

Research Article

Analysis Scopus Article on Phenomenon-based Learning Through Bibliometric Analysis

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Abstract.

A bibliometric analysis is conducted for a scientific paper in Scopus databases about phenomenon-based learning, focusing on studies related to the use of phenomenon-based learning (PhenoBL) in learning at elementary, secondary, and higher education. The research purposes were 1) To analyze the results of bibliometric mapping visualization on research trends in phenomenon-based learning and its contribution to science learning. 2) To analyze author collaboration on research trends in phenomenon-based learning. 3) Recommendations for future phenomenon-based learning in science learning. In this research, the descriptive method is applied with a bibliometric approach. As much as 324 data were obtained through the Scopus databases published from 2012 to 2021. The study was carried out using R studio and the Bibliometrix R package. The results showed that phenomenon-based learning made a significant contribution to learning in elementary, secondary, and higher education. Phenomenon-based learning can be integrated with learning innovations in schools and can also train/improve students' thinking skills. Phenomenon-based learning also dominates the social sciences.

Keywords: scopus article, phenomenon-based learning, bibliometric analysis

1. INTRODUCTION

Indonesia is a nation characterized by its abundant natural resources and distinctive natural phenomena [1]. Indonesia is situated in a geographically advantageous position, positioned between the continents of Asia and Australia, as well as the Pacific Ocean and the Indian Ocean. As a result, Indonesia possesses a diverse range of captivating natural phenomena that warrant further investigation and scholarly examination.

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Indonesia offers a unique opportunity for students to engage with science learning concepts in a contextualized manner, thanks to the presence of various natural phenomena. Phenomenon-based learning has emerged as a prominent area of emphasis in educational advancement, particularly within the realm of natural sciences and physics education. This approach aims to incorporate authentic experiences, empirical observations, and investigations of natural phenomena within the educational framework. This pedagogical approach fosters the cultivation of enhanced comprehension of scientific principles and the cultivation of critical thinking abilities among students.

Science education, encompassing disciplines such as Physics, chemistry, and biology, plays a crucial role in equipping students with the necessary skills to address societal challenges in a socially aware, analytical, and imaginative manner. The acquisition of scientific knowledge entails more than mere rote memorization of concepts, principles, laws, and theories. It also necessitates the cultivation of a scientific mindset through the practice of critical analysis and re-evaluation. Science is an academic discipline that focuses on the systematic investigation and understanding of the natural environment. In the pursuit of scientific knowledge, it is imperative to establish a conducive and favorable environment. Based on empirical evidence, it can be observed that students' proficiency in applying scientific concepts to their daily lives remains inadequate. Hence, it is imperative for educators to possess the ability to integrate contextual factors, such as natural phenomena, into the science instructional framework. The field of science education encompasses curricula and instructional strategies that extend beyond their dissemination of theoretical knowledge and factual information, aiming to enhance the educational significance of the subject matter. Phenomenon-based learning, when integrated with scientific knowledge, facilitates students' acquisition of factual information and understanding of social phenomena.

This study provides a comparative overview of the current state and pattern of Phenomenon-Based Learning research. This study presents a bibliometric analysis of publications on Phenomenon-Based Learning (PhenoBL) published from 2012 to 2021. The analysis examines collaboration patterns, key publications, major themes, and research trends in the field. This bibliometric analysis mainly addresses the following research questions: i) the current state of Phenomenon-Based Learning (PhenoBL), which includes key research domains, important publications, and collaboration patterns, ii) thematic patterns in Phenomenon-Based Learning (PhenoBL) in educational research, as indicated by the use of keywords in publications, and iii) emerging trends and future directions of Phenomenon-Based Learning (PhenoBL) in educational research.

2. RESEARCH method

A statistical method is used in bibliometric analysis to categorize and assess the results of recent research on PhenoBL. The research findings summarize what is known about the subject and offer significant insight into present and future research paths. A crucial part of a systematic and bibliometric study is the evaluation of research output indicators like the quantity of publications, authors, journals, and countries [2–4]. Additionally, this research methodology seeks to provide a rigorous evaluation of the key writings on a certain topic. A bibliography should be created as a first step. Then, bibliometric analyses are performed on a variety of subjects, such as theoretical advancements, authors, nations with the highest production rates, publications, and publishing foci.

A compilation of all the sources you have consulted is called bibliometric. Bibliometric, then, is a group of quantitative tools for reviewing scientific and technical publications [5]. Statistical study of publications produced in a certain topic is a clearer definition of bibliometrics [6]. By assessing items like physical publications, bibliographic citations, and other related things, bibliometrics represents the body of literature. The five-stage procedure is used in this research approach [3].

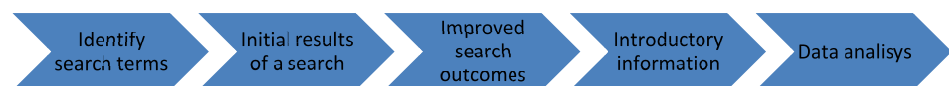


Figure 1: Step method bibliometric analysis.

The Scopus databases are searched using terms like TITLE-ABS-KEY (phenomenon-based AND learning) OR TITLE-ABS-KEY (phenomena-based AND learning) OR TITLE-ABS-KEY (phenomena-based AND science AND education) OR TITLE-ABS-KEY (phenomenon-centered AND learning) OR TITLE-ABS-KEY (phenomenon-driven AND learning) OR TITLE-ABS-KEY (inquiry-based AND learning AND with AND phenomena). When the use “OR” operator so specifies that the probe includes at least one of the terms.

This search is specific to 'TITLE-ABS-KEY' only, and the year '2012-2021'. 357 articles were found at the search. The results are compiled in Research Information Systems (RIS) format to include all important article information such as paper titles, author and affiliation names, abstracts, keywords and references.

The Scopus database is used to filter and select papers that are deemed appropriate and indexed. This dataset includes various types of scholarly publications, such as journal articles, conference papers, book chapters, reviews, conference reviews, books, and editorials. These publications were specifically chosen for inclusion in the dataset.

In order to implement the necessary enhancements, the file is saved in the format of a Comma-Separated Values (CSV) file.

The collected data was stored in the Comma-Separated Values (CSV) format. During the initial phase, we conducted a thorough examination of the various elements comprising the journal articles, such as the publication year, volume, number, and page numbers. In cases where incomplete data was identified, we supplemented the missing information as necessary. The data analysis was conducted in order to categorize articles based on their year of publication, source of publication, and publisher.

This study utilized the Scopus database for bibliometric analysis (1). The utilization of Bibliometrix R software within the R Studio environment is employed for the purpose of analyzing and visualizing bibliometric networks (1). The utilization of the Bibliometrix R software, operating within the R Studio environment, is motivated by its capacity to effectively handle extensive datasets and offer a diverse range of compelling visualizations, analyses, and inquiries (1). The R Studio environment offers the Bibliometrix R software, which enables the creation of publication maps, author maps, and journal maps. These maps are constructed using co-citation networks and shared networks to generate keyword maps.

3. result and discussion

The results of bibliometric-based examination of articles from the Scopus database were provided in this section. R studio's Bibliometrix R software was utilised to do the analysis [7]. The raw bibliographic data is exported from the Scopus database in CSV format and used in R studio for research with the command. Figure ?? below outlines the main points of the phenomenon-based learning (PhenoBL) publication.

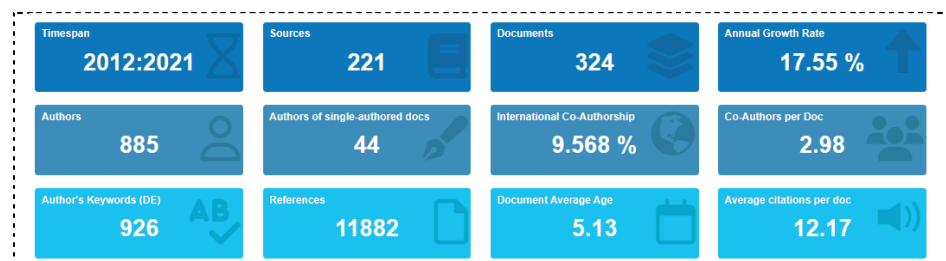


Figure 2: Main Infomation.

3.1. Annual Scientific Article Production

The R program identified a 17.55% yearly growth rate in article publication as the annual scientific production of phenomenon-based learning (PhenoBL) publications. Every year, there are more publications on phenomenon-based learning (PhenoBL) [8–10]. This rise is a result of scholars in the field of education becoming more aware of phenomenon-based contextual learning [11]. The year 2021 saw the highest publication, with 60 papers. The number of publications has increased every year, as seen in Figure 3. Around the world, a large number of scholars are currently researching in this area, advancing it and identifying new study areas in learning.

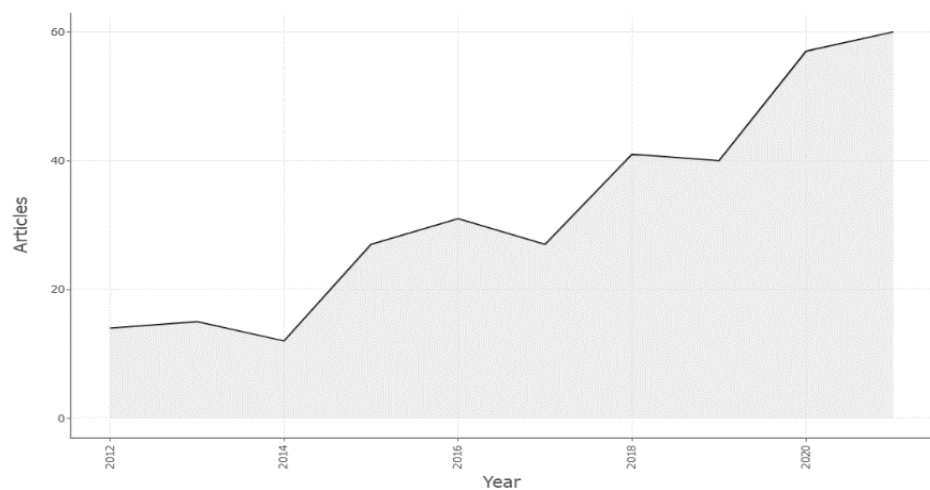


Figure 3: Annual Scientific Production.

3.2. Distribution of Regions

Figure 4A depicts a globe map based on the amount of publications produced in each nation. With 55 articles, the United States provided the most, followed by China (17 publications), Indonesia and Italy (10 publications). The majority of the papers were written by authors from the same nation, as seen in Figure 4A. Collaboration WorldMap from many nations is displayed in Figure 4B [12, 13].

3.3. Distribution of Institutions

It is essential for authors to determine the most active and important study area because this will enable them to determine which sources are contributing more research publications to that field. By analysing the data, we identified the most productive journals.

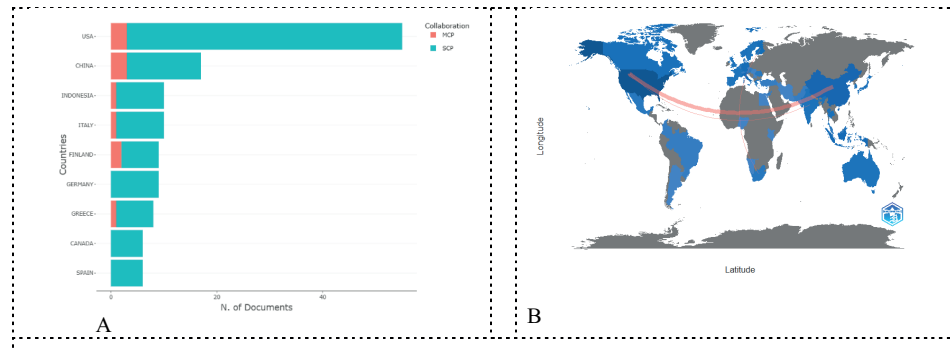


Figure 4: Countries were contributing to PBL research A) Corresponding Author’s Country B) Collaboration WorldMap.

We discovered that several contributions to the authoring of articles about phenoBL. The largest contribution came from Nanyang Technological University (13 records), followed by the Universities of Western Macedonia (12 records), Bayreuth (8 records), and Jyväskylä (8 records). We can also see that a few sources are openly available and have respectable citation styles, showing that academics and professionals can easily access these articles. Figure 5 depicts the most productive papers [14, 15].

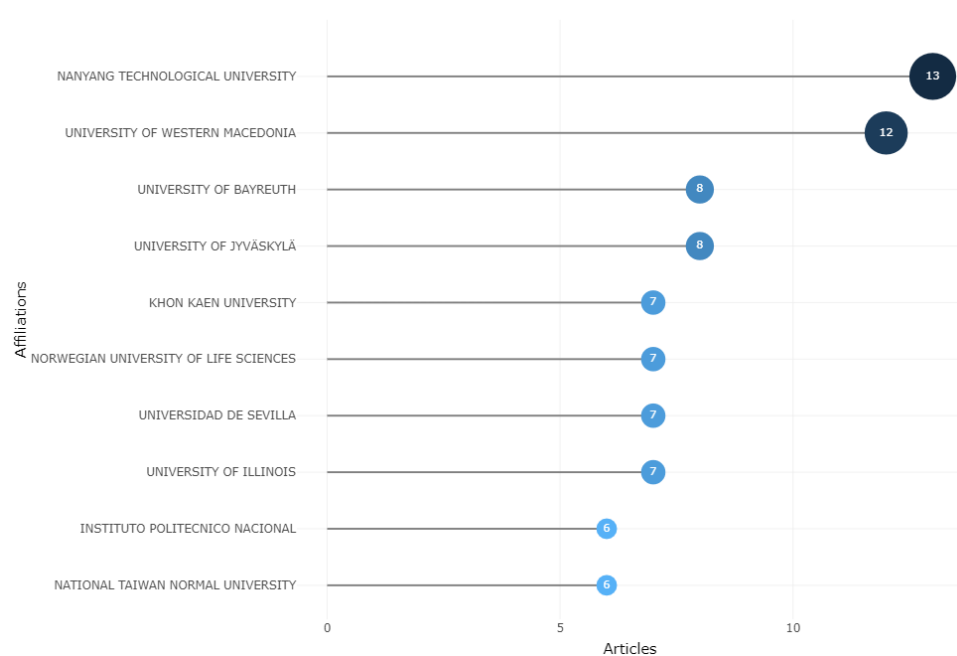


Figure 5: Most Relevant Affiliations.

3.4. Word cloud of PhenoBL

For this study, we created a word cloud of the study’s keywords using the R studio program. The Scopus bibliographic database has two keywords: (1) Author Keywords

and (2) Keyword Plus. In this paper, we employed author keywords to better clearly map our research. A keyword cloud of the author’s keywords is shown in Figure 5.

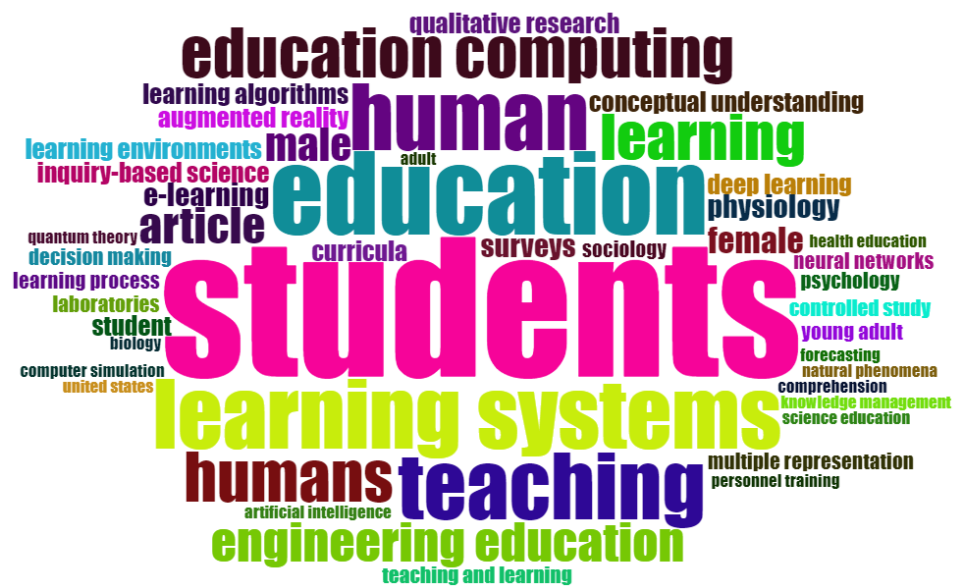


Figure 6: Most Relevant Affiliations.

Figure 6: A group of words in PhenoBL (Scopus database) Based on the results of the analysis, it can be concluded that Student is the keyword most often used by writers in their articles. To come up with specific keywords, we do our best to eliminate those words that we view as generic. we get keywords like learning systems, computing education, engineering education, inquiry-based learning, machine learning, computer-aided instruction, e-learning, physiology, augmented reality and conceptual understanding. In general, these keywords show the relationship between PhenoBL and computers in learning [16–18].

3.5. Average Citation Per Year

Table 1 displays the average citation frequency observed on an annual basis from 2012 to 2021 relating to corporate social responsibility (CSR). In 2017, published corporate social responsibility (CSR) publications received significant attention, as evidenced by their sizable citation rates. On average, these articles received 6.35 citations per year, indicating their great impact among the academic community. However, there has been a decline in the average annual number of citations since 2017, mainly due to the substandard quality of research outputs produced in this particular domain. There has been a consistent increase in the number of scholarly works highlighting the

importance of corporate social responsibility (CSR) and reflecting the growing interest among researchers in this field [19].

TABLE 1: Average Citation Per Year.

Year	N	MeanTCperArt	MeanTCperYear	CitableYears
2012	14	40.29	3.66	11
2013	15	16.40	1.64	10
2014	12	13.25	1.47	9
2015	27	19.44	2.43	8
2016	31	5.77	0.82	7
2017	27	38.11	6.35	6
2018	41	9.15	1.83	5
2019	40	10.28	2.57	4
2020	57	5.21	1.74	3
2021	60	2.65	1.32	2

4. CONCLUSION

This bibliometric analysis examines the impact of phenomenon-based learning (PhenoBL) in the field of science education, utilizing data obtained from Scopus. Examination of bibliometric mapping and author collaboration has yielded insights into research patterns and networks of cooperation. The results show that PhenoBL plays an important role in many educational contexts, establishing a link between phenomenon-based learning and the integration of computing in the learning process. The results also show that students are the main focus, with specific terms such as “inquiry-based learning,” “machine learning,” and “e-learning” highlighting the incorporation of innovation and technology into the learning process.

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