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Bibliometric Analysis of Green Economy Learning for Children (1996-2023): Current Status and Future Directions

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Abstract

This research aims to map research conducted by reputable journals indexed by Scopus on Science Direct from 1996 to 2023 regarding the theme "Green economic learning for children." Data was obtained from the Scopus website (Science Direct), using the keywords: "Green Economy" AND "Learning for Children," with a range of publication years 2016-2023, in the field of Social Sciences, documents: research articles, and open access. Based on the criteria, there were 54 articles, and the analysis used R – biblioshiny software. The analysis technique uses bibliometrics using R biblioshiny software. The results of the bibliometric analysis revealed four quadrants, namely the motor theme quadrant or driving topic, represented by future energy transition, sustainability, transition planning, green, and urban. This topic must be developed considering topics that are important for the future. The special theme quadrants are governance, insight, and students: learning and teachers. The emerging or decreasing theme quadrants represent environmental, economic, and emissions evidence and perspectives. The basic theme quadrant is represented by the themes: learning, education, COVID, climate, strategy, and pathways. The themes from the results of this research recommended for further development are themes related to the keywords governance, insight, students, learning, and teachers, especially themes related to innovative learning models for children.

Keywords Green Economy; Study; Children; Bibliometry

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1. INTRODUCTION

Someone must have economic knowledge in economic activities to obtain efficient and effective results. Without knowing the economy, you will quickly fall into losses. Education cannot guarantee that someone can determine economic activities that can improve their welfare. Green economy-based development is difficult to implement, considering the increasingly uncontrolled environmental damage caused by development. (R. Ma, Xie, Liu, Zhou, & Samsurijan, 2023; Zheng, Hao, Lv, & Wei, 2023). The world needs to transform from a 'black' economy, which has been wasteful in using fossil fuels such as petroleum and coal, to a green economy, prioritizing using renewable energy for sustainable growth, such as solar power, wind power, and hydropower.(Luo & Liang, 2023; R. Ma et al., 2023).

Green economic development strategies and a transition from conventional to green economic development models are necessary because of the negative impact of conventional economic development models on the local and global environment. Policymakers must prioritize science and technology education to support green economic development. (Baba, Pavlovich, & Amfo, 2021; Chen, Wang, & Haroon, 2023; M. Ma, Zhu, Liu, & Huang, 2023).

Based on this, economic and environmental development integration is very important and should be implemented immediately. (W. Fang, Liu, & Surya Putra, 2022; Mohsin, Taghizadeh-Hesary, Iqbal, & Saydaliev, 2022; Zhao, Mahendru, Ma, Rao, & Shang, 2022).

Therefore, the green economic paradigm needs to be put forward by the government in implementing natural resource management and utilization policies to prevent environmental damage and realize fair and sustainable management and utilization of natural resources.(Bai, 2023; Feng et al., 2022; Tang, 2021; Yuan, Li, Wang, Wu, & Chang, 2023; Zhao, Shang, Magazzino, Madaleno, & Mallek, 2023).

The environmentally friendly potential is largely unexploited and requires attention from academic circles, both practical and empirical, which can help policymakers make their countries more environmentally friendly.(Dunlap, 2023; Licastro & Sergi, 2021; Mutascu, Horky, & Strange, 2023; Zachariadis et al., 2023)

The world is trying to do this, which requires supporting and preparing future generations by providing the next generation with green economic literacy from an early age. (Nurastuti, 2019b). Green economic values are very important to develop in children because that is when they will absorb learning well so that everything that is instilled in them can influence the development of life in the future.

The importance of developing green economic values in children cannot be ignored, considering that this period is a critical phase in forming attitudes, values , and knowledge that will form the basis of their behavior in the future. Green economic values include understanding sustainability, environmental responsibility, and awareness of the economic impact on the ecosystem. This awareness at this stage of children's development provides several invaluable benefits.

First of all, children at this age can absorb and internalize information quickly. Therefore, introducing green economic values early in their lives allows them to build a strong knowledge base and awareness of environmental issues. This information and values can become integral to their thinking and worldview, forming sustainable thinking patterns as they age.

Second, children who understand the values of the green economy are expected to be able to integrate them into their daily lives. By understanding the importance of wise use of resources, environmental responsibility, and the impact of economic decisions on the planet, they can take small steps that have a big impact on preserving the environment. This includes daily habits such as energy savings, waste management, and sustainable consumption choices.

Third, green economic values in children can also shape future work ethics and attitudes toward social responsibility. By understanding that sustainability is a shared responsibility, children can carry this collaborative attitude into their communities and work environments later on. Awareness of economic and environmental impacts can motivate them to seek innovative solutions to future challenges.

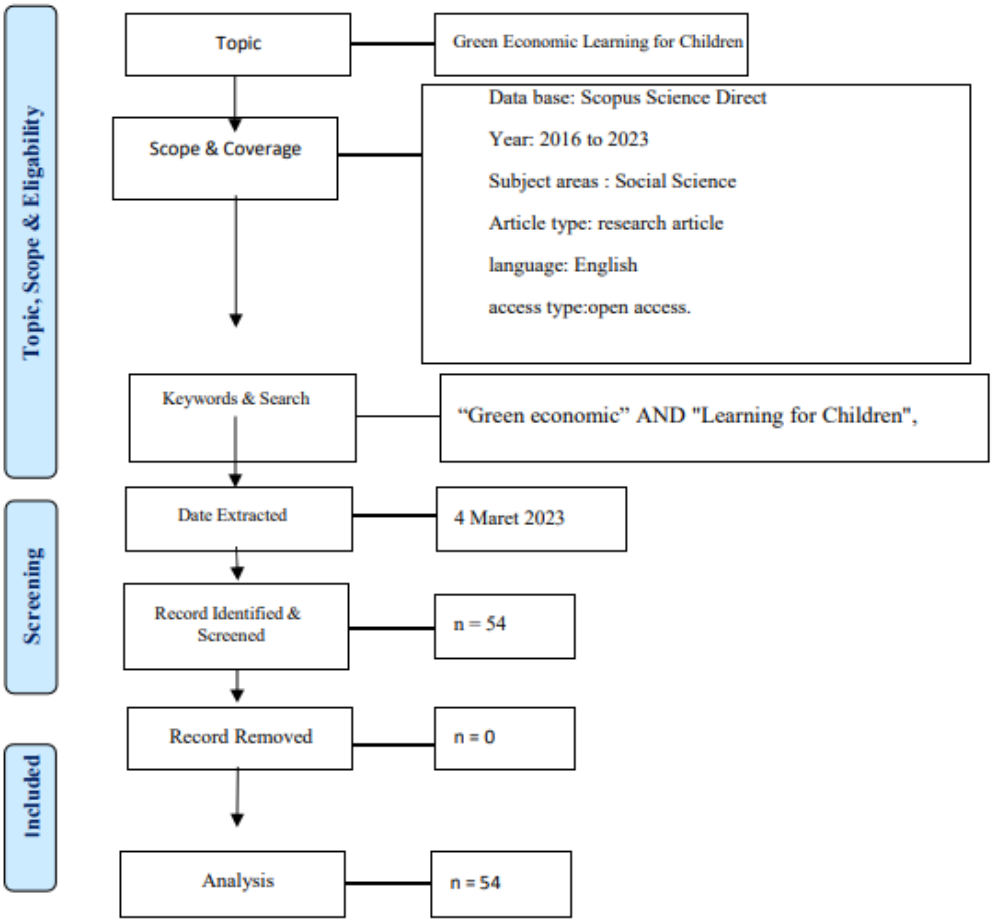
Fourth, green economic values can trigger the discovery of children's talents and interests in environmental science, sustainable technology, or environmental policy. Inspiring this interest early can help create a solution-focused generation actively involved in solving global environmental and economic problems.

Thus, involving children in learning green economic values provides them with knowledge and shapes their character, attitudes, and concern for the environment. This is not only an investment in their personal development but also an investment in creating a sustainable society responsive to future economic and environmental challenges.

Based on this information, to provide an important summary of the theme of green economic learning for children, researchers conducted bibliometric analysis to classify and identify current and future events. This research uses the Scopus (Science Direct) database, which matches the criteria and keywords. There are 54 articles published from 2016 to 2023.

2. METHODS

In this research, the data used involves scientific publications such as journal articles, conferences, books, or other scientific literature related to the themes of "Green Economy" and "Learning for Children." The data includes various information, including title, author, abstract, keywords, year of publication, and other related elements, depending on the data source. The main data source used in this research is Scopus (Science Direct), a database that provides access to thousands of scientific publications in various fields of knowledge. Data was collected using the keywords "Green Economy" AND "Learning for Children" as search criteria. The time range chosen for data collection is 2016-2023. Focus on the field of Social Sciences and document types limited to research articles and open access. Search results using these criteria produced 54 articles that met the predetermined limits. After collecting this data, analysis was performed using R software using the biblioshiny package. R is a statistical programming language used for data analysis and visualization. Biblioshiny, developed by Massimo Aria, Corrado Cuccurullo, and Luigi Vanvitelli of the University of Naples, Italy, is a software package that facilitates bibliometric analysis. This analysis process includes mapping and identifying scientific literature trends relevant to the research theme. By using R – biblioshiny software, researchers can visualize and analyze data more effectively, helping researchers to understand relationships and patterns in the information collected.



3. FINDINGS AND DISCUSSIONS

Findings

Text Analysis

The analysis in this study used R-studio software with biblioshiny developed by Massimo Aria and Corrado Cuccurullo from the University of Naples and Luigi Vanvitelli from the University of Campania (Italy). The results of text analysis regarding the frequency of occurrence of words are that there are frequencies ranging from 4 to 10 times related to "green economy for children."; The words that appear most frequently are by the keywords, namely "Learning," which appears ten times, followed by the words children six times, and energy, planning, and sustainability six times. In comparison, the least frequency is four times, namely the words climate, covid, and evidence. , future and green, digital, covid, countries and approaches.

The analysis in this research was carried out using R-studio software with the help of biblioshiny, which was developed by Massimo Aria, Corrado Cuccurullo from the University of Naples, and Luigi Vanvitelli from the University of Campania, Italy. Biblioshiny is a software package designed specifically for bibliometric analysis, enabling researchers to explore and analyze trends and patterns in scientific literature.

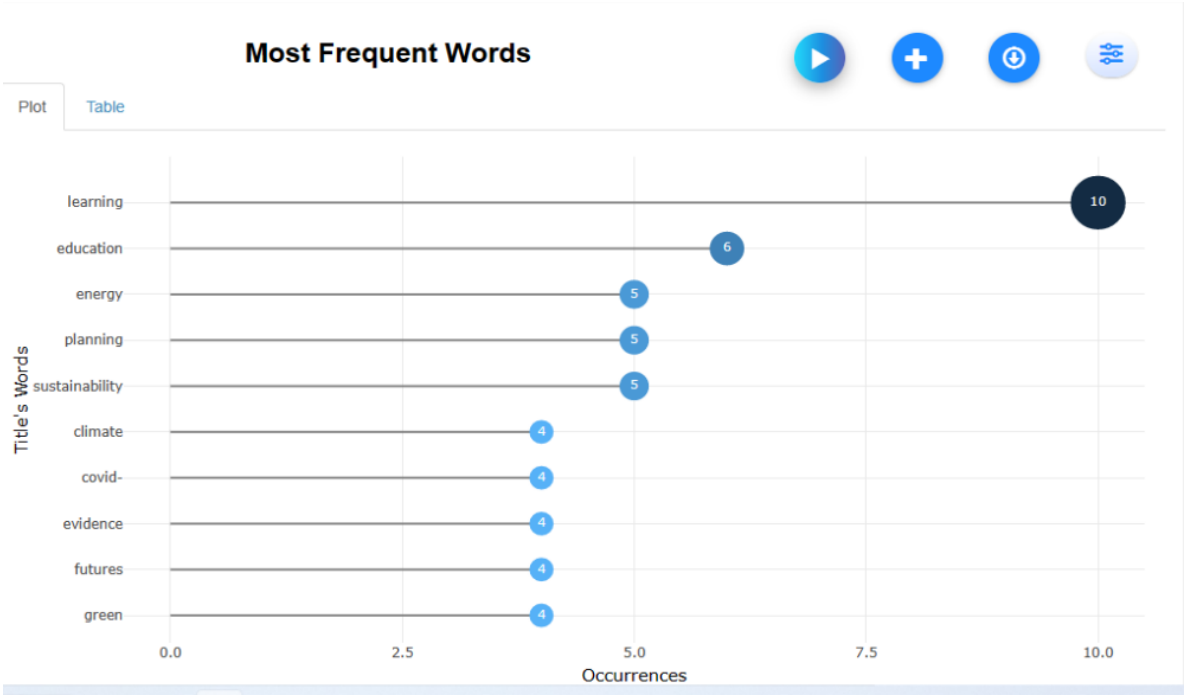
The analysis process in this study involved text analysis to evaluate the frequency of occurrence of certain words related to the theme "green economy for children." The text analysis results show that the frequency of word occurrence ranges from 4 to 10 times for the term "green economy for children." This

frequency variation indicates the diversity in using these words in the observed literature.

The word that appeared most frequently in this context was “Learn,” which appeared ten times. This shows that education and learning are central in discussions about the green economy for children. Other words that also achieved high frequency included “child” (six times), “energy,” “planning,” and “sustainability” (six times each). This highlights the focus on children's participation, energy resources, sustainability planning, and the overall theme.

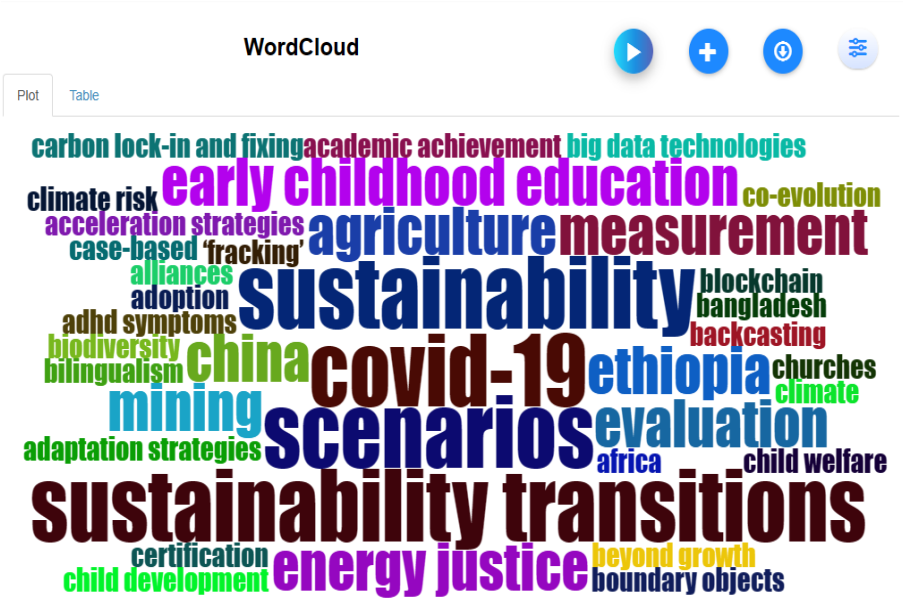
On the other hand, some words have a lower frequency of occurrence, namely four times. These words involve concepts such as “climate,” “covid,” “evidence,” “future,” “green,” “digital,” “state,” and “approach.” Even though they have a lower frequency, the presence of these words shows the diversity of topics in research related to the green economy for children.

Overall, the word frequency analysis provides an overview of the main focus and variations of themes found in the literature on "green economy for children." These results can provide deeper insight into frequently occurring keywords, guiding researchers in determining trends and research areas that may require further attention.



Cloud said

Words related to the theme "green economy for children" in the form of a word cloud are illustrations of words that appear from keywords from random word images of various sizes; the dominant word is located in the middle with a relatively larger size. From the documents collected in this research, there are Word Cloud results in the following image:



Based on the results of the Word Cloud images and tables, the most dominant words related to the theme "green economy for children" are sustainability transition, sustainability, COVID-19, scenarios, and early childhood education. The themes discussed are mostly related to green and economics, which mutually support each other in achieving green economics.

Words such as sustainability transition and sustainability emerged as dominant words in the context of "green economy for children." This reflects a focus on creating a sustainable and environmentally responsible economic system. These words indicate that the main discussion is related to how to apply the green economy concept as a whole to achieve sustainability goals.

COVID-19:

The sustainability of the green economy appears to be closely linked to the impact of the COVID-19 pandemic. These linkages may include how the pandemic affects consumption patterns, changes in green economy strategies in response to the crisis, or efforts to build a green economy as part of the post-pandemic recovery.

Scenarios and Early Childhood Education:

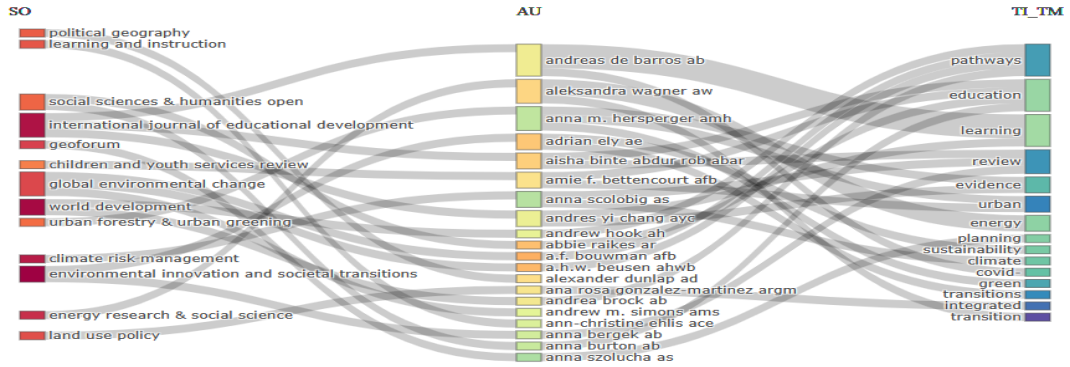
Words such as scenarios and early childhood education are in the spotlight. This shows that discussions about the green economy for children do not only include theoretical understanding or macro aspects but also discuss implementation and practical approaches, especially in early childhood education. Scenarios may refer to situations or models of change proposed in the context of a green economy.

Relationship Between Green and Economics:

The important point that emerges is the connection between the words green and economics, which support each other. This shows that discussions about the green economy for children consider environmental aspects and the economic implications of implementing sustainability principles. This linkage emphasizes that the green economy approach is designed to achieve harmony between economic growth and environmental preservation.

By analyzing the Word Cloud, it can be concluded that the discussion theme regarding the green economy for children includes key aspects such as sustainability transition, sustainability, response to COVID-19, scenarios, and early childhood education. Overall, the emphasis on the link between green and economics shows that this discussion encourages the application of green economic principles in achieving holistic sustainability goals.

Three Field Plot

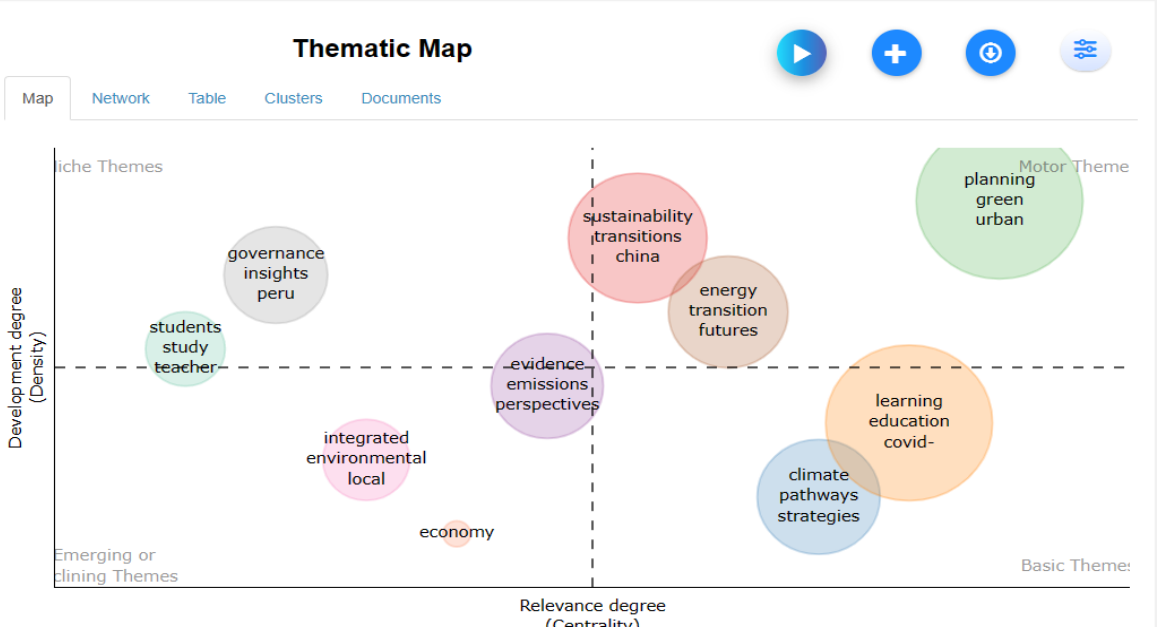


Three Fields Plot depicts three elements: a list of journal names, authors, and topics. These three elements are plotted with gray lines showing their relationship to each other, starting with the journal name, followed by the author, and each author is then associated with the publication topic. The size of each rectangle in each list indicates the number of papers associated with that element. The first element on the left is the journal. Thirteen journals indexed on the three-field plot have published papers on the topic "Economic Literacy Learning for Children," and the top journal that published the most papers on this topic is the International Journal Educational Development, which is depicted in a red box and is linked to several authors: Andreas de Baros AB, Andreas Yi Chang ayo and Aisha Binte Abdur.

The second element contains the author's name. Authors who publish articles in well-known journals related to the previous elements are Alexandra Wagner, who is related to energy and social sciences research. Each author is also associated with a frequently used keyword topic on the right. The top 20 authors are listed in this plot. The box size indicates the number of papers written by each author. In this plot, Andreas de Barros has the largest square.

Element the third contains keywords related to the topics that appear most frequently; each is associated with the author who published that topic. Thirteen keyword topics are listed, and the most frequently occurring keywords are “education” and “learning,” indicated by the size of the green box that dominates the other boxes. Additionally, this plot also displays several other keywords used.

Thematic Map



Based on the document's title with the theme of learning green entrepreneurship in children, the thematic map analysis is divided into four quadrants. First, the upper right quadrant displays motorbike theme topics or driving topics, indicating high density and centrality. The topics in this position are future energy transition, sustainability, transition planning, and green and urban planning, which must be developed by considering important topics for the future.

The top left quadrant shows that niche topics are specific and underrepresented, namely topics currently developing rapidly, namely the topic of governance insights and students: learning and teachers. The themes in this quadrant must be developed and have further potential. In the lower left quadrant are emerging or descending themes, namely old themes that increase or decrease with low centrality. The themes in this research are the environment, economics, evidence emissions, and an integrated perspective. The development of this topic is increasing.

The last one is in the lower right quadrant. This quadrant shows basic topics with high centrality but low density. This topic is an important general research topic: "learning, education, climate, strategies and pathways." There are many learning methods to strengthen children's character and understanding of the green economy by using innovative learning methods.(Bohak Adam & Metljak, 2022; J. Fang & Toole, 2023; Kulish & Cheng, 2023; Nordin & Malik, 2015; Nurastuti, 2019a; Sjöberg & Brooks, 2022; Srivastava, Oberoi, & Gupta, 2023).

Using innovative learning methods to understand the green economy is not only about providing knowledge but also forming the character and skills needed to face future challenges. By creating engaging and relevant learning experiences, children can become more effective agents of change in promoting sustainable practices.

Discussion

Green economy learning is an innovation in education that aims to equip the younger generation with a deep understanding of the close relationship between the economy, the environment, and sustainability. The main focus of this learning is to teach environmentally friendly and sustainable economic principles to children from an early age so that they can become agents of change who care about the environment. Green economy learning begins by forming a basic understanding of sustainability, product life cycles, and the impact of economic decisions on the environment. Through a structured curriculum, children are invited to explore how economic activities can be carried out without harming the earth.

Green economy learning focuses on technical aspects and educates on environmental values and ethics. Children are taught to consider the ethical impact of their economic decisions and how their small actions can contribute to sustainability. Green economy concepts, such as natural sciences, mathematics, and languages, are integrated into existing subject curricula. This helps create linkages between aspects of the green economy and learning that already exist in formal education contexts. Through mapping bibliometric analysis, researchers succeeded in exploring research opportunities that have the potential to be deepened in the context of "Green Economy Learning for Children (1996-2023): Current Status and Future Directions." The results of the bibliometric analysis present information organized into four quadrants, each reflecting various themes and topics that can become the focus of relevant and meaningful research.

First is the motor theme quadrant, which includes driving topics such as future energy transitions, sustainability, transition planning, green, and urban. These themes were identified as a crucial part of the sustainability research agenda, especially considering the urgency of future environmental and economic challenges. The research recommendation is to explore specific aspects of the energy transition, sustainability, and transition planning that may significantly contribute to understanding and future solutions.

Then, the special theme quadrant brings up governance, insight, and students, as well as learning

and teachers as the main focus. In this context, researchers see the potential to develop further research related to governance in the context of green economy learning, insights that can guide policy, and the role and involvement of students in sustainability efforts. Likewise, research on learning strategies and the role of teachers in integrating green economy concepts into the curriculum can be an important aspect to deepen.

The emerging or decreasing theme quadrants highlight several aspects, including the environment, economics, evidence emissions, and perspectives. This analysis provides an overview of the dynamics of the development of these issues during the period studied and can provide directions for further research. Understanding emerging or declining trends can help direct research attention to aspects requiring further focus.

Finally, the basic themes quadrant shows underlying themes such as learning, education, COVID-19, climate, strategy, and pathways. These themes provide a basis for further research and can provide a basis for formulating better strategies and policy pathways in the future.

From the results of this research, the themes recommended for further development are those related to the keywords governance, insight, students, learning, and teachers. In particular, further research on innovative learning models for children could contribute to understanding and applying green economy concepts in educational contexts. In conclusion, this mapping provides a comprehensive view of research trends and opportunities in Green Economy Learning for Children, guiding researchers and practitioners in determining meaningful and relevant future research directions.

4. CONCLUSION

The analysis revealed that future energy transitions, sustainability, transition planning, green, and urban represent four quadrants: the motor theme quadrant or driving topics. This topic must be developed considering topics that are important for the future. Specific theme quadrants are represented by governance, student learning, and teacher insights. The environment, economics, evidence emissions, and perspectives represent the emerging or decreasing theme quadrants. The basic theme quadrant is represented by the themes: learning, education, COVID, climate, strategy, and pathways.

The results of this research can be used as a reference for further research with the theme "green economic learning for children." Furthermore, bibliometric analysis can be developed with different software to obtain more comprehensive comparison results.

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