

Mapping Moodle-Based E-Learning Research in Indonesia: A Bibliometric Study of Self-Directed Learning

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ABSTRACT

The rapid development of information and communication technology has significantly transformed educational practices, particularly through the adoption of e-learning platforms such as Moodle-based Learning Management Systems (LMS). This study aims to analyze the research trends of Moodle-based e-learning in Indonesia using a bibliometric approach. Data were collected from Google Scholar using the Publish or Perish (PoP) software, with a limitation of 500 articles published between 2018 and 2023. After a screening and refinement process, 482 articles were selected for analysis. The data were then analyzed using VOSviewer to visualize bibliometric networks, including citation patterns and keyword co-occurrence. The results show a significant increase in publications during 2020 and 2021, driven by the implementation of distance learning during the COVID-19 pandemic. Most publications are indexed in SINTA, Scopus, and conference proceedings, with several highly cited articles indicating strong academic impact. The keyword “Moodle” appears as the most dominant term, reflecting its central role in e-learning research. Furthermore, the findings reveal that Moodle-based e-learning positively contributes to learning quality, knowledge acquisition, and student satisfaction across various educational levels. In conclusion, Moodle plays a crucial role in supporting self-directed and digital learning in Indonesia. However, further research is needed to enhance its long-term effectiveness, innovation, and global research visibility.

Keyword: Bibliometric Analysis; E-learning; Moodle; Learning Management System; Self-directed Learning

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INTRODUCTION

The rapid advancement of information and communication technology (ICT) has brought about significant transformations in the field of education. Alongside these developments, instructional methods have also evolved, increasingly emphasizing independent learning supported by various forms of learning media. Learning media serve as essential components in the educational process, functioning as a bridge that facilitates knowledge transfer between educators and learners, ultimately becoming a vital source of knowledge for students (Amirullah & Hardinata, 2017).

The dynamic growth of ICT has further expanded the need for diverse and adaptive learning media. In response to this demand, mobile learning has emerged as one of the most prominent innovations in educational technology. Mobile learning is considered a forward-looking approach due to its substantial contribution to transforming teaching and learning processes (Nasir & Nirfayanti, 2020). It enables flexible learning environments by removing spatial and temporal constraints, allowing learners to access educational content anytime and anywhere in a practical manner (Ananta et al., 2024).

Moreover, mobile learning shifts the paradigm of education from passive reception to active engagement. It not only facilitates content delivery but also encourages learners to participate in various activities that enhance their knowledge and skills. Through mobile learning, learners are empowered to develop new ways

of thinking and processing information, thereby fostering a more meaningful and enjoyable independent learning experience (Camilleri & Camilleri, 2019).

The relevance of mobile learning became particularly evident during the COVID-19 pandemic, which reached its peak in 2021. Government policies enforcing remote learning accelerated the adoption of online education systems. This transition significantly increased the demand for independent learning, supported by digital technologies. In this context, learning media play a crucial role in developing self-regulated learning skills, tailored to the characteristics and needs of learners (Ismaniati & Budiningsih, 2022). Various ICT-based media, such as video, audio, multimedia, and supporting applications, are utilized in planning, implementing, and evaluating the learning process.

Considering these demands, the utilization of mobile learning integrated with robust platforms becomes increasingly important. One of the most widely adopted platforms to support such needs is the Learning Management System (LMS) based on Moodle. Moodle (Modular Object-Oriented Dynamic Learning Environment) is an open-source application equipped with a wide range of comprehensive plugins, enabling it to function as a web-based learning platform (Samala et al., 2019). Through Moodle, educators and learners can engage in interactive discussions via chat features, access embedded multimedia content, conduct online attendance, and implement comprehensive evaluation systems, including the creation and management of online quizzes within a unified environment.

Several studies and surveys conducted across educational institutions and training centers indicate that Moodle-based LMS platforms demonstrate advantages over other LMS alternatives. These advantages are primarily attributed to Moodle's extensive features and flexibility. Consequently, Moodle has become a reliable solution in supporting effective learning processes, both in the current educational landscape and in addressing future challenges in education.

However, despite the widespread adoption of Moodle-based e-learning in Indonesia, existing studies have largely focused on implementation and learning outcomes, with limited attention to the overall landscape of research in this area. There is still a lack of comprehensive bibliometric studies that systematically map the development, trends, and research patterns related to Moodle-based e-learning, particularly in relation to self-directed learning. Furthermore, it remains unclear how research on Moodle and self-directed learning has evolved over time, including key themes, influential authors, and collaboration networks. Therefore, this study aims to fill this gap by conducting a bibliometric analysis to map and analyze the trends of Moodle-based elearning research in Indonesia, with a specific focus on self-directed learning.

METHODS

This study employs a bibliometric analysis approach to evaluate the development of research on Moodle-based e-learning in Indonesia. Bibliometric analysis is a quantitative method used to examine patterns, trends, and structures within scientific literature (Donthu et al., 2021; Zupic & Čater, 2015). This method is considered appropriate as it enables a systematic and objective assessment of large volumes of publications, while also identifying influential works, collaboration patterns, and emerging research themes (Cobo et al., 2011).

Data were collected using the Publish or Perish (PoP) software, which facilitates the retrieval and analysis of academic publications from indexed databases. The search was limited to a maximum of 500 articles related to Moodle-based e-learning in Indonesia, published between 2018 and 2023, in order to capture recent research trends.

The inclusion criteria applied in this study were: (1) publications focusing on Moodle-based e-learning, (2) studies conducted within the Indonesian context, (3) articles indexed in reputable academic databases (e.g., Google Scholar), (4) publications between 2018 and 2023 to reflect recent research trends, and (5) documents in the form of journal articles or conference proceedings. Meanwhile, the exclusion criteria included: (1) publications not directly related to Moodle or e-learning, (2) studies conducted outside the Indonesian context, (3) duplicate records retrieved from multiple sources, (4) non-academic documents such as reports, theses, or opinion papers, and (5) publications with incomplete bibliographic information.

The collected data were then analyzed using VOSviewer to visualize bibliometric networks, including co-authorship, keyword co-occurrence, and citation relationships (van Eck & Waltman, 2010). This visualization helps to reveal the intellectual structure and thematic development of the research field.

Furthermore, a descriptive analysis was conducted to present the characteristics of the literature, focusing on bibliographic information and citation metrics. The results were organized into tables and interpreted descriptively to provide a comprehensive overview of the research landscape (Zupic & Čater, 2015).

RESULTS AND DISCUSSION

The bibliometric analysis of self-directed learning using Moodle-based Learning Management Systems (LMS) was conducted based on document frequency and citation data. A total of 500 articles were initially retrieved from Google Scholar using the keywords “e-learning Moodle in Indonesia” within the publication period of 2018–2023. After a refinement and screening process, 482 articles were retained for analysis, excluding irrelevant sources such as Google Books that do not meet bibliometric criteria.

Table 1. Number and Percentage of Moodle E-Learning Publications in Indonesia

<u>Year of Publication</u>	<u>Number of Publication</u>	<u>Percentage</u>
2023	53	11,0%
2022	84	17,4%
2021	162	33,6%
2020	96	19,9%
2019	52	10,8%
2018	35	7,3%
Total	482	100%

Based on Table 1, the distribution of publications indicates a significant surge in 2021, with 162 articles (33.6%), followed by 2020 with 96 articles (19.9%). This pattern not only reflects the impact of the COVID19 pandemic but also reveals a structural shift in research priorities toward digital learning. The sharp increase suggests that Moodle-based e-learning became an immediate solution for emergency remote teaching rather than a result of long-term instructional planning. This implies that the growth of research was largely driven by situational demands rather than sustained pedagogical innovation.

Furthermore, as shown in Table 1, the decline in publications after 2021 indicates a normalization phase, where research interest began to stabilize as educational institutions adapted to hybrid or blended learning environments. This trend suggests that future research needs to move beyond crisis-driven adoption and focus on evaluating the long-term effectiveness and sustainability of Moodle-based learning systems.

Table 2. Citation Count of Selected Articles

<u>Title</u>	<u>Author</u>	<u>Year</u>	<u>Number of Citations</u>
The drivers of e-learning satisfaction during the early covid-19 pandemic: empirical evidence from an indonesian private university	Astadi Pangarso & Retno Setyorini	2023	48
Evaluation of distance learning system (elearning): a systematic literature review	Ignatius Adrian Mastan, Dana Indra Sensuse, Ryan Randy Suryono, & Kautsarina	2022	138
Exploring students'attitude towards english online learning using moodle during covid-19 pandemic at smk yadika bandar lampung	Robekka Risten Fransiska Sinaga & Reza Pustika	2021	175
Tantangan dan peluang pemanfaatan teknologi informasi dalam pembelajaran online masa covid-19	Ni Komang Suni Astini	2020	559
Factors affecting the e-learning acceptance: a case study from uae	Said A. Salloum, Mostafa Al-Emran, Khaled Shaalan & Ali Tarhini	2019	416

The development of internet-based economic learning media using moodle approach	Andika Sari & Ananda Setiawan	2018	193
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Based on Table 2, citation analysis identified six highly cited articles across different years. Highly cited publications are generally considered to reflect strong scientific contributions and academic impact (Kriyantono, 2016). A higher citation count indicates that the research has been widely recognized and utilized within the academic community (Aulianto et al., 2019). However, a deeper examination reveals that these highly cited studies are predominantly associated with general discussions on e-learning effectiveness rather than specific innovations in Moodle-based learning.

This suggests that, as reflected in Table 2, the research landscape is still dominated by confirmatory studies that validate the benefits of e-learning, including improvements in learning outcomes, knowledge acquisition, and student satisfaction (Pangarso & Setyorini, 2023; Salloum et al., 2019; Sari & Setiawan, 2018). While these findings provide important empirical support for the effectiveness of e-learning, they also indicate a saturation of similar research themes, which may limit further theoretical and methodological advancement in this field.

Furthermore, the findings indicate that Moodle-based e-learning is applicable across various levels of education and supports future-oriented learning systems (Mastan et al., 2022). Its implementation has been shown to enhance digital literacy among educators and learners while addressing the technological demands of modern education (Astini, 2020). In addition, Moodle contributes to increased learning motivation and performance, which in turn improves overall learning outcomes (Sinaga & Pustika, 2021). Nevertheless, the dominance of these general findings reinforces the need for more in-depth and innovative research that goes beyond effectiveness studies toward exploring pedagogical design, adaptive learning, and advanced technological integration within Moodle environments.

Table 3. Citation Distribution Across Indexed Journals

Journal Name	Document	Number of Citatiton
Q1 - Scopus		
Computer-Assisted Language Learning (CALL-EJ) Journal	2	1
Education and Information Technology (IFIP Technical Committee on Education)	5	817
Q2 - Scopus		
TELKOMNIKA (Telecommuncation Computing Electronic and Control)	2	37
EJEL: The Electronic Journal of e-Learning	3	55
SINTA 1		
JAETS: Journal of Applied Engineering and Technological Science	2	82
SINTA 2		
Al-Ishlah Jurnal Pendidikan	3	19
ENGLISH REVIEW: Journal of English Education	2	6
JET: Journal of Education Technology	4	72
JPPPF: Jurnal Penelitian dan Pengembangan Pendidikan Fisika	3	47
SINTA 3		
Cetta: Jurnal Ilmu Pendidikan	2	488
EDUTEC: Journal of Education and Technology	2	14
IJCET: Innovative Journal of Curriculum and Educational Technology	2	19
E-SAINTIKA: Jurnal Penelitian dan Pengkajian Ilmu Pendidikan	2	203
JTiP-UNP: Jurnal Teknologi Informasi dan Pendidikan SINTA	2	23

English Education: Jurnal Tadris Bahasa Inggris SINTA 5	2	4
IJOTL-TL: Indonesian Journal of Language Teaching and Linguistics SINTA 6	2	16
Jurnal Syntax Admiration Proceeding	3	27
Proceeding Universitas Muhamadiyah Surabaya	2	49
Atlantis Press: International Conference on Online and Blended Learning 2019 (ICOBL 2019)	3	6
ICEEL '20: Proceedings of the 2020 4th International Conference on Education and E-Learning	3	8
IOP Conference Series: Materials Science and Engineering	8	60
IOP Conference Series: Earth and Environmental Science	3	29

Based on Table 3, the analysis of journal distribution shows that most publications are concentrated in SINTA-indexed journals, particularly in ranks 2 and 3, followed by Scopus-indexed journals and conference proceedings. This distribution reflects a strong national research orientation but also indicates limited international exposure.

The bibliometric data were collected using Publish or Perish (PoP), which enables the retrieval and analysis of citation data from Google Scholar (Aulianto et al., 2019; Saputro, 2022). The data were subsequently processed using VOSviewer to construct bibliometric networks, including co-authorship, citation, and keyword co-occurrence (Budianto, 2023).

From an analytical perspective, as shown in Table 3, this pattern suggests that while the quantity of research is increasing, its global impact remains constrained. One possible explanation is the tendency of researchers to prioritize accessibility and publication feasibility over international dissemination. Additionally, methodological limitations and the dominance of descriptive approaches may reduce the competitiveness of these studies in high-impact international journals.

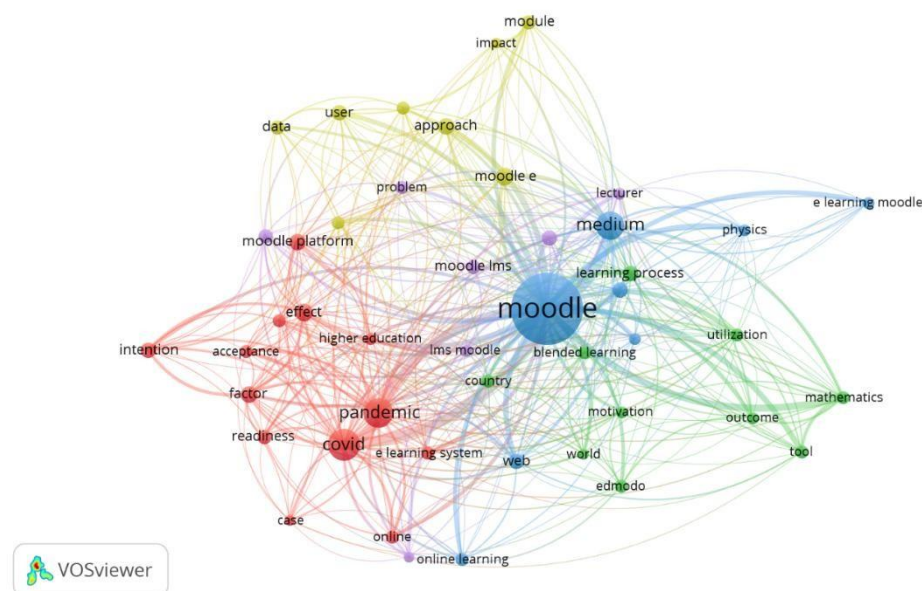


Figure 1. Network Visualization using VOSviewer

As shown in Figure 1, the network visualization reveals that the keyword “Moodle” is the most dominant, with 839 occurrences and 44 related keyword linkages. A total of 46 items were grouped into five clusters, representing major research themes such as e-learning systems, COVID-19 impact, learning processes, user acceptance, and LMS quality.

Beyond this descriptive finding, based on Figure 1, the clustering pattern indicates that research topics are still fragmented and revolve around general constructs. The strong linkage between “Moodle” and terms such as “effect,” “impact,” and “motivation” suggests that most studies focus on outcome-based evaluation rather than process-oriented or design-based research. This reflects a limited exploration of deeper pedagogical dimensions, such as instructional design frameworks or learner-centered innovation.

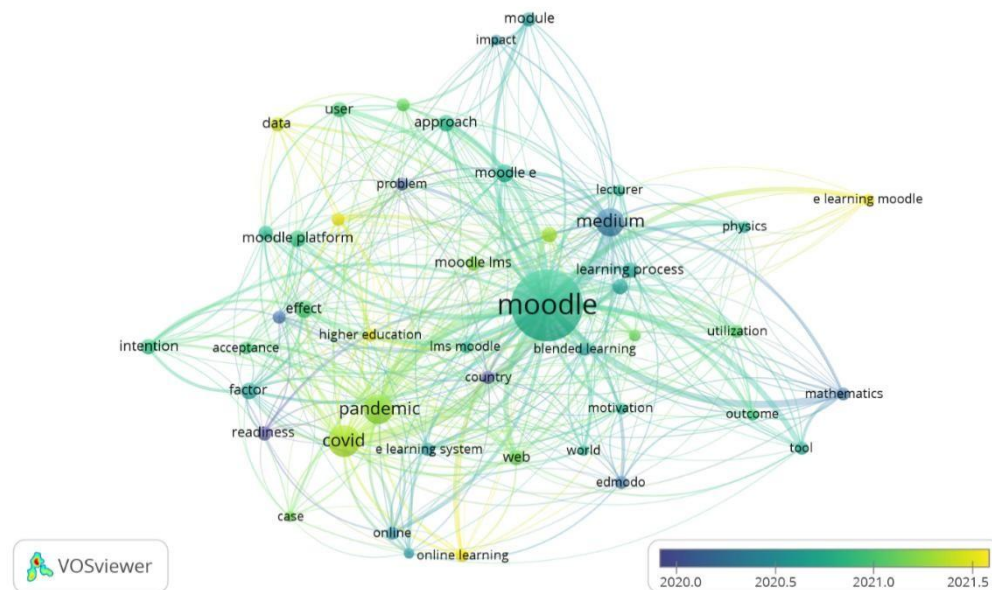


Figure 2. Overlay Visualization using VOSviewer

Based on Figure 2, the overlay visualization shows that the majority of keywords were intensively used between 2020 and 2021, confirming that the pandemic period served as a critical turning point in Moodle-related research. The concentration of recent keywords around terms such as “COVID,” “pandemic,” and “online learning” indicates that research topics were heavily influenced by external conditions rather than theoretical development.

This temporal pattern highlights that, as illustrated in Figure 2, there is a lack of continuity in research themes beyond the pandemic context. As a result, there is a need to shift toward more forward-looking studies that address post-pandemic educational challenges, including hybrid learning models and long-term digital transformation.

More importantly, this trend reflects a structural limitation in the research landscape, where knowledge development is driven by short-term disruptions rather than sustained theoretical progression. If this pattern persists, the field risks stagnation in innovation, as research may continue to reproduce context-specific findings without contributing to broader conceptual or methodological advancement. Therefore, future studies should not only respond to emerging educational challenges but also aim to build cumulative knowledge by integrating longitudinal perspectives, theory-driven approaches, and scalable pedagogical models within Moodle-based learning environments.

CONCLUSIONS

This study provides a bibliometric overview of Moodle-based e-learning research in Indonesia from 2018 to 2023. The findings show a significant increase in publications during 2020–2021, largely driven by the COVID-19 pandemic, indicating a predominantly reactive research trend. Most studies focus on confirming the effectiveness of e-learning in improving learning outcomes, knowledge acquisition, and student satisfaction. However, this dominance suggests a saturation of similar themes, with limited exploration of advanced areas such as instructional design, adaptive learning, and learning analytics. In addition, the concentration of publications in nationally indexed journals (SINTA) reflects limited international visibility. Overall, the findings indicate that research development is still influenced by short-term needs rather than sustained theoretical advancement. Therefore, future studies should emphasize innovation, methodological rigor, and broader international contributions to strengthen the field.

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