Inovasi Kurikulum *- p-ISSN 1829-6750 & e-ISSN 2798-1363*
Volume 22 No 1 (2025) 391-406

Inovasi Kurikulum
https://ejournal.upi.edu/index.php/JIK

A bibliometric analysis on research trends of outcome-based education in higher education

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ABSTRACT

This study aims to determine the trend of research on learning outcome-based education implemented in higher education that is published. An overview of these research trends can be the basis for determining the focus of research that can be carried out related to learning outcomes-based education to improve the quality of higher education implementation. This research uses a bibliometric analysis method of 140 published research documents from the Scopus database. This research begins by collecting documents discussing learning outcomes-based education in Higher Education. Then, we analyzed the results using VOSviewer software to visualize all documents' keyword and author linkage maps. The results of the analysis show that the number of publications on learning outcome-based education in higher education tends to increase yearly. The three highest countries in the number of publications on learning outcome-based education in higher education are India, Malaysia, and the Philippines. Indonesia needs to increase research in this field to optimize the implementation of outcome-based learning in higher education.

ARTICLE INFO

Article History:
Received: 26 Oct 2024
Revised: 18 Jan 2025
Accepted: 20 Jan 2025
Available online: 24 Jan 2025
Publish: 28 Feb 2025

Keywords:
bibliometric analysis; higher education; outcome-based education

Open access
Inovasi Kurikulum is a peer-reviewed open-access journal.

ABSTRAK

Penelitian ini bertujuan untuk mengetahui tren penelitian mengenai pendidikan berbasis capaian pembelajaran yang dilaksanakan di pendidikan tinggi yang dipublikasikan. Gambaran mengenai tren penelitian tersebut dapat menjadi dasar menentukan fokus penelitian yang dapat dilakukan terkait pendidikan berbasis capaian pembelajaran untuk meningkatkan kualitas pelaksanaan pendidikan tinggi. Penelitian ini menggunakan metode analisis bibliometrik terhadap 140 dokumen penelitian yang telah dipublikasi bersumber dari database Scopus. Penelitian ini diawali dengan mengumpulkan dokumen penelitian yang membahas pendidikan berbasis capaian pembelajaran di Pendidikan Tinggi. Kemudian kami analisis menggunakan perangkat lunak VOSviewer untuk memvisualisasikan peta keterhubungan kata kunci dan penulis dari seluruh dokumen. Hasil analisis menunjukkan jumlah publikasi mengenai pendidikan berbasis capaian pembelajaran di pendidikan tinggi cenderung meningkat di setiap tahunnya. Tiga negara tertinggi dalam jumlah publikasi mengenai pendidikan berbasis capaian pembelajaran di pendidikan tinggi adalah India, Malaysia, dan Filipina. Indonesia perlu meningkatkan penelitian mengenai bidang ini sebagai salah satu upaya mengoptimalkan pelaksanaan pendidikan berbasis capaian pembelajaran di pendidikan tinggi.

Kata Kunci: *analisis bibliometrik; pendidikan berbasis capaian pembelajaran; pendidikan tinggi*

How to cite (APA 7)
Sholihah, T., Johan, R. C., & Rullyana, G. (2025). A bibliometric analysis on research trends of outcome-based education in higher education. *Inovasi Kurikulum, 22*(1), 391-406.

Peer review
This article has been peer-reviewed through the journal's standard double-blind peer review, where both the reviewers and authors are anonymised during review.

https://doi.org/10.17509/jik.v22i1.78540

INTRODUCTION

Developments in the world of education are happening very rapidly. This is in line with the development of the industrial world into Industry 4.0. Thus, education has been developed into Education 4.0 (Hernandez-de-Menendez et al., 2020; Vilalta-Perdomo et al., 2022). To answer the challenges and needs of the industry, the education system, especially in higher education, needs to undergo adaptation, one of which is by implementing education based on learning outcomes (Galeon & Palaoag, 2020a; Rahate et al., 2020). Higher education implementing outcome-based learning should focus on student achievement to master concrete competencies following industry needs, including knowledge, skills, and attitudes (Liang, 2022; Liu, 2020). Education based on learning outcomes can also improve critical thinking skills, one of the skills needed in the 21st century (Syahrin et al., 2024).

Therefore, implementing learning outcome-based education requires restructuring the curriculum, assessment, and grade reporting to make the learning process more effective (Lugay et al., 2020). Wiggins, in a book entitled "Understanding by Design. Association for Supervision and Curriculum Development (ASCD)," states that the implementation of education based on learning outcomes, learning design is carried out by backward design, which is the planning of the learning process that begins with determining the objectives of learning outcomes for students. In line with technological developments, integrating technology into learning outcomes-based education will increase learning effectiveness (Cheng et al., 2016). Thus, outcome-based education in higher education is expected to align with today's needs.

Learning outcome-based education has been predicted in the independent curriculum at the Higher Education level following the Peraturan Menteri Pendidikan dan Kebudayaan Republik Indonesia Nomor 49 Tahun 2014 Tentang Standar Nasional Pendidikan Tinggi. In addition, learning outcome-based education has received special attention in recent decades to respond to the challenges of globalization and the need to increase relevance in higher education (Almuhaideb & Saeed, 2020). Bryk et al., in a book entitled "*Learning to Improve: How America's Schools Can Get Better at Getting Better*," state that implementing a new education system requires various studies to evaluate it to be implemented optimally. To be able to implement learning outcome-based education requires good competence in its application for both universities and lecturers (Cruz, 2022; Mohamad et al., 2019; Mufanti et al., 2024; Tungpalan & Antalan, 2021).

In addition, implementing education based on learning outcomes needs alignment in all aspects of learning, from teaching methods to assessment (Li & Rohayati, 2024). Student perceptions of learning outcome-based education are strongly related to student skills (Guo et al., 2023). In learning outcome-based education, a clear assessment and accreditation framework can increase the accountability and transparency of higher education (Hapinat, 2023). In addition, implementing accreditation to evaluate the implementation of learning outcome-based education in higher education can also improve the quality of education. Therefore, implementing outcome-based learning in higher education, especially in Indonesia, requires various studies to be implemented optimally.

This research shows that learning outcome-based education in higher education is rapidly developing, and there is still a need for research related to learning outcome-based education, especially in higher education, to support its implementation in Indonesia. More in-depth research is needed to evaluate the implementation of learning outcome-based education, such as through more comprehensive observations, to determine the success rate of implementing learning outcome-based education in higher education (Mufanti et al., 2024). Higher education institutions need to comprehensively understand the implementation of education based on learning outcomes. However, based on research that has been conducted, higher education institutions still do not understand the implementation of education based on learning outcomes, so they are not ready to implement it (Widyatuti et al., 2022).

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Therefore, research conducted on learning outcome-based education in higher education is important to positively impact the quality of education (Al-Saqqaf, 2023). Thus, the author researched learning outcome-based education in higher education. This study was conducted to determine the research trends on learning outcome-based education in higher education. By knowing these research trends, researchers can identify research focuses that can be carried out to improve the quality of implementing learning outcome-based education in higher education and achieve educational goals.

LITERATURE REVIEW

Education is any learning process organized in a formal school environment. Education can be interpreted as a conscious effort to create educated and ethical human resources. Organizing education aims to develop human talents and competencies to have high dignity (Rosyiddin et al., 2022). In achieving educational goals, a curriculum is needed as a learning design. The curriculum is a set of plans and arrangements as a reference for implementing education. Implementation of the curriculum in all subjects by providing experience to students. The curriculum needs to be adequate for the needs of students and industry needs (Cantika, 2022).

The Merdeka curriculum used today has successfully provided real experience to students. The problems of Indonesian education are still often found in every educational institution. Educational problems include 1) Weak competence of educators in using technological devices to create learning media; 2) Limited experience of educators and students in online learning; 3) Unfulfilled education quality caused by monotonous learning strategies so that teachers need to create creative and innovative learning strategies; 4) Relevance of education to environmental conditions; and 5) Inadequate facilities and infrastructure in learning activities (Rosyiddin et al., 2022).

These educational problems must be addressed jointly by the government, educators, and students to create a comfortable learning atmosphere and superior human resources. A comfortable and innovative learning atmosphere equipped with adequate facilities will increase student learning outcomes. Learning outcomes assess students' abilities after participating in the learning process characterized by increased cognitive, affective, and psychomotor aspects (Moko et al., 2022). It can be interpreted that good learning outcomes indicate an increase in students' knowledge, understanding, attitudes, and creativity (Sudirman et al., 2024).

METHODS

This quantitative study uses bibliometric analysis to determine research trends regarding Learning Outcome-Based Education in Higher Education. Bibliometrics is a method to determine the relationship between authors, agencies, keywords, or countries that will be described as a bibliometric map (Zupic & Čater, 2014). Make bibliometric maps using the VOSviewer program, which will then be interpreted. The bibliometric map will display the relationship between keywords from research publications (Donthu et al., 2021). This bibliometric analysis is conducted from 140 documents published in journals from the reputable Scopus database with wide journal coverage and diverse citation analysis (Mongeon & Paul-Hus, 2015).

This bibliometric analysis will focus on performance analysis and science mapping. Performance analysis determines the results of publications and research based on authors and institutions, while science mapping maps the fields of research conducted. Bibliometric analysis consists of five stages: Defining Search Keywords, Initial Search Results, Refining Search Results, Compiling Initial Data Statistics, and Analyzing Data. The five stages will be explained as follows.

https://doi.org/10.17509/jik.v22i1.78540

Defining Search Keywords

The first stage is identifying keywords for searching research publications according to the specified topic. The search for research publications was conducted in the Scopus database with the TITLE-ABS-KEY search strategy (“outcome-based education" AND "higher education").

Initial Search Results

In the second stage, researchers will find the results of research publications according to keywords. The search results display 186 documents.

Refining Search Results

In the third stage, the results of the documents found are filtered so that the documents obtained are appropriate and correct. Researchers carry out document activities only with sources from journals and conference proceedings in the final publication stage. In addition, documents are limited to the types of articles and conference papers expressed in English. The final results obtained 140 appropriate documents.

Compiling Initial Data Statistics

In the fourth stage, the data results of various research publications will compiled along with a graph of the number of research publications by year, country, institution, author, and field of study. The search results from the Scopus database are downloaded in a comma-separated values (CSV) data format that contains key information, which includes citation information, bibliographic information, abstracts and keywords, and conference information.

Analyzing Data

In the fifth stage, researchers analyze the data based on the results of the keyword connectivity map visualization of the research publications. The data analysis process uses VOSviewer software to present a bibliometric map of the relationship between co-occurrence and co-authorship keywords.

RESULTS AND DISCUSSION

Publication Trend

The results are described in graphs and bibliometric maps based on data from 140 documents from the Scopus research publication database on educational research based on learning outcomes in higher education.

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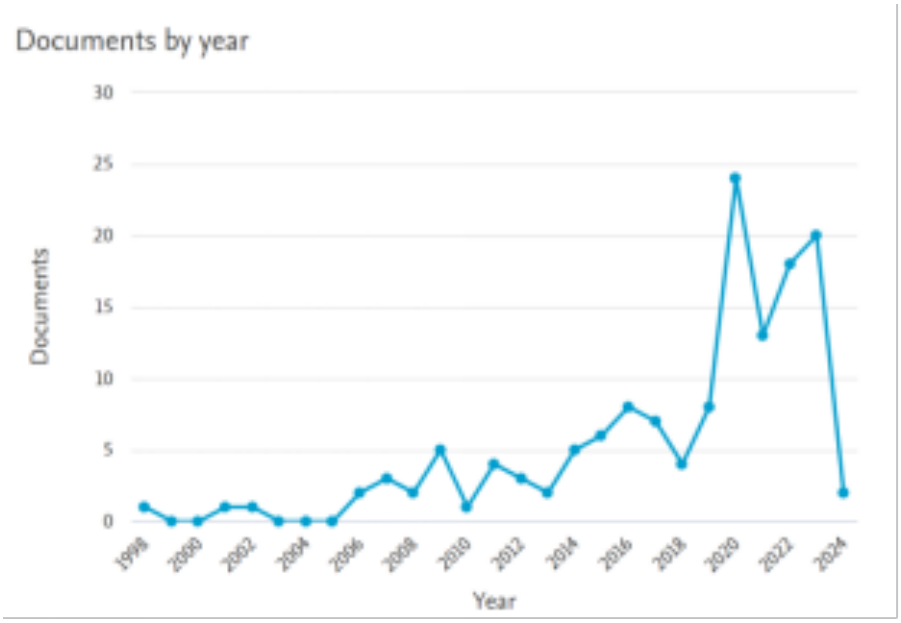

Figure 1. Development of the number of publications
Source: scopus.com processed by author 2024

Figure 1 shows the number of research publications on Learning Outcome-Based Education in Higher Education, which fluctuates but increases relatively yearly. The number of research publications has increased significantly in 2020. Namely, there are 24 published article documents. The increase was due to the growing awareness of implementing higher education based on learning outcomes in higher education. This follows Gea & Koto's (2024) research, which states that outcome-based education effectively improves student competency, showing a growing interest in OBE evaluation so that research on outcome-based education continues to increase. During the pandemic in 2021, there was a decline, and it increased again the following year. In 2024, there was a decrease because, at this time, 2024 was still ongoing.

Country Analysis

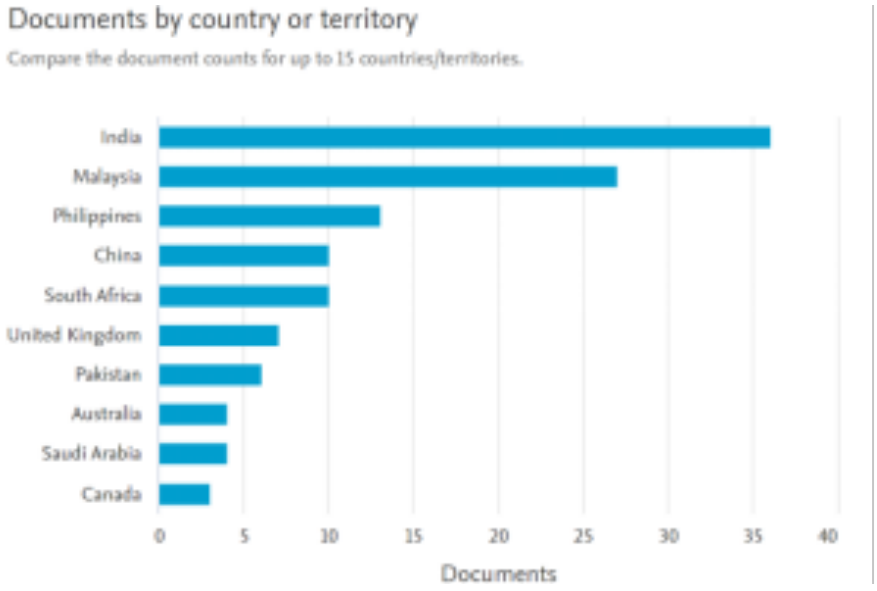

Figure 2. Number of Publications by Country
Source: scopus.com processed by author 2024

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Research publications on learning outcome-based education in higher education consist of 31 countries. **Figure 2** shows the 10 countries with the most publications, with India, Malaysia, and the Philippines being the three countries with the highest numbers. India has 36 published research articles, 27 in Malaysia and 13 in the Philippines. India's dominance in this study is because higher education in India prioritizes the quality of graduates according to the skills required by various industries, thus following outcome-based education (Shah, 2023). Furthermore, Philippine higher education institutions are transforming to implement outcomes-based education in line with government-mandated reforms to enhance quality and ensure sustainability (Alonzo et al., 2023; Galeon & Palaoag, 2020b).

Indonesia is not among the top ten countries but has published three articles on this topic. This shows that Indonesia needs to increase research on learning outcome-based education in higher education. The following research publications from Indonesia are listed in **Table 1**.

Table 1. Authors of Research Publications from Indonesia

No.	Author	Title	Source	Year	Citation
1	Mufanti, R., Carter, D., England, N.	Outcomes-based education in Indonesian higher education: Reporting on the understanding, challenges, and support available to teachers	Social Sciences and Humanities Open, 9, 100873	2024	0
2	Kendengis, Y.	Feasibility Study of Outcome-Based Education Information System in Indonesia: A Survey-based Approach	2023 10th International Conference on Information Technology, Computer, and Electrical Engineering, ICITACEE 2023, pp. 309-313	2023	0
3	Tjandra, E., Kusumawardani, S.S., Ferdiana, R.	Competencies Measurement Framework Using Course Scoring Sheet (CSS) and Course Competencies Score (CCS)	2021 13th International Conference on Information Technology and Electrical Engineering, ICITEE 2021, pp. 127-132	2021	1

Source: Research 2024

Subject Area Analysis

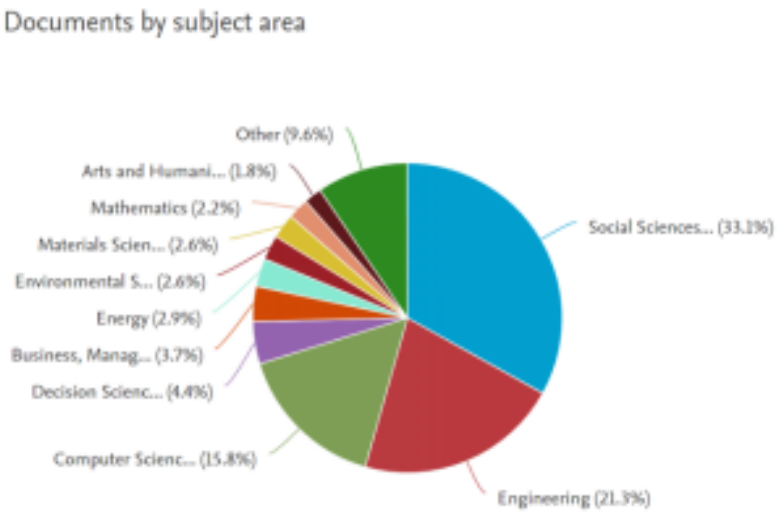

Figure 3. Distribution of Publications by Subject Area
Source: scopus.com processed by author 2024

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Figure 3 shows the distribution of publications by subject area, which indicates that educational research based on learning outcomes in higher education covers various disciplines. The most researched subjects are Social Sciences with 33.1%, Engineering with 21.3%, and Computer Sciences with 15.8%. This follows the research of Qadir et al. in a Conference entitled "Outcome-based engineering education: A global report of international obe accreditation and assessment practices," which designed assessment and accreditation to implement learning outcome-based education specifically in engineering. However, with so many disciplines researching this, it can be said that learning outcomes-based education can also be applied in various disciplines. However, learning outcome-based education implemented online using LMS cannot support the learning process by the OBE framework (Siang et al., 2024). Therefore, outcome-based education implementation requires constructing e-learning that aligns with learning outcomes, processes, and assessments (Sapawi et al., 2023; Yuniarti et al., 2024).

Affiliation Analysis

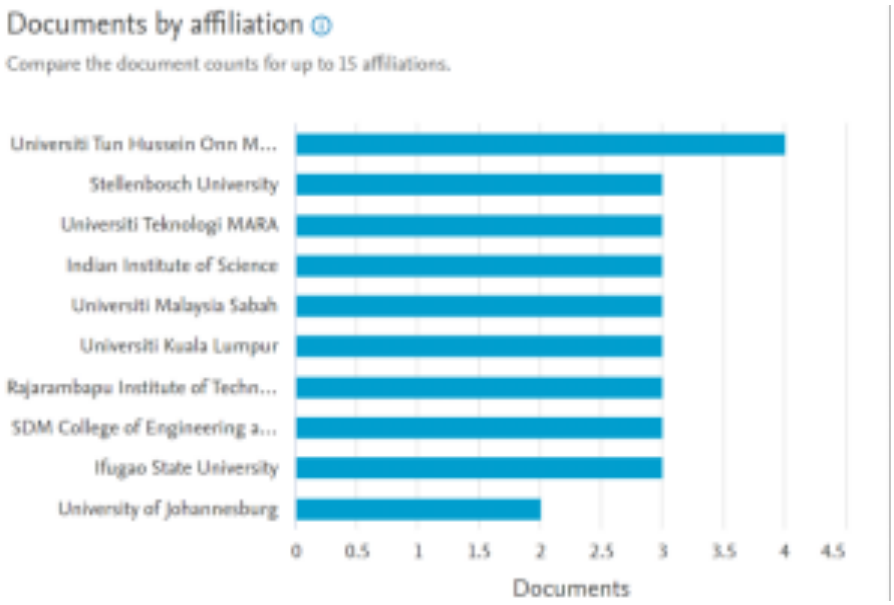

Figure 4. Number of Publications by University
Source: scopus.com processed by author 2024

The universities with the highest number of publications on outcome-based learning education in higher education can be seen in **Figure 4**. Universiti Tun Hussein Onn Malaysia has the most publications, namely four documents. Then there are eight universities with several publications of 3 documents, namely Stellenbosch University, Universiti Teknologi MARA, Indian Institute of Science, Universiti Malaysia Sabah, Universiti Kuala Lumpur, Rajarambapu Institute of Technology, SDM College of Engineering and Technology, and Ifugao State University. Indonesian universities that have published research on learning outcome-based education in higher education include Gadjah Mada University, Petra Christian University, Surabaya University, and Muhammadiyah Ponorogo University, each with one publication document.

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Authorship Analysis

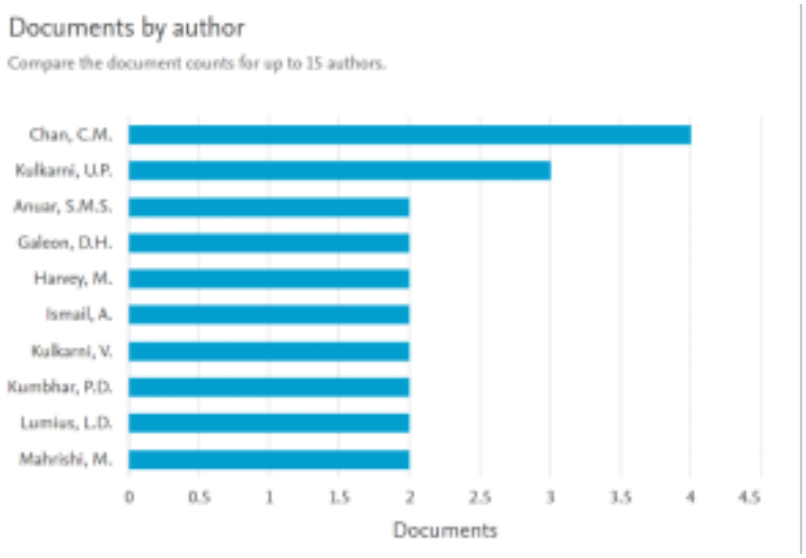

Figure 5. Number of Publications by Author
Source: scopus.com processed by author 2024

Based on **Figure 5**, Chan Chee Ming, a professor from Universiti Tun Hussein Onn Malaysia who has published four studies, is the author with the most publications on learning outcome-based education in higher education. Umakant P. Kulkarni from Purdue University in the United States is second.

To find out which research documents have the most significant influence and contribution can be seen from the highest number of citations (Aulianto, 2022). Of the 140 research publications on Learning Outcome-Based Education in Higher Education, the 10 most influential publications marked by the highest number of citations are listed in **Table 2**.

Table 2. Influential Authors Based on Number of Citations

No.	Author	Title	Source	Year	Citation
1	Harden, R.M.	International medical education and future directions: A global perspective	Academic Medicine, 81 (12 SUPPL.)	2006	120
2	Rao, N.J.	Outcome-based Education: An Outline	Higher Education for the Future, 7(1), pp. 5-21.	2020	46
3	van Deventer, K.	Perspectives of teachers on the implementation of life orientation in grades R-11 from selected Western Cape schools	South African Journal of Education, 29(1), pp. 127-145	2009	40
4	Tshai, K.Y., Ho, J.-H., Yap, E.H., Ng, H.K.	Outcome-based education - The assessment of program educational objectives for an engineering undergraduate degree.	Engineering Education, 9(1), pp. 74-85	2014	38
5	Loughlin, C., Lygo-Baker, S., Lindberg-Sand, Å.	Reclaiming constructive alignment	European Journal of Higher Education, 11(2), pp. 119-136	2021	28

https://doi.org/10.17509/jik.v22i1.78540

No.	Author	Title	Source	Year	Citation
6	Gleeson, J.	The European Credit Transfer System and curriculum design: Product before process?	Studies in Higher Education, 38(6), pp. 921-938	2013	28
7	Lombard, K., Grosser, M.	Critical thinking: Are the ideals of OBE failing us, or are we failing the ideals of OBE?	South African Journal of Education, 28(4), pp. 561-579	2008	22
8	Manzoor, A., Aziz, H., Jahanzaib, M., Wasim, A., Hussain, S.	Transformational model for engineering education from content-based to outcome-based education	International Journal of Continuing Engineering Education and Life-Long Learning, 27(4), pp. 266-286	2017	21
9	Cretchley, G., Castle, J.	OBE, RPL and adult education: Good bedfellows in higher education in South Africa?	International Journal of Lifelong Education, 20(6), pp. 487-501	2001	21
10	Katawazai, R.	Implementing outcome-based education and student-centered learning in Afghan public universities: current practices and challenges	Heliyon, 7(5), e07076	2021	19

Source: Research 2024

Based on **Table 2**, the first publication document is a conference paper titled International Medical Education and Future Directions: A Global Perspective written by Harden, R.M., which has been cited 120 times. In second place is an article titled Outcome-based Education: An Outline written by Rao, N.J., which has been cited 46 times. The article titled Perspectives of Teachers on the Implementation of Life Orientation in Grades R-11 from Selected Western Cape Schools by van Decenter, K. came in third with 40 citations. The document with the highest number of citations originating from Indonesia is a conference paper entitled Competencies Measurement Framework Using Course Scoring Sheet (CSS) and Course Competencies Score (CCS) written by Tjandra et al. (2021), which has only been cited once.

Figure 6. Co-Authorship Relationship Map
Source: Research 2024

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Figure 6 shows a co-authorship relation map. The published research on learning outcome-based education in higher education involved 376 authors. Based on Figure 6, 12 authors have relationships with other authors. The relationship shows that research is conducted together, and they collaborate. This collaboration can lead to exchanging ideas and developing methodologies in learning outcome-based education research (Morris, 2010).

Co-Occurance Keywords Analysis Networks

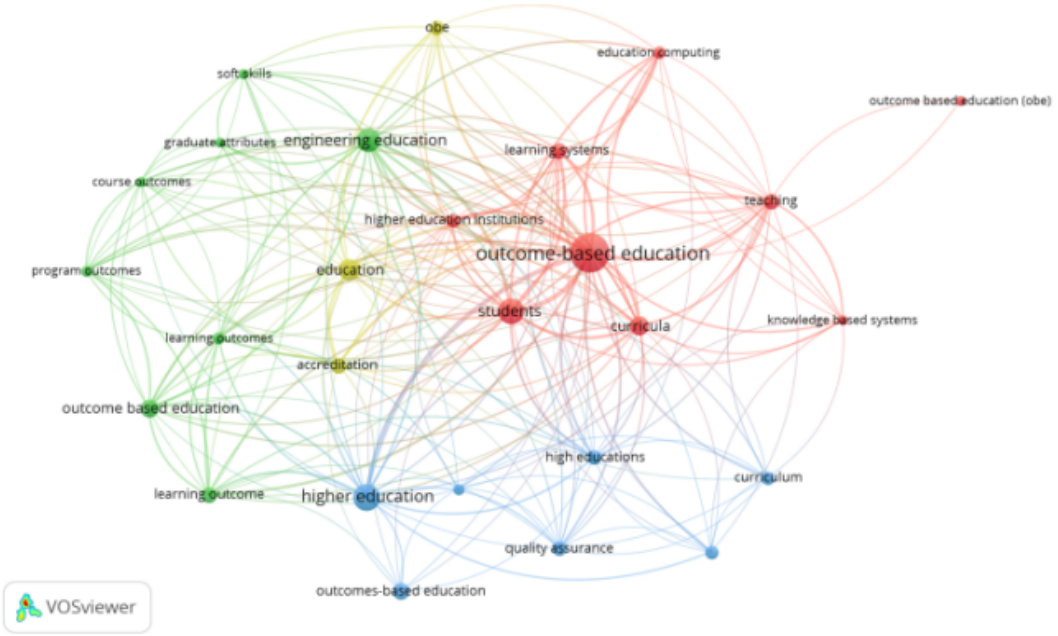

Figure 7. Keyword Relationship Visualization based on Co-Occurrence
Source: Research 2024

Figure 8. Keyword Overlay Visualization based on Co-Occurrence
Source: Research 2024

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Figure 7 and **Figure 8** show the keyword relationship visualization based on co-occurrence. The following analysis is about the relationship between keywords from 140 articles consisting of 854 keywords; 27 keywords are interconnected with a minimum of 5 connections with other keywords, resulting in four clusters. Cluster 1, marked in red, includes the keywords curricula, education computing, higher education institutions, knowledge-based systems, learning systems, outcome-based education (obe), outcome-based education, students, and teaching. Cluster 2, marked in green, consists of the keywords course outcomes, engineering education, graduate attributes, learning outcomes, learning outcomes, outcome-based education, program outcomes, and soft skills. Cluster 3, marked in blue, consists of constructive alligment, curriculum, high education, higher education, outcome-based education (obe), outcomes-based education, and quality assurance. Cluster 4, marked in yellow, includes accreditation, education, and obe.

The keywords that appear in the bibliometric analysis using VOSviewer are several keywords that have the same meaning but are categorized differently because there are differences in characters, such as curricula with curriculum, higher education institutions with higher education, and high education. In addition, there are also various terminologies of education based on learning outcomes in English, including outcome-based education (obe), outcome-based education, outcome-based education, outcome-based education (obe), outcomes-based education, and obe. The diversity of keywords reflects the breadth of approaches and research focus related to learning outcomes-based education (Gurukkal, 2020).

Bibliometric analysis also displays research mapping results based on the publication year. This analysis can be used as a reference to determine the state of the art of research on education based on learning outcomes in higher education. Figure 8 shows the distribution of research publication years marked by color. The lighter color of the dot in the figure indicates that the research with the keyword was conducted in a more recent year. In comparison, the darker color indicates that the research with the keyword has been researched in an older year. 'soft skills' 'program outcomes' and 'learning outcomes' are some of the keywords researched around 2016, while 'knowledge based systems', 'learning systems', and 'education computing' are keywords researched around 2019-2020. Outcome-based education is responsive to technological changes (Panisha, 2022).

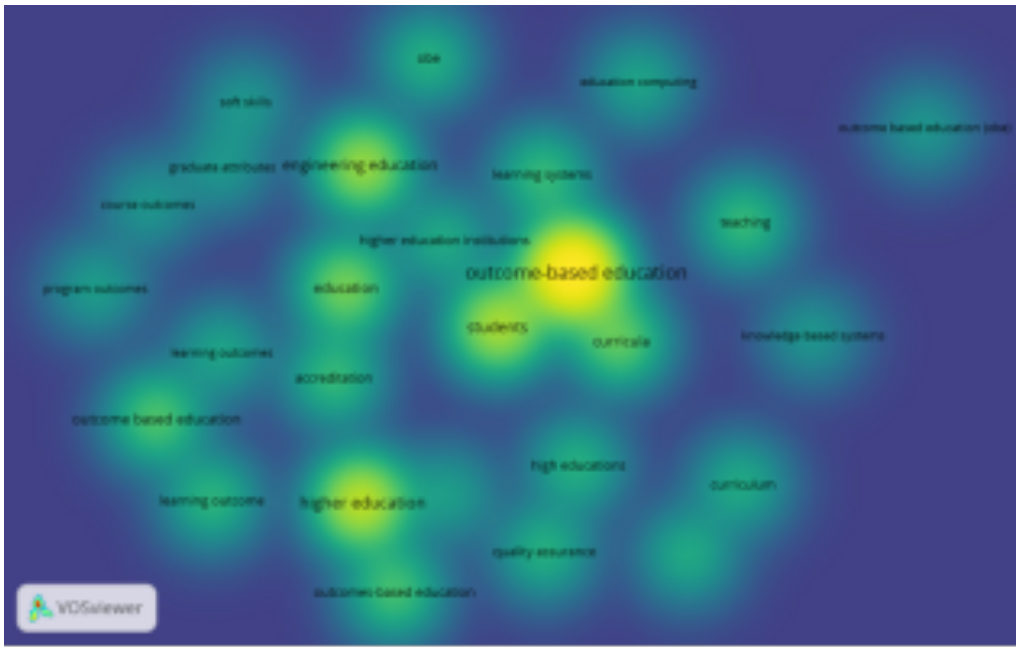

Figure 9. Visualization of Keyword Density based on Co-Occurrence
Source: Research 2024

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Figure 9 shows the density of keywords based on co-occurrence depicted by a dot image. The brighter the dot, the more research that discusses the keyword will be needed. Vice versa, the darker the dot, the more the keyword has not been widely studied in Scopus-indexed research. Based on the figure, it can be said that the keywords 'engineering education,' 'curricula,' and 'learning systems' have been widely studied in research on learning outcomes-based education in higher education. In addition, some examples of keywords that have not been widely researched include 'quality assurance,' 'soft skills,' and 'knowledge-based system.'

Keywords that are still not widely researched and still very broad should be researched so that researchers can develop research trends regarding learning outcomes-based education in higher education and conduct further research on them. This research is important to improve quality and overcome various problems in implementing outcome-based education (Damit et al., 2021).

CONCLUSION

Based on the results of the bibliometric analysis carried out on 140 publication documents on education based on learning outcomes in higher education, several findings can be used as information about the trends and development of research in this field. The number of research publications on learning outcome-based education in higher education tends to increase yearly. This shows that outcome-based learning education is receiving attention and is being applied in higher education to improve the quality and relevance of student graduates' competencies to meet global needs.

Research on learning outcomes-based education is conducted in various countries, with India, Malaysia, and the Philippines having the highest number of publications. These countries' dominance reflects the support of their governments and educational institutions in implementing outcome-based learning in higher education. However, Indonesia has not done much research and publication in this field, which is characterized by only three publications, so there is still a need for more significant research on learning outcome-based education in higher education.

Learning outcomes-based education research spans various disciplines, with engineering, computer science, and social sciences being the most researched subjects. Universities in Malaysia, India, and the Philippines are most active in this research, suggesting that these universities are paying more attention to implementing learning outcome-based education. Universiti Tun Hussein Onn Malaysia was recognized as the university with the most publications.

The co-authorship analysis showed a collaborative network among 12 researchers from different countries and institutions. This has led to the exchange of ideas and the development of new methodologies in research on learning outcome-based education in higher education. Authors such as Chan Chee Ming and Umakant P. Kulkarni showed the highest productivity in this area, based on the number of published studies. At the same time, the author with the highest contribution marked by the number of citations of the research document is Harden, R. M., with the title International Medical Education and Future Directions: A Global Perspective, which has been cited 120 times.

Keyword analysis resulted in four main clusters indicating the main topics in learning outcome-based education research: curriculum, learning outcomes, and accreditation. The change in keywords from fundamental aspects to technology integration in education shows that the main focus of research in this field is keeping up with the times. Keywords such as 'engineering education' and 'curricula' have been widely researched, while 'quality assurance' and 'soft skills' have received less attention, indicating further research opportunities in these areas.

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Education based on learning outcomes is considered one of the learning approaches that can answer global challenges. Therefore, higher education in Indonesia adopts outcome-based learning to produce graduates who are competent in their fields and can directly enter the workforce. However, based on the results of this study, few studies on learning outcomes-based education, especially in higher education, were conducted in Indonesia. Therefore, further research is needed in Indonesia to optimize its implementation regarding learning outcomes-based education in higher education.

Research on learning outcome-based education has been quite prevalent in recent years. This shows that it is one of the focuses of education implementation in various countries and has proven to benefit the advancement of higher education.

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