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A bibliometric analysis: Science education paradigm in a humanistic perspective

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ABSTRACT

The aim of this research is to analyze the development of publications related to science education in a humanistic perspective. The method used in this research is bibliometric analysis using the VOSViewer application. Publication data is collected using the Publish or Perish application to obtain article data in journals indexed by Google Scholar. Data was obtained for 180 relevant articles from 2020 to 2024, that's is because the author wants to see how big the development of educational research is, especially regarding humanistic-based science education after the Covid-19 pandemic. Of course, the development of learning strategies will feel much different after this pandemic. Therefore, it is hoped that this bibliometric analysis can become a reference in the development of a more relevant and comprehensive science education pattern. In 2020 there were 79 articles, in 2021 there were 29 articles, in 2022 there were 47 articles, and in 2023 there were 17 and in 20204 there were 8 articles. The research results show that there has been research development related to Science Education in a Humanistic Perspective. Topics that have recently been frequently discussed apart from the keywords used in searches are humanistic approach, science education, humanism, curriculum and contextual learning. However, there are several topics, such as sustainability, scientific literacy, science integrations, and the nature of science which are still rarely discussed, so they can become material for other researchers to develop research based on these topics.

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INTRODUCTION

Education is a series of efforts to achieve educational goals, namely changing the behavior of students, whether moral, intellectual or social, towards maturity. Educational objectives are divided into three domains, namely cognitive, affective and psychomotor. These three domains must be integrated and connected to each other in order to create students who are intelligent, have good personalities and are skilled in managing daily life (Aryanto *et al* ., 2021).

The current Merdeka Curriculum, as part of education reform efforts in Indonesia, is designed to provide greater flexibility to schools and teachers in managing the learning process. The aim is to create an education system that is more relevant and responsive to student needs and the challenges of the times. This approach is in line with the principles of humanistic education which emphasizes holistic individual development. There was a tension, seldom addressed, between the liberal, humanistic science education (Matthews, 2024). Humanistic theory in implementing the

Independent Curriculum is one of the most abstract learning theories among existing learning theories, because this theory talks more about ideas about the most ideal learning rather than paying attention to what can be done in everyday life. Humanistic learning theory has the aim of humanizing humans (Aiman et al., 2024). Humanistic education views students as unique individuals with different potentials. Abraham Maslow's humanistic learning theory emphasizes the understanding that the learning process is an effort to develop individual potential to the fullest (Atikoh *et al.*, 2024). Then, when viewed from the other perspective, such as the humanistic existential perspective emphasizes the importance of existence, meaning of life, self-awareness, responsibility, freedom of choice, openness, and individual involvement in overcoming depression and anxiety (Nasution *et al.*, 2024).

Humanistic educational philosophy places more emphasis on aspects of educational values and goals, while humanistic educational psychology places more emphasis on aspects of student characteristics and development (Hartini, 2023). This emphasizes the importance of treating students as active subjects in the learning process, not just objects receiving information (Li *et al.*, 2023). Thus, education must focus on developing all aspects of the student's self, including cognitive, emotional, social and moral aspects (Pais *et al.*, 2024). Education plays a role in developing human potential, both intellectually, emotionally and spiritually. Therefore, education needs to be designed and implemented as well as possible in order to achieve its goals (Hartini, 2023).

Humanistic education is education that is humanistic in nature which provides space for the growth of awareness of human values and life. Social and spiritual values and focus on building the character of students (Holbrook *et* al., 2022). Humanistic education must of course be translated as an approach that involves all elements of education starting from policy makers, organizations, society, teachers and education staff, as well as students as the center of the educational universe (Hudaya *et al.*, 2020). Humanistic education recognizes the uniqueness of each student and prioritizes the development of students' full potential through a learning process centered on individual needs, interests and experiences (Agus, 2024).

The Independent Curriculum aims to create a learning environment that supports these principles. Through a more flexible and contextual approach, this curriculum allows teachers to adapt learning materials and methods according to students' needs and interests. This includes giving students the freedom to explore topics that interest them, encouraging active participation, and providing space for the development of creativity and critical thinking skills. Apart from that, the Merdeka Curriculum also integrates the values of the Pancasila Student Profile which includes aspects such as independence, mutual cooperation and social justice. Humanist educational manifesto of the twentieth century (Mochizuki et al., 2022). In this way, students are not only invited to achieve academic achievements, but also to become individuals with character, integrity and the ability to contribute positively to society. The need for a holistic humanistic and at the same time natural scientific description of a person's personality in modern psychology (Bilyk *et al.*, 2022).

In a humanistic education perspective, the Independent Curriculum is an important step towards more inclusive and holistic education. By providing space for the development of individual potential and creating a learning environment that supports diversity and independence, this curriculum is expected to create a generation that is not only intellectually intelligent, but also

emotionally and socially mature, and has a commitment to human values (Husnaini *et al.*, 2024). Then a humanistic potential is unleashed and intensified when the vision and the direction are personal and the functional is a secondary element whose aim is to serve best not just the tasks and concrete achievements but also the holistic, long-life personal and academic growth and wellbeing (Mincu *et al.*, 2024).

Bibliometric analysis allows researchers to conduct a very comprehensive literature review in a relatively short time. This helps build a strong theoretical foundation for new research in science education with a humanistic approach such as empathy, caring and the enhancement of 21st century skills. In addition, bibliometric analysis helps identify current trends in humanistic-based science education research. This allows researchers to see what topics are being widely researched, what methods are popular, and what gaps still need to be filled.

This research aims to critically describe science education from a humanistic perspective. It is hoped that the results of this research will provide a more comprehensive understanding of the educational philosophy perspective on humanistic educational psychology which is more comprehensive in science education in schools so that it is hoped that it will be useful for educators in designing and implementing education that is oriented towards optimally developing students' personal potential.

METHOD

The search for this article is limited to the 2020-2024 time period, this is because the author wants to see how big the development of educational research is, especially regarding humanistic-based science education after the Covid-19 pandemic. Of course, the development of learning strategies will feel much different after this pandemic. Therefore, it is hoped that this bibliometric analysis can become a reference in the development of a more relevant and comprehensive science education pattern.

This research uses bibliometric analysis methods. Bibliometric analysis techniques are used to find context, trends and other data drawn through qualitative interpretation based on the results of bibliometric data modeling (Donthu, 2021). Bibliometric analysis is a form of meta-analysis of research data to help researchers understand bibliographic content and analyze quotations from articles published in journals and other scientific works (Al Husaeni & Nandiyanto, 2022).

This research uses science mapping techniques to determine the relationship between research constituents such as the relationship between words, between authors and others (Widyaningsih et al., 2023). Then in this research *co-word* (text) analysis is used to present the relationship between the topics that want to be reviewed for the research objectives, namely science education, humanistic approach, curriculum development. The stages followed in this research are as shown in Figure 1. (Öztürk et al., 2024).

This research used *the Google Scholar database* which has a wider research coverage than Scopus or Web of Science based on the Iowa State University Library, in addition research searches were carried out using the *Publish or Perish application* (Widyaningsih *et al.*, 2023). The data findings are then saved in RIS format to be processed using bibliometric analysis with the VOSviewer version 1.6.20 application.

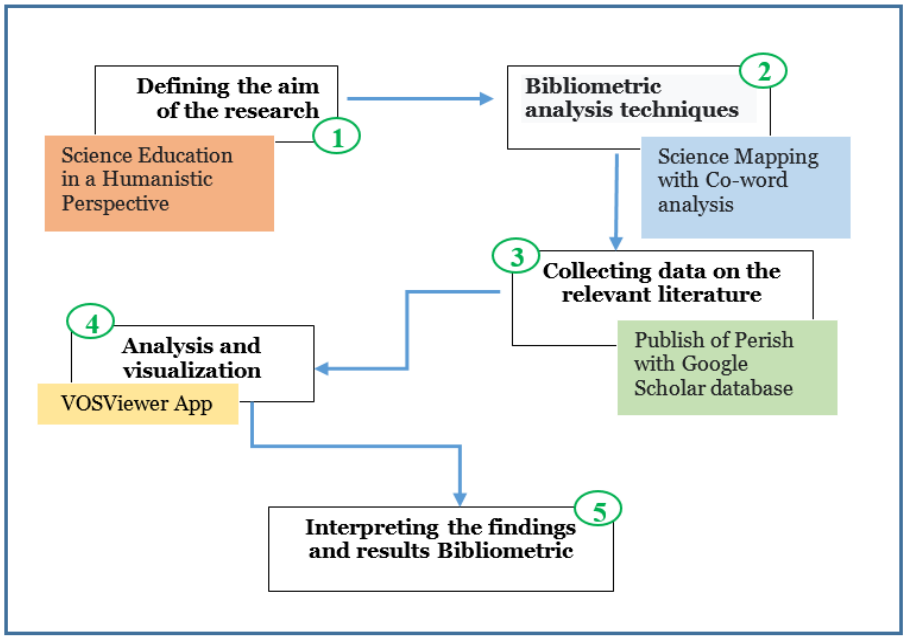


Figure 1. Research stages

RESULTS AND DISCUSSION

The author uses the *Publish or Perish application* with predetermined keywords. The data search results show that there are 200 articles related to the research theme from a search limit of 200 articles with a time span starting from 2020-2024. The author sorted several publications that did not meet the criteria, so that those included in the journal or article category totaled 180 publications that's display the journal reference as shown figure 2 (Lestari *et al.*, 2022). Then, the author saves the data in the Ris/RefManager file and enters it into the *VOSViewer application* (Sianipar. 2023).

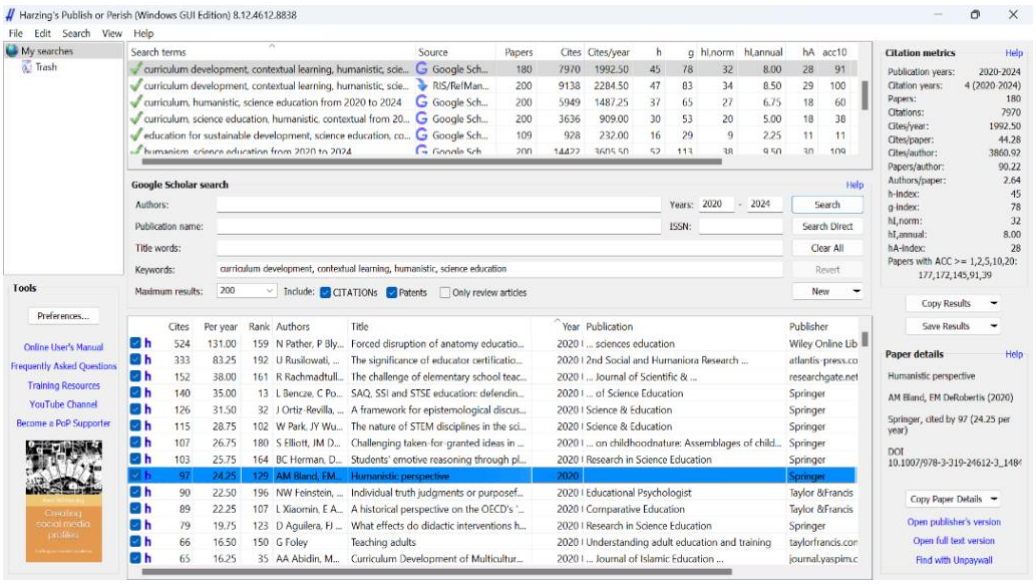


Figure 2. Search results using the *publish or perish application*

The following data are the results of searches from each year in the 2020-2024 period in relation to the development of science education publications in a humanistic perspective.

Table 1. Publication development of science education in a humanistic perspective

Year of Publication	Number of Publications
2020	79
2021	29
2022	47
2023	17
2024	8
Amount	180

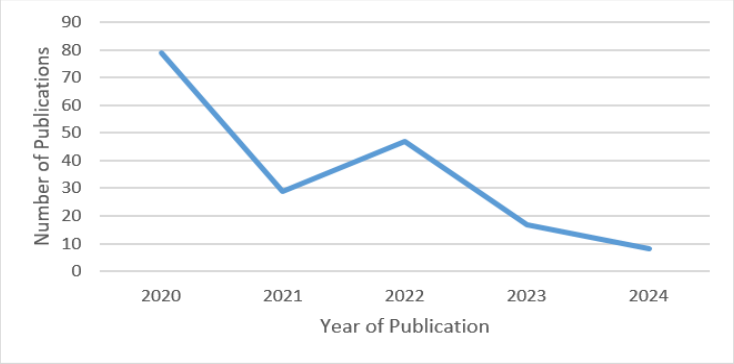
Table 1 shows the development of humanistic approach science education research and contextual learning in *Google Scholar indexed journals*. From 2020 to 2024, there are 200 article search and filtering restrictions. In 2020 there were 79 articles, in 2021 it decreased to 29 articles, in 2022 it increased to 47 articles, and in 2023 there was a drastic decrease to 17 articles, and in 2024 there are 8 articles which can still increase. It can be seen that there is a tendency for publications to decrease each year, this could be an indication that there is still the possibility to carry out more extensive research in the following year. Then, the metric data collected from *Publish or Perish*, as in the following Figure 3:

Figure 3. Results metric data

Citation metrics Help

Publication years:	2020-2024
Citation years:	4 (2020-2024)
Papers:	180
Citations:	7970
Cites/year:	1992.50
Cites/paper:	44.28
Cites/author:	3860.92
Papers/author:	90.22
Authors/paper:	2.64
h-index:	45
g-index:	78
hI,norm:	32
hI,annual:	8.00
hA-index:	28
Papers with ACC >= 1,2,5,10,20:	177,172,145,91,39

From this amount of research, it shows that research on science education from a humanist perspective continues to change.



Graph 1. Distribution of the number of publications in 2020-2024

Graph 1 provide information regarding Distribution of the number of publications in 2020-2024. In bibliometric analysis, several parameters for measuring research results are used. The size of the label circle shows a positive correlation with the appearance of the term in the title and abstract. The more often the term is found, the larger the label size (Nandiyanto & Al Husaeni, 2021). This research uses 3 types of mapping visualization which are used for analysis, namely overlay visualization (see Figure 3), network visualization (see Figure 4 and 5), density visualization (see Figure 6).

VOSViewer application is used to map the articles that have been collected. As a result of this mapping, 180 articles indexed by Google Scholar were grouped into 5 clusters, 34 items, 166 links, and 396 link strengths, which can be identified through the color of each node. First, cluster 1 is red. There are 9 items in this cluster, such as concept, contextual learning, discipline, humanistic education, implementation, paper, practice, problem and process. Second, cluster 2 is marked in green. There are 9 items in this cluster, such as application, challenge, higher education, humanistic approach, Indonesia, need, school, stem education, and theory. Third, cluster 3 is marked in dark blue. There are 6 items in cluster 3, such as anatomy, article, ethics, example, humanism and medical education. Fourth, cluster 4 is marked in yellow with 6 items, such as aspect, case, history, nature, nos, and science. Finally, cluster 5 is marked in purple with 3 items, such as art, scientific literacy, sustainability and technology.

Figure 3 shows the level of development of research on science education from a humanistic perspective over the last four years, from 2020-2024. In 2024, the number of article publications will still be less than in 2023, but there is still the possibility of increasing.

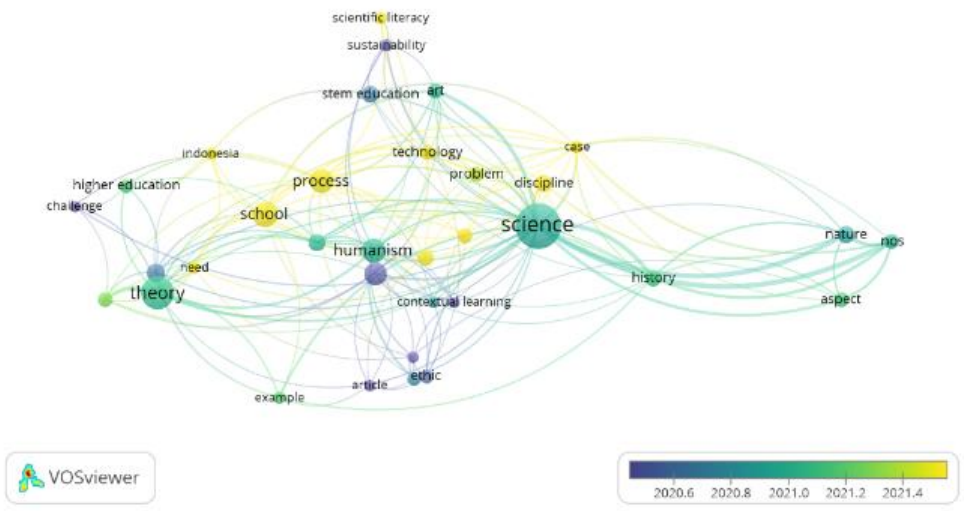


Figure 4. Overlay visualization of science Education in a Humanistic Perspective

Figure 4 shows a collection of interrelated terms in research on humanistic education in a humanistic approach. An interconnected network shows the relationships between terms in the research. The research on science education in the humanistic approach and contextual learning is found in 3 main clusters, namely science which is in cluster 4 with a total of 29 links, total link strength of 138, and occurrences of 62. The humanistic approach is in cluster 3 with a total of 17 links, total link strength 31, and occurrences 20. Contextual learning contained in cluster 1 total links 8, total link strength 10, and occurrences 5.

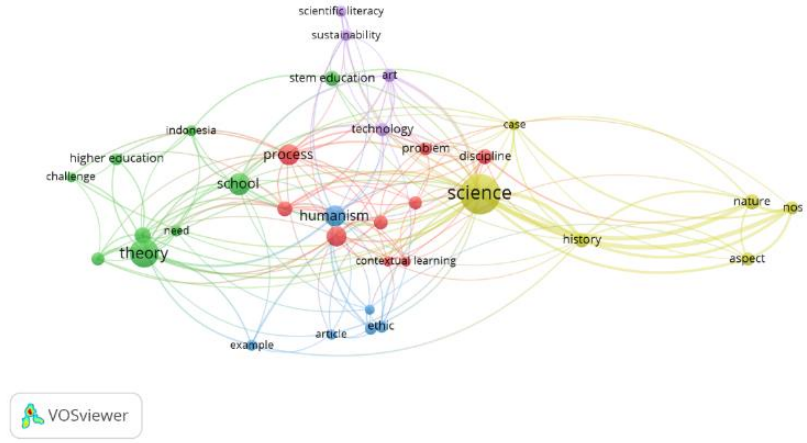


Figure 5 . *Network visualization* of science education from a humanistic perspective

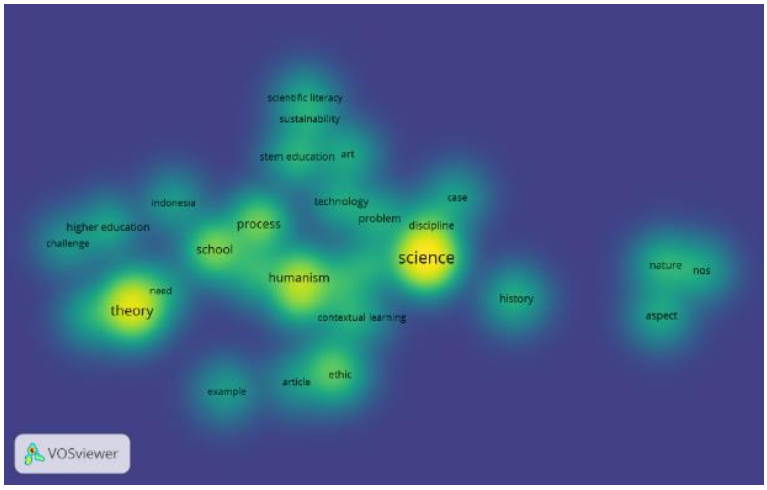


Figure 6. *Density visualization* of science

In density visualization figure 5, if the color of the density becomes brighter and more detailed, then a lot of research has been discussed on the topic. Meanwhile, if the color of the density fades, this indicates that there is still little or rarely research on this topic (Holbrook et al., 2022). Visualization colors that fade or become smaller mean that research is rarely carried out, for example on the items scientific literacy, humanism, contextual learning and nature of science (NOS). This topic could be the next research solution in relation to science education with a humanistic approach.

There are several things that must be considered in applying humanistic theory to learning activities, namely: 1) creating a warm impression at the beginning of learning activities, 2) providing a general overview regarding their goals in carrying out learning activities, 3) providing teaching materials that make it easier for them to learn independently, 4) teach each student to always be open to receiving criticism and suggestions, 5) teachers can participate in interactions if the learning atmosphere is under control (Muqarrobin. 2021). Then, the development of humanistic literacy can be carried out in science learning. This can be done through leadership, cultural maturity, communication, collaboration, creativity, critical thinking and entrepreneurship (Dewi *et al.*, 2024). Other research also states that a humanistic approach can be combined with STEM in science lessons at school (Gleason, 2020). European Humanistic Principles in the curriculum as a political strategy

to present educating the younger generation to be more in tune with the realities of life, and encouraging them to act as informed citizens (Kushner, 2023). In the context of learning leadership in schools, the principal has the authority to change the educational unit curriculum to be more humane. The humanistic approach taken by the principal is supported by personal excellence and inspired by spirituality an inspiring, humanist figure. The superiority of a leader is shown by his openness in accepting other people , transparency within himself managing education, empathy and respect for others, involving others in decision making, and accepting input and suggestions from others (Rustan *et al.*, 2020). And then students are expected to have the six basic literacy skills (numeracy, scientific literacy, information literacy, financial literacy, cultural literacy, and citizenship) and other skills such as thinking critically, reasoning, being creative, communicating, collaborating, having problem-solving skills, and most importantly, having curiosity, initiative, persistence, adaptability, leadership, and social and cultural awareness (Tavares *et al.*, 2022).

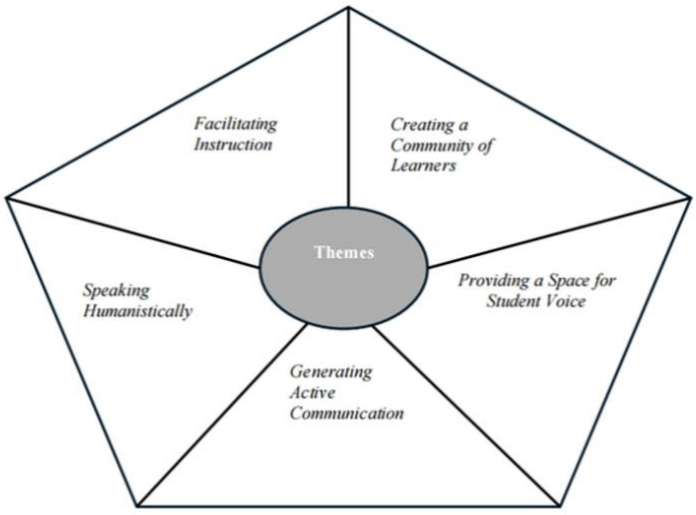


Figure 7. *The visual thinking strategies* (VTS) in humanistic education

At the figure 7, that on of way strategy humanistic learn in education that the practice of Visual Thinking Strategies (VTS) lent itself to the development of a humanistic approach to teaching. In describing how that approach marked a shift away from previous practices, the following five themes emerged among student responses: (1) Facilitating instruction; (2) Creating a community of learners; (3) Providing a space for student voice; (4) Generating active communication; (5) Speaking humanistically (Connors and Jody S. Piro, 2024). Separately too, if seen from a psychological point of view, that is core characteristics of humanistic psychology's approach find that's humanistic psychology's empirical epistemological underpinning to emphasize (a) the confluence of the a priori and a posteriori; (b) the qualitative structure of knowledge; (c) formative meaning bestowal; (d) situated knowing; (e) intentional, presentational grounding; (f) imaginative presence to phenomena; (g) intuitive insight into essences; and (h) bracketing the naturalistic assumptions of positivistic empirical psychology (DeRobertis, 2021). Another alternative for implementing humanistic learning is through "Two-Eyed Seeing" (TES) offers perspective that recognises complementary 'whole truths'—one based on evidence-based rigour and the other based on the intuition-based interpretation of experiences of persons in communities. This gift of multiple perspectives is not

merely conceptual but serves as a practical way of exploring research directions that take into account both scientific knowledge and the humanistic dimensions of education (Zayer, 2024).

Based on these research findings, several implications that can be applied in science learning practices are 1) Student-centered learning: Teachers need to create a learning environment that allows students to be actively involved in the learning process, both individually and in groups. 2) Utilization of various learning resources: The use of various learning resources such as experiments, discussions, and case studies can help students understand science concepts better. 3) Integration of humanistic values: Teachers can integrate humanistic values such as concern for the environment and society into science learning. 4) Authentic assessment: Assessment does not only focus on the final result, but also on the learning process and student development.

CONCLUSION

This research is an assessment of the Google Scholar indexed database to determine trends in science education research in a humanistic perspective using descriptive and bibliometric analysis. Vosviewer is used to help analyze data and visualize the required information. The results of this analysis show that there has been a fluctuation in the number of publications in education from 2020 to 2024, but there has been an increase in the number of publications in recent years, so that interest in the study of science education from a humanistic perspective is increasing. The researcher assumes that based on the analysis of the results of the network structure, this research shows trends in education in the future, namely sustainability , scientific literacy, science integrations , and the nature of science which will be interesting research material in the future.

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