does not advocate a particular perspective or course of action. On the contrary, environmental education teaches individuals how to weigh different aspects of a problem through critical thinking. Environmental education is conducive to improving the ability of individuals to solve problems and make decisions. They can explore environmental problems in a scientific way, participate in solving problems and take action to improve the environment. Scholars Klas Sandella and Johan Öhman discuss that direct contact with the natural environment has a long tradition in environmental education in Sweden. In about 2010, schools in Swedish developed a more diversified method of environmental and sustainable education: outdoor teaching, and discussed its importance. Many scholars maintain that traditional environmental education separates man from nature and its role is limited (Sandell and Öhman, 2008) [15]. Educational ecology is student-oriented, making students become more concerned about environmental issues and have a correct attitude toward the ecological environment.

Cluster #7 industrial ecology has the keywords such as “energy”, “consumption”, “evolution model”, “environment” and “impact”. Industrial ecology is known as the science of sustainability, and it is the means for human beings to maintain sustainability through the rational arrangement of resources and energy under the condition of continuous economic, cultural, and technological development. According to Amit Kapur and Thomas E. Graede, “the biological analogy, the use of systems perspectives, the role of



technological change, the role of companies, ecological efficiency and dematerialization, as well as forward-looking research and practice are the core elements of this discipline (Amit Kapur and Thomas E. Graedel, 2004) [16].” As we all know, resources and energy are limited, but the development of human society is continuing. Hence the consumption of resources and energy is constantly increasing. It is not a rare case that due to unrestrained abuse of resources, human beings face crises resulting from the exhaustion of natural resources and ever-increasing pollution. Therefore, it is very necessary to learn and implement industrial ecology. From the point of view of ecosystems, all the factors in the surrounding environment would affect human beings. To develop and educate sustainably, we should give priority to forward-looking research such as industrial ecology.

Cluster #8 is ecology, which is the core term in the keyword clusters of ecology of education. Ecology is the study of the environment which helps people to understand how different organisms coexist. Living in an interconnected ecosystem, different aspects interact with each other. The ecology-related researches like urban ecology, social ecology, educational ecology, media ecology, and industrial ecology are meaningful and forward-looking. Their development can't be separated from education. The content of education is made up of these subjects. While, as one of the trends of human ecology, ecology of education is the inter-discipline integrating natural, social, sciences, and the humanities.

**Top 25 Keywords with the Strongest Citation Bursts**

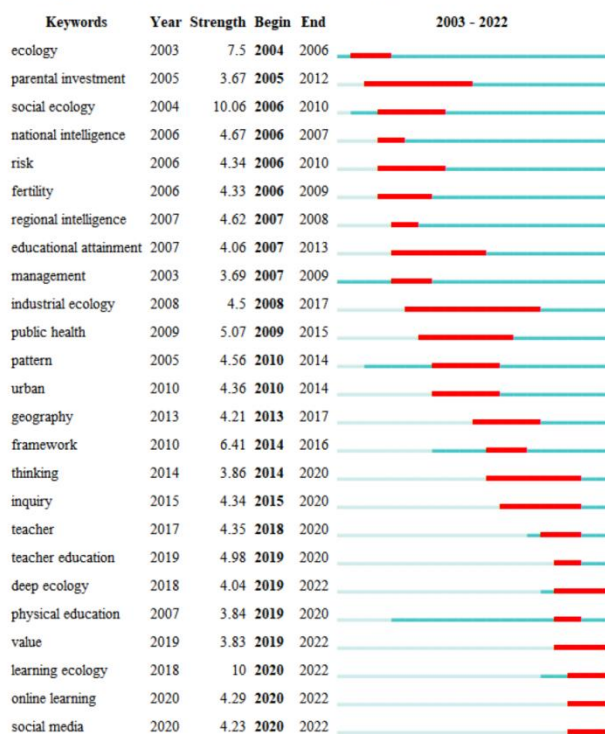


Figure 6. Citation bursts of keywords in terms of ecology of education (2003-2022)

The burst detection can better identify the usage frequency of a keyword in a specific period of time. High frequency indicates the current research focus. Meanwhile, the trend of development is visible. Using the “Burstness” function in CiteSpace can obtain the citation bursts of keywords, as shown in Figure 7. The red part in this figure is the time when the keywords appear, and the blue part is the whole selected time period.

According to Figure 6, industrial ecology shows the longest burst time from 2008 to 2017. As we all know, industrial pollution can seriously damage the ecological environment. And the balance between economic development and ecological protection has long been a thorny problem facing human beings, especially in the process of industrialization and urbanization. Keywords such as “deep ecology”, “value”, “learning ecology”, “online learning” and “social media” are the burst keywords in recent years, and this situation may continue. The COVID-19 pandemic has brought many changes, and online education plays a more important role. People tend

to reflect on their own behavior and re-examine the established values. The impact of the pandemic on human beings is huge and far-reaching. Therefore, these keywords are likely to remain the research hotspot for some time to come.

Since 2004, researchers began to pay attention to “ecology”, “social ecology”, “public health” and so on. Since the American scholar Lawrence Arthur Cremin put forward the term “ecology of education”, many scholars have carried out detailed researches in this field. Most scholars regard the ecology of education as the research of educational problems with principles and methods. Therefore, ecological research is very important in the field of ecology of education. Ecological principles and concepts such as ecosystem, ecological factors, and dynamic balance have been applied to pedagogy. Whether as formal school education or informal family and community education, the ecological environment of society influences them directly or indirectly. It is also very important to study and improve the social and ecological environment so as to reform the educational ecosystem.

Since 2018, researchers have been paying attention to keywords like “teacher education”, “learning ecology”, and “online learning”, which emphasize the education theme. As one of the important subjects in the educational ecosystem, the thoughts and behaviors of educators are closely related to the student’s academic performance and academic achievements. For example, from the perspective of context and social culture, effective ways of using video in pre-service teacher education are demonstrated conducive to improve teachers’ professional quality (Kang Hoaun and van Es Elizabeth A, 2019) [17]. Therefore, the education of teachers has attracted much attention. Teachers can improve their professional skills only by dealing with the relationship between the environment, students, and themselves. In this way, we can achieve sustainable development of education and promote the balanced development of the education ecosystem.

#### 4. Conclusion

Based on CiteSpace software and the Web of Science core database, this paper analyzes 3429 publications on ecology of education from 2003 to 2022 in terms of the number of publications, high-yield authors and institutions, keywords co-occurrence, keywords clusters, and bursts of keywords. This research draws some conclusions, hoping to provide inspiration for the study of ecology of education.

Firstly, in terms of the number of publications, the study of educational ecology emerged early and continuously attracted the attention of researchers. In the past two decades, the study of ecology of education has entered a mature stage of development, and the number of publications has generally shown an upward trend.

Secondly, in terms of authors, the number of authors who study ecology of education is relatively large, and most of them publish about 2 articles, but the cooperation among authors is insufficient. The international prolific authors mainly include Marianne Elizabeth Krasny, Martin Voracek, David Meek, etc. The density of the author co-occurrence network in the field of educational ecology research is low which means the research is mainly finished by individuals.

Thirdly, in terms of institutions, the distribution of institutions is more concentrated. There are obvious cooperative relations, and many exchanges and sharing among institutions. Moreover, the most prolific institutions in this field are mostly famous universities such as Michigan State University, Cornell University, Colorado State University, and Peking University. The university has a strong learning atmosphere, enough research tools, and many research teams. Therefore, in the field of ecology of education, a lot of research achievements and academic breakthroughs have been made in universities. The advantages of the university are used to set up research teams and promote cooperation.

Fourthly, in terms of the results of keyword co-occurrence, many keywords that appear frequently are closely connected. Keywords such as “ecology”, “education”, “science” and “environmental education” have become the research focuses of ecology of education. Among them, “ecology” plays an important role in the research of ecology of education.

Fifthly, from the perspective of keywords clusters and keywords bursts, ecology of education is an interdisciplinary subject covering human beings, nature, economy, environment, culture, and other various aspects. The process of personal growth is the process of mutual influence between an individual and the surrounding environment. Any kind of factors will affect the harmony of the whole education system, so the researches on ecology of education include many elements of other fields, such as urban ecology, environmental education, industrial education, and so on. The interconnection with the other disciplines is conducive to the development of ecology of education. Furthermore, over time, the research in the field of ecology of education is becoming more and more in-depth. The emergence of new social problems and phenomena brings new research perspectives to the study of ecology of education. At the same time, from the tendency of emerging keywords, “teachers”, and “learning ecology” are also the focuses of our future attention.

On the whole, the research of ecology of education is on the rise and has attracted the attention of scholars at home and abroad, but there is still a long way to go. First of all, academic exchanges and cooperation between authors and institutions should be strengthened to promote the development of ecology of education. Secondly, it is necessary to promote the deep integration of ecology of education and information technology. For example, by using big data and bibliometric tools to grasp the latest research hotspots of educational ecology and enrich the research system of educational ecology. Thirdly, improve the comprehensive study of ecology of education from multiple perspectives and tighten the close relationship between ecology of education and other disciplines.

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### **Conflicts of Interest**

The authors declare no conflicts of interest.

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