



Bibliometric Analysis: Trends in the Last 10 Years of EPA Method Implementation (Exploration, Introduction, and Application of Concepts) in Education

Nur Azizah*

Departement of Natural Science Education , Universitas Lambung Mangkurat,
South Kalimantan, Indonesia

Muhammad Fajar

Departement of Natural Science Education , Universitas Lambung Mangkurat,
South Kalimantan, Indonesia

Pramita Dwi Rahmati

Departement of Natural Science Education , Universitas Lambung Mangkurat,
South Kalimantan, Indonesia

Syubhan Annur

Departement of Natural Science Education , Universitas Lambung Mangkurat,
South Kalimantan, Indonesia

Muhammad Fuad Sya'ban

Departement of Natural Science Education , Universitas Lambung Mangkurat,
South Kalimantan, Indonesia

*Correspondence author: 2210129120006@mhs.ulm.ac.id

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Abstract:

This research aims to investigate research trends in the implementation of the EPA Method (Exploration, Introduction, and Application of Concepts) through bibliometric analysis based on the Google Scholar (GS) database in the field of education over the last 10 years. The database was reviewed using Harzing's Publish or Perish on October 14, 2024. The method used was a quantitative method with a descriptive bibliometric approach. The results of the bibliometric analysis show a significant increase in the number of publications examining this method in the last 10 years, with varying increases each year, indicating high academic interest in approaches to exploration, introduction, and application of the concept. In addition, visual analysis using VOS viewer shows a map of the relationships between various terms related to the EPA Method. The increasing number of publications and academic attention shows that the exploration, introduction, and application of concept approaches are relevant to today's educational needs. Therefore, researchers and educational practitioners are expected to utilize these findings to design more effective, innovative, and contextual learning strategies according to the characteristics of learners.

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Introduction

Amidst the rapid growth of scientific publications in education, researchers and stakeholders face increasing challenges in filtering, understanding, and charting the overall research direction. Traditional literature reviews are often limited in processing large volumes of data. Therefore, bibliometric analysis has become essential as it provides a comprehensive picture of trends, contributions, and research gaps in education literature systematically and measurably (Cebral-Loureda et al., 2022; Dervis, 2019; Rahmah, 2022).

This analysis is also invaluable in shaping policy and strategic planning in education. By identifying the most productive researchers, leading journals, and emerging topics, bibliometric studies provide a solid foundation for institutions, governments, and academics to determine future research directions, design professional development programs, and allocate resources more effectively (Triansyah et al., 2023; Alsharif et al., 2020; Rochman, 2024).

Furthermore, in the ever-evolving field of education influenced by social and technological dynamics, bibliometric analysis enables the evaluation of research performance and collaboration among researchers and institutions. This contributes to increased transparency, accountability, and the formation of academic networks that support learning innovation, curriculum development, and education policies that are more responsive to current and future needs (Annur et al., 2024; Kokol et al., 2021; Wahyudi, 2024).

Bibliometric analysis is a statistical method to evaluate scientific publications and determine trends, contributions, and knowledge gaps in a particular field. By considering the characteristics and progress of a particular discipline, bibliometric indicators can provide a higher level of development of the discipline. Two main components affect the reliability of bibliometric indicators: database selection; this includes the number of bibliometric databases, some multidisciplinary, and other factors relevant to a particular field (Muhammad & Juandi, 2023; Utami & Karlina, 2022; Lestary et al., 2023). With technological advancements and the increasing number of publications, this analysis has become more popular as it can explore and analyze large amounts of scientific data with the help of software. Descriptive bibliometric analysis illustrates the characteristics of literature and is divided into two main techniques: performance analysis and mapping (Lestary et al., 2023; Djalal, 2017; Rasto et al., 2023).

The main objectives of bibliometric analysis are to: (1) obtain an overview of research trends, (2) identify knowledge gaps, (3) generate new ideas for further research, and (4) map scientific contributions (Marwantika, 2022; Djalal, 2017; Soniyatul Ummah et al., 2023). One of the main tools in this analysis is Google Scholar, which functions as a search engine for scientific literature in various formats and disciplines, such as journals, books, theses, and conference articles (Khairiyah & Marlina, 2022; Destari, 2023; Wahyudi, 2024; Kanaya, 2023). Google Scholar filters search results from trusted sources such as universities, libraries, and scientific journals, making it a primary choice for students seeking valid references.

In the context of education, education is the process of developing intellectual and emotional capacities to interact with nature and humanity. It aims to develop

students' potential ([Samsuri, 2021](#); [Kaniawati et al., 2023](#); [Triwiyanto, 2024](#)). Education is also an interaction process between individuals and their environment, resulting in change and development.

One way to improve education quality is by selecting appropriate learning methods. There is no single best method; each has its strengths and weaknesses ([Hazzah et al., 2024](#); [Djalal, 2017](#); [Samsuri, 2021](#)). Therefore, teachers must be able to choose methods that suit the characteristics of students and the subject matter.

The EPA method (Exploration, Introduction, and Concept Application) is a learning approach that considers students' prior knowledge. This method consists of three stages: exploration (identifying problems and prior knowledge), concept introduction (experiments for problem-solving), and concept application (solving problems and applying them to real-life situations) ([Hazzah et al., 2024](#); [Susisusanti et al., 2022](#); [Samsuri, 2021](#)). Process skills are important because children can understand abstract concepts through concrete situations.

This paper aims to map global research trends related to the EPA Method using bibliometric analysis. The method involves searching for journal article metadata through Google Scholar using Harzing's Publish or Perish software. The obtained data is then analyzed using VOSviewer through several stages: (1) searching for articles with the keywords "Exploration," "Introduction," and "Concept Application," (2) saving metadata in CSV format, (3) analysis using VOSviewer, and (4) visualizing results in the form of a bibliometric map ([Lestary et al., 2023](#); [Muhammad & Juandi, 2023](#); [Rochman, 2024](#)).

According to [Cebral-Loureda et al \(2022\)](#), bibliometrics analyzes author data, keywords, references, publication years, and sources. [Rahmah \(2022\)](#) adds that bibliometrics can enhance the ranking of research institutions and evaluate scientific citations. Therefore, this approach is highly relevant in assessing the development of specific learning methods, including the EPA Method ([Damar, 2021](#); [Kokol et al., 2021](#); [Rochman, 2024](#)).

Based on the above explanation, it can be concluded that bibliometric analysis is an effective method for assessing the development of educational research, particularly the global trend of applying the EPA Method ([Muhammad & Juandi, 2023](#); [Triwiyanto, 2024](#); [Soniyaatul Ummah et al., 2023](#)).

The application of the EPA method not only improves students' conceptual understanding but also promotes active student engagement in the learning process. This aligns with the constructivist approach, where students build their knowledge through direct experience and interaction with their environment. Thus, learning becomes more meaningful and contextual ([Susisusanti et al., 2022](#); [Hazzah et al., 2024](#); [Soniyaatul Ummah et al., 2023](#)).

In addition, this method also plays a role in developing critical thinking and problem-solving skills, as students are actively involved in formulating problems and finding solutions through experiments. This is essential in preparing students to face 21st-century challenges that require higher-order thinking skills ([Samsuri, 2021](#); [Rochman, 2024](#); [Triwiyanto, 2024](#)).

In the global context, implementing the EPA method can also be adapted to various countries' curricula and educational cultures. This flexibility makes it worthy

of analysis from a bibliometric perspective to understand its dissemination and impact on student learning outcomes worldwide (Annur et al., 2024; Alsharif et al., 2020; Djalal, 2017).

With the growing attention to *active* learning approaches and competency development, studies highlighting the EPA method have also shown an increasing trend. Therefore, bibliometric analysis becomes a highly relevant tool for mapping the dynamics of such research while also serving as a reference in educational policy-making and curriculum design based on scientific evidence (Djalal, 2017; Destari, 2023; Marwantika, 2022).

Research Method

The method used in this research is quantitative with a descriptive bibliometric approach. The information obtained from this study was obtained through a search using Google Scholar software in Harzing's Publish or Perish, which amounted to 100 scientific publication databases; then, the database obtained was analyzed using bibliometric analysis. Google Scholar is a website used to dig up information or databases at national and international levels. This study used the VOSviewer software application to manage and visualize data originating from the Google Scholar database. The population of this research is scientific publications on the EPA Method (Exploration, Introduction, and Application of Concepts) worldwide that Google Scholar indexes. The years 2014 to 2024 are when researchers collect metadata about the EPA Method. The data is a CSV file extension, or RIS, and is analyzed using VOSviewer. VOSviewer is an application that provides a web interface to facilitate the use of bibliometrics (Muhammad & Triansyah, 2023). This supports academics in facilitating the use of the main features of bibliometrics. Some of the features found in VOSviewer are 1) Creating a visual map in the form of a visualization of the author or keyword network, 2) Data importing can be via Web of Science, Open Alex, PubMed, CSV, RIS files, and others, 3) Visual displays can be in the form of network visualization, overlay visualization, and density visualization, 4) Co-citation and Bibliographic Coupling Analysis (Muhammad & Triansyah, 2023).

Bibliometric Analysis: Trends in the Last 10 Years ...

Google Cendekia Eksplorasi, Pengenalan, Aplikasi Konsep

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2014 — 2024
Telusuri

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... adalah metode EPA (**Eksplorasi Pengenalan**, dan **Aplikasi Konsep**) merupakan metode yang ... melewati tiga tahap yaitu tahap **eksplorasi**, tahap **pengenalan**, dan **aplikasi konsep** ...

Figure 1. Keyword data search from Google Scholar

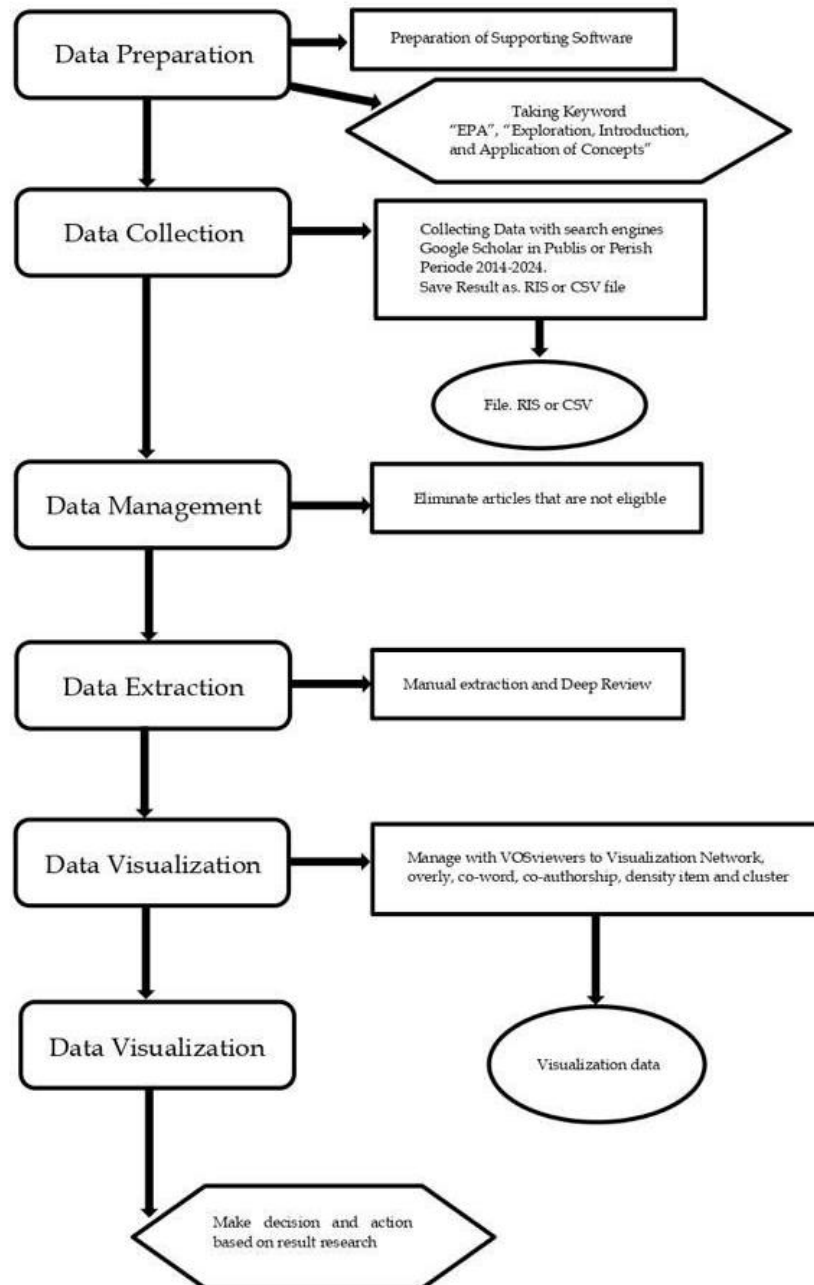


Figure 1. Research Step Chat Based on the Topics

Results and Discussion

Figure 2 shows the number of studies related to the EPA Method based on the Google Scholar database from 2014 to 2024.

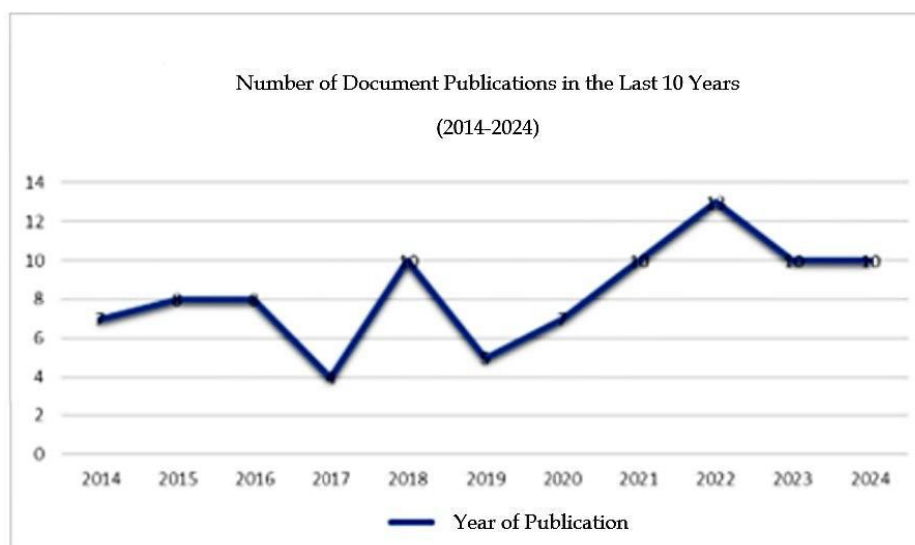


Figure 2. EPA Methods Research Trends

The total number of Google Scholar search documents related to the EPA method throughout 2014-2024 amounted to 92 documents that were widely distributed and openly accessible. Based on data from Google Scholar, the number of publications on the EPA method from 2014 to 2024 showed variation, with several years experiencing a significant increase. Based on the trend line of this data, the number of documents related to the EPA method in the Google Scholar database will still experience a moderate increase in the next three years. The 2014–2024 time span selection in this study was based on recording medium-term developments in literature. This span is considered relevant because it covers the period before, during, and after the COVID-19 pandemic, which has influenced the direction of research and learning practices at various levels of education. Thus, the analysis results provide a comprehensive picture of the position and development of the EPA method in current educational studies. Overall, these results illustrate that the EPA method occupies a significant position in contemporary educational discourse, especially in developing learning models that explore, predict, and actively apply concepts by students. Table 1 is a research data metric that uses Harzing's Publish or Perish with the Google Scholar database.

Table 1. Research Data Metrics

Data Metrics	Information
Publication years	2014-2024
Citation years	10

Papers	100
Citations	2369
Cites/year	236.69
Cites/paper	23.69
Cites/author	1266.58
Papers/author	62.20
Author/paper	2.12
h-index	18
g-index	48
hI,norm	15
hI,annual	1.50
hA-index	10

Source: Output *Harzing's Publish or Perish*, 2024.

Table 1 above presents research data such as the publication year range 2014-2024, with 10 years calculated for citations. The data includes 100 scientific articles with 2369 citations, an average of 236.69 citations per year, and an average of 23.69 citations per article. The average citation per author reaches 1266.58, while each article has an average of 62.20 authors, with the number of authors per article around 2.12. The h index is at 18, while the g index reaches 48 hI, the norm is 15, while the hI annual is 1.50. The hA index is at 10. Considering the number, distribution, and influence of citations and the number of authors involved, this data provides a comprehensive picture of the impact and productivity of research-related scientific work.

Table 2. Top Five Most Active Authors Based on Google Scholar

No	Writer	University	Country	Total
1	Prasetyo	UNY	Indonesia	3
2	Susisusanti	STIKIP BIMA	Indonesia	1
3	Wirahmad	STIKIP BIMA	Indonesia	1
4	Mulyasih	UPI	Indonesia	1
5	Hazzah	UMMAT	Indonesia	1

Based on data from Harzing's Publish or Perish In the Google Scholar section (Table 2), Prasetyo from Yogyakarta State University leads with three articles. Followed by Susisusanti, Wirahmad, Mulyasih, and Hazzah, with 1 article each.

Table 3. Top Five Authors With the Most Citations Based on Google Scholar

No	Writer	Source	Number of Citation
1	Mawaddah (2015)	EDU-MAT: Journal of Mathematics Education	674
2	Deliany et al. (2019)	Educare	164
3	Budiana et al. (2015)	Dharmakarya: Journal of Science and Technology Applications for Society	159
4	Nismalasari et al. (2016)	Edu Sains: Journal of Science and Mathematics Education	119
5	Panjaitan (2018)	Math Education Nusantara Journal	73

Table 3 shows the five authors with the highest citations in Harzing's Publish or Perish in the Google Scholar section. In general, the journals cited from 2014-2024 can be seen in Table 3, namely Mawaddah (674), Delaney et al. (164), Budiana et al. (159), Nismalasari et al. (119), and Panjaitan (73). Table 4 shows the journals that published the most documents related to the EPA method from 2014 to 2024.

Table 4. Top Three Journals Most Published Documents Related to EPA Methods Based on Google Scholar

No	Publication	Number of Documents Published
1	DIKSI: Journal of Educational and Social Studies	2
2	JMM: Journal of Independent Society	2
3	TPACK-IPA Journal	2

Based on the table 4, sourced from Google Scholar, three journals publish the most documents related to the EPA Method, namely DIKSI: Jurnal Kajian Pendidikan Dan Sosial, JMM: Jurnal Masyarakat Mandiri, and Jurnal TPACK-IPA, with two documents each. These journals play an important role in disseminating studies on the EPA method, which shows that this topic has received attention in various fields, such as education, community development, and technology integration in learning. Publications in these journals show their contribution to supporting the development and understanding of the implementation of the EPA method in various academic and practical contexts.

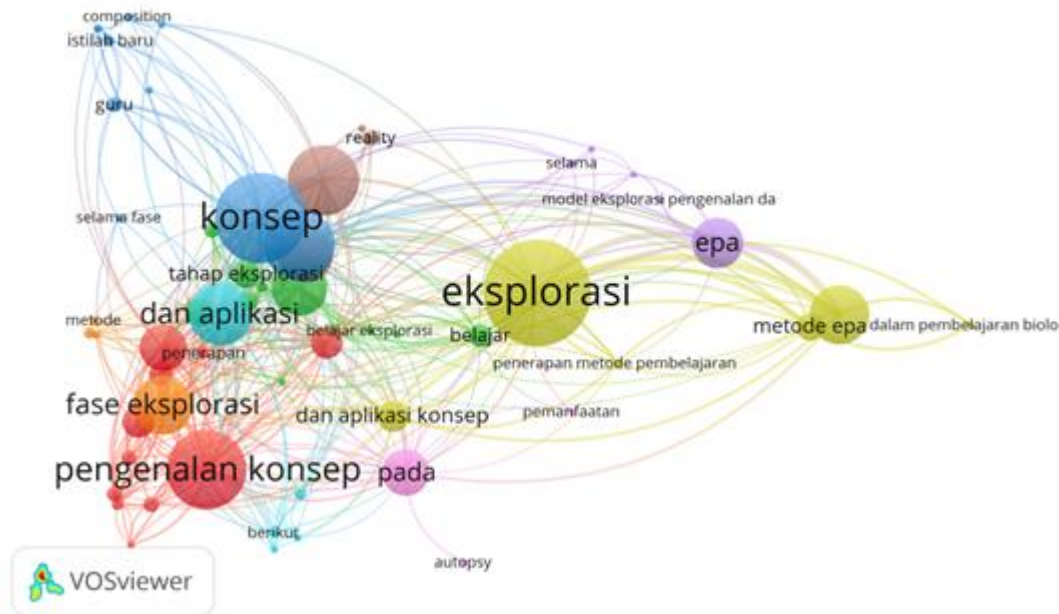


Figure 3. Network Visualization

Source: Processed Data, 2024

Based on Figure 3, it can be seen that different colors indicate several clusters. These clusters describe themes or topics that often appear in literature reviews. According to the color and distribution of the dots, there are at least three main clusters used, namely:

1. Yellow Cluster: This Cluster is concentrated on aspects related to the word "exploration" in the article, such as "learning," "application of learning methods," and "exploration phase."
2. Blue Cluster: Focus on this Cluster related to the word "concept" in the article, for example, "concept introduction," "exploration findings," and "understanding."
3. Brown Cluster: This Cluster looks smaller and shows other words related to the word "application" in the article, such as "reality," "implementation," and "model."

The bibliometric analysis results show that two main themes dominate and are intertwined in the literature review analyzed: the exploration of learning and the development of conceptual understanding. The theme of exploration in learning is powerfully illustrated through the frequency of occurrence of terms such as "exploration stage," "learning," and "application of learning methods," which indicates that the exploration-based learning approach is still the primary concern of researchers in the field of education. This indicates a strong drive to create learning that emphasizes the active involvement of students. On the other hand, implementing or applying concepts into the real world does not seem to get a balanced portion. This can be seen from the smaller and more scattered clusters, such as the brown Cluster, which contains terms such as "reality," "implementation," and "model." Although the

number is smaller, the emergence of these words indicates a growing interest in bridging conceptual understanding with applied practice.

Further research recommendations should focus more on implementation studies, such as how exploratory or concept-based models can be applied in real-world contexts, such as classrooms, out-of-school education, or even teacher training programs. Moreover, studies can be directed to designing integrated learning models that include exploration and understanding of concepts and the application and resolution of real problems.

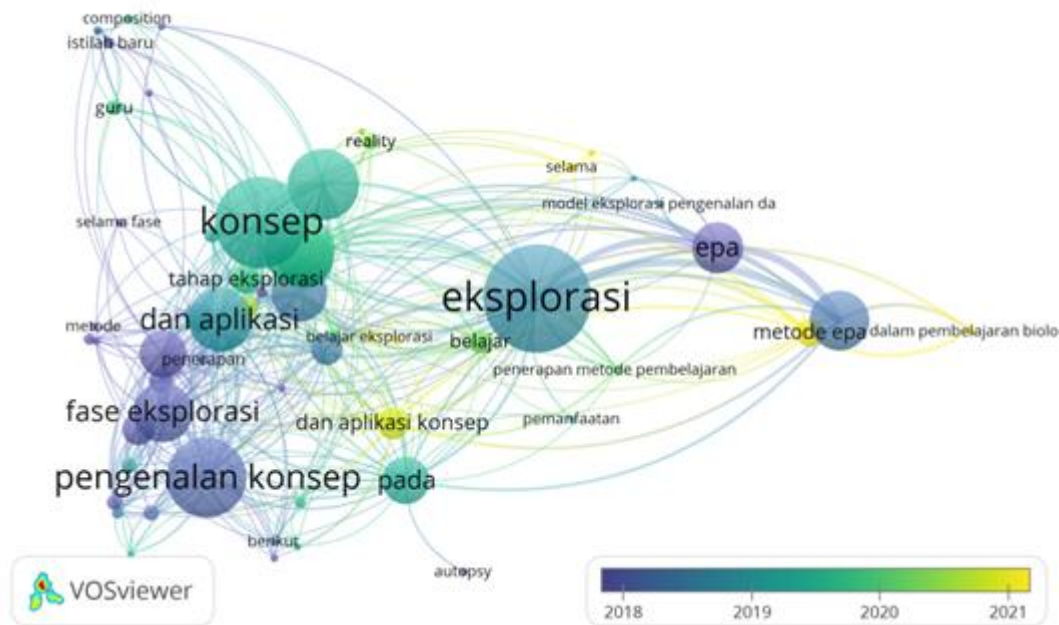


Figure 4. Overlay Visualization

Source: Processed Data, 2024.

The image above shows a map of the word network with color-coded years used to analyze research over time. The color scale at the bottom right of the image ranges from 2018 (dark blue) to 2021 (yellow). The color of the dots in this network indicates the year in which the words became most frequent in the scientific literature.

1. Words in dark blue (2018): Words in dark blue indicate the oldest year in the data, appearing to be spread almost throughout the network. This shows the connectedness of words such as “concept introduction,” “exploration phase,” “EPA,” and “methods,” which were the topic of recent research at that time.
2. Words in green-blue (2019-2020): Words in green-blue indicate the addition of connected words over time. These words include “concept,” “exploration,” “learning,” and “exploration stage.”

Words in yellow (2021): Words in yellow indicate the most recent year in the data and appear to be relatively new to the network. This suggests that words like “epa method” and “concept application” are still relatively new to this scientific research.



Figure 5. Density Visualization

Source: Processed Data, 2024.

The density visualization in the image presented identifies several research opportunities. Words like “concept” and “exploration” appear central within the bibliometric network, indicating their foundational role in current and future research. Meanwhile, more specific terms like “EPA method” and “concept application” suggest emerging focus areas and efficient implementation in educational settings.

These findings suggest that the EPA method remains a promising and evolving topic within educational research. The prominence of core concepts highlights their influence in shaping learning models and instructional strategies ([Al Sharif et al, 2020](#)). At the same time, the growing attention to more targeted keywords indicates increased interest in applying the EPA method to real-world classroom practices. Therefore, it is recommended that future studies delve deeper into the practical applications of the EPA method across diverse educational contexts, such as science learning, inquiry-based instruction, and digital learning environments ([Dervis, 2019](#)). Researchers are encouraged to conduct classroom-based investigations or action research to assess how this method affects student engagement, conceptual understanding, and higher-order thinking. Strengthening inter-institutional collaboration and publishing findings in international academic platforms can also enhance the visibility and impact of EPA-related research ([Hazzah, 2024](#)). Continued bibliometric monitoring is advised to trace research dynamics and identify new thematic directions in this field.

Conclusion

The EPA method allows educators to carry out learning activities considering students' initial abilities before providing further information. The rapid development of research on the EPA method (Exploration, Introduction, and Application of Concepts) requires further study to understand how this research has developed from year to year using bibliometrics. The results of the bibliometric analysis show a significant increase in the number of publications examining this method in the last 10 years, with varying increases each year, indicating high academic interest in the exploration, introduction, and application of the concepts approach. The most productive author based on Google Scholar is Prasetyo from UNY Indonesia, while the author with the most citations is Mawaddah, with 674 citations. In addition, visual analysis using VOSviewer shows a map of the relationship between various terms related to the EPA Method, such as exploration, introduction, and application of concepts, indicating that this method is adapted to various educational contexts. The results of this study provide an overview that the EPA Method has excellent potential to continue to be developed and applied in various learning contexts in Indonesia. The increasing number of publications and academic attention shows that the exploration, introduction, and application of concept approaches are relevant to today's educational needs. Therefore, researchers and educational practitioners are expected to utilize these findings to design more effective, innovative, and contextual learning strategies according to the characteristics of learners.

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