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# Ecology-based learning management in early childhood education

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**ABSTRACT**

The growing attention to environmental education in early childhood has not been fully balanced by studies that integrate learning management aspects, underscoring the need for this research. This study aims to examine the development of research on ecology-based learning management in early childhood education through a Systematic Literature Review. The review identifies thematic trends, research patterns, and potential areas for development in this field. Data were collected via article searches in the Scopus database using the Publish or Perish application, covering the period from 2020 to 2026. The selection process was conducted on the Covidence platform, while the bibliometric analysis was conducted in VOSviewer. The results show that research continues to focus on learning aspects, the role of educators, and children's learning experiences. Keyword mapping places education, learning, and teachers as central themes. These findings indicate that the integration of ecology-based learning management remains limited and requires further systematic, comprehensive, and sustainable development.

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***ABSTRAK***

Meningkatnya perhatian terhadap pendidikan lingkungan pada anak usia dini belum sepenuhnya diimbangi dengan kajian yang mengintegrasikan aspek manajemen pembelajaran, sehingga penelitian ini perlu dilakukan. Penelitian ini bertujuan untuk mengkaji perkembangan riset mengenai manajemen pembelajaran berbasis ekologi dalam pendidikan anak usia dini melalui pendekatan Systematic Literature Review. Kajian ini mengidentifikasi kecenderungan tema, pola penelitian, serta peluang pengembangan dalam bidang tersebut. Data diperoleh melalui pencarian artikel menggunakan aplikasi Publish or Perish pada basis data Scopus dengan rentang tahun 2020 hingga 2026. Proses seleksi dilakukan menggunakan platform Covidence, sedangkan analisis bibliometrik dilakukan menggunakan VOSviewer. Hasil menunjukkan bahwa penelitian masih berfokus pada aspek pembelajaran, peran pendidik, dan pengalaman belajar anak. Pemetaan kata kunci menempatkan tema pendidikan, pembelajaran, dan guru sebagai pusat kajian. Temuan ini menunjukkan bahwa integrasi manajemen pembelajaran berbasis ekologi masih terbatas dan memerlukan pengembangan lebih lanjut dalam kajian pendidikan anak usia dini secara sistematis, komprehensif, dan berkelanjutan, termasuk dalam praktik pembelajaran di berbagai konteks pendidikan.

***Kata Kunci:*** *ekologi; manajemen pembelajaran; pendidikan anak usia dini*

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## INTRODUCTION

Early Childhood Education (ECE) serves as the primary foundation in shaping children's character and potential from an early age. The learning process at this level needs to be designed in a directed manner to align with learners' developmental stages. Learning management involves planning, implementing, and evaluating learning activities systematically (Hanita et al., 2023). Structured learning models help teachers organize learning activities effectively (Fitri et al., 2022). Learning systems also need to be aligned with the applicable curriculum in educational institutions (Rohaeni, 2020). This condition indicates that learning management is an essential element in early childhood education. Explain how introducing environmental and sustainability concepts can shape children's ecological intelligence (Anggereni & Azizy, 2025). Learning that utilizes the natural environment can foster environmental awareness from an early age. Those who emphasize the role of environmental education in developing naturalistic intelligence (Priadi & Fatria, 2024).

Digital media can also be utilized to support ecological learning (Ninsiana et al., 2024). Environmental education approaches need to be adjusted to the characteristics of early childhood learners (Lestiawati et al., 2025). Creative learning methods can help children understand the environment through direct experience (Gea & Zega, 2025). The use of technology can also support learning management (Manora et al., 2024). Digital media in ECE learning serves as a means to support learning management in the modern era (Kresnawaty et al., 2025). The management of learning resources, methods, and media needs to be integrated. This shows that ecological learning cannot be separated from management aspects. Environmental education in early childhood contributes to improving ecological understanding and children's connection with their surroundings through a Systematic Literature Review approach (Ardoin & Bowers, 2020).

Environmental awareness develops through structured and continuous learning processes within educational contexts (Aquije-Mansilla, 2025). The integration of educational values with child development has a positive impact on cognitive and social aspects, as demonstrated in a systematic review (Masykuri et al., 2024). The introduction of sustainability concepts at an early age fosters environmentally responsible attitudes (Anggereni & Azizy, 2025). Environmental education approaches that align with early childhood characteristics enhance engagement and learning effectiveness (Lestiawati et al., 2025). The development of naturalistic intelligence improves children's ability to recognize and interact with their environment (Priadi & Fatria, 2024). These findings indicate that environmental learning plays an important role in early childhood education. Learning methods that do not discuss management aspects in depth highlight creativity in early childhood learning (Gea & Zega, 2025).

The use of digital media is mostly discussed in the context of modern learning (Abbas et al., 2025). The impact of technology on learning management is also a concern (Manora et al., 2024). Project-based learning management is discussed, without a specific focus on ecological aspects (Hanita et al., 2023). These differences in focus indicate variations in approaches in previous research (Ardoin & Bowers, 2020). Systematic reviews provide a comprehensive overview of a research theme (Masykuri et al., 2024). Demonstrate the



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effectiveness of this method in summarizing environmental education research. A similar approach in examining environmental awareness (Aquije-Mansilla, 2025). The use of Systematic Literature Review is relevant for studying learning management in ECE. Various concepts and practices can be analyzed in depth through this method. This approach supports the development of a more integrated understanding. Ecology-based learning management in early childhood education involves a high level of complexity, as it requires the integrated management of various components, including planning, implementation, and evaluation, all connected to the surrounding environment.

The development of children's ecological intelligence cannot occur spontaneously but requires well-designed strategies that help children understand the relationship between themselves and their environment (Anggereni & Azizy, 2025). Learning approaches that align with the characteristics of early childhood need to be systematically designed to ensure that learning activities remain engaging and meaningful (Lestiawati et al., 2025). The use of technology can support ecology-based learning by enriching children's learning experiences, but its effectiveness depends on how well educators manage and integrate it into the learning process (Ninsiana et al., 2024). The use of learning media also requires careful planning to ensure alignment with learning objectives and student conditions (Manora et al., 2024). This explanation shows that ecology-based learning management extends beyond teaching methods and requires the systematic integration of multiple aspects in early childhood education practice.

## LITERATURE REVIEW

### Early Childhood Education and Learning Characteristics

Early childhood education represents a foundational stage that plays a crucial role in optimizing overall individual development (Kresnawaty et al., 2024). Children experience rapid growth in cognitive, social, emotional, and motor domains, requiring appropriate, well-planned stimulation. Experience-based learning approaches have been shown to enhance children's thinking and problem-solving abilities (Hudaifah & Mashudi, 2024). A supportive learning environment becomes an essential factor in facilitating optimal child development. Learning characteristics in early childhood education emphasize active engagement and exploratory activities.

Contextual learning allows children to connect knowledge with real-life situations. Outdoor learning activities provide broader and more authentic learning experiences for young children (Kiviranta et al., 2023). This condition highlights the environment's important role in shaping meaningful learning experiences. Enjoyable learning activities influence children's motivation and participation in the learning process. Actively engaged children tend to understand concepts more easily (Hudaifah & Mashudi, 2024). Social interactions that occur during learning activities also support the development of communication skills. Well-designed learning experiences contribute to creating a positive learning atmosphere.


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## Learning Management in Early Childhood Education

Learning planning involves determining objectives, selecting materials, and choosing appropriate methods and media. Structured learning management has been proven to support successful curriculum implementation in educational institutions (Sakila et al., 2023). The planning stage serves as the foundation for organizing learning activities effectively. Learning activities are designed to encourage active participation without creating pressure. Flexibility in implementation allows educators to adapt activities to learners' conditions. A variety of learning methods helps maintain children's interest and attention during the learning process (Hudaifah & Mashudi, 2024). Effective management creates a conducive and well-directed learning environment. Differences in learners' characteristics affect the classroom learning process. Teachers' readiness is an important factor in the success of learning (Hanita et al., 2023).

Understanding learning models also determines the quality of learning implementation (Fitri et al., 2022). The use of technology has not been evenly distributed across all ECE institutions (Manora et al., 2024). The integration of digital media requires continuous assistance (Ninsiana et al., 2024). Limited facilities and infrastructure also affect learning effectiveness. These varied conditions lead to differences in how learning management is implemented. Educators play a significant role in the success of learning management. The ability to manage time, space, and learning resources influences the quality of learning activities. Educators are expected to adjust teaching strategies according to children's characteristics. The use of varied methods enhances children's engagement in learning activities. Adaptive learning management enables each child to gain optimal learning experiences.

## Ecology-Based and Environmental Learning

Sustainable environmental education plays an important role in shaping children's thinking patterns and behaviors toward nature from an early age. Hence, learning processes need to be structured consistently and continuously (Priadi & Fatria, 2024). Children gain understanding through direct interaction with nature and the social environment. Outdoor learning provides benefits for children's physical and social development (Kiviranta et al., 2023). The environment serves as a medium that helps children grasp concepts more concretely. Environment-based learning contributes to the development of ethical attitudes and a sense of responsibility toward nature (Brđanin et al., 2025). This process helps children understand the relationship between humans and the environment simply. Early environmental awareness influences children's future behavior.

Nature-based learning has been found to enhance children's creativity and independence (Permatasari et al., 2025). Direct experiences enable children to understand concepts more deeply. Open environments also provide space for children to express themselves and interact freely. Learning plans need to be carefully designed to ensure that environment-based activities run effectively. Social interaction in environment-based learning supports the development of children's communication skills. Open environments offer opportunities for exploration without rigid limitations. Learning activities become more active and participatory. This approach supports holistic learning development. Proper management helps organize learning activities in a structured manner. This condition indicates that ecology-based learning is closely related to learning management practices.


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### Learning Strategies in Early Childhood Education

Learning strategies refer to the methods used to achieve learning objectives effectively. In early childhood education, strategies are tailored to active, curious children. Learning approaches should be designed to create engaging learning experiences. Project-based learning has been shown to increase children's involvement in learning activities (Sakila et al., 2023). Appropriate strategies help children understand concepts more deeply. Experimental methods offer children opportunities to learn through direct experience. Children understand concepts by trying activities and observing their outcomes.

The use of experimental methods is effective in improving children's cognitive abilities (Hudaifah & Mashudi, 2024). Learning becomes more concrete because children are directly involved. This approach encourages active knowledge discovery. Storytelling is a strategy for conveying moral and social values. Engaging stories help children understand messages more easily. The use of storytelling in learning influences children's emotional development (Nabihasnah et al., 2025). Children tend to grasp values better when they are connected to daily life experiences. This strategy supports gradual character development.

## METHODS

This study employed a *Systematic Literature Review* approach to examine ecology-based learning management in early childhood education. This approach enables systematic identification, mapping, and synthesis of research findings through structured stages. The procedure consisted of identification, selection, eligibility assessment, and literature analysis. The search used keywords "ecology based learning," "ecology-based learning management", "ecology management in early childhood education", "learning management in early childhood education", "ecology-based learning management in early childhood education" with a publication range from 2020 to February 2026 to ensure the data is recent. The initial search resulted in 604 articles. The selection stage was conducted using the Covidence platform through title and abstract screening to assess relevance to the research focus.

Relevant articles were then evaluated through full-text review to ensure alignment with the study objectives. Inclusion criteria included articles addressing early childhood education, learning management, and environmental education, and published in reputable scientific journals. Articles that did not meet the criteria were excluded from the analysis. The analysis stage used a bibliometric approach with VOSviewer to map keyword relationships and research trends. Content analysis was also conducted by examining the objectives, methods, and main findings of each article to produce a comprehensive understanding of ecology-based learning management.

## RESULTS AND DISCUSSION

### Results

Based on an initial search using the Publish or Perish application for the period 2020–February 2026, a total of 604 articles related to ecology-based learning and learning management in early childhood education were identified. The distribution of articles by year of publication is presented in **Table 1**.


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**Table 1.** Distribution of Articles by Year of Publication

| Year | Number of Articles |
|---|---|
| 2020 | 115 |
| 2021 | 134 |
| 2022 | 112 |
| 2023 | 102 |
| 2024 | 77 |
| 2025 | 57 |
| 2026 | 7 |
| **Total** | 604 |

*Source: Processed data from Publish or Perish (2026)*

**Table 1** shows that the highest number of publications occurred in 2021, with 134 articles. The number of articles from 2020 to 2023 remained relatively high compared to subsequent years. From 2024 to 2026, publication numbers declined gradually, with 2026 having the fewest articles. This pattern reflects the dynamic development of research in ecology-based learning and learning management in early childhood education.

The total of 604 articles at this stage represents only the initial search results and has not yet undergone screening based on inclusion and exclusion criteria. All articles will subsequently be analyzed through a selection process to determine their relevance and suitability as research data sources. In addition to analyzing by publication year, the search results were also reviewed based on keyword usage. The distribution of articles by keyword is presented in **Table 2**.

**Table 2.** Distribution of Articles by Keyword

| Keyword | Number of Articles |
|---|---|
| ecology based learning | 200 |
| ecology-based learning management | 200 |
| ecology management in early childhood education | 3 |
| learning management in early childhood education | 200 |
| ecology-based learning management in early childhood education | 1 |
| **Total** | **604** |

*Source: Processed data from Publish or Perish (2026)*

**Table 2** shows that most articles were found using the keywords "*ecology based learning*," "*ecology-based learning management*," and "*learning management in early childhood education*," each yielding 200 articles. More specific keywords, such as "*ecology management in early childhood education*" and "*ecology-based learning management in early childhood education*," produced very limited results. The keyword distribution indicates that research more commonly uses general terms rather than those that explicitly combine ecology, management, and early childhood education. This suggests that studies with a more integrated focus remain relatively few in the available literature.



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These search results form the basis for proceeding to the article selection stage to obtain sources most relevant to the research objectives. After obtaining 604 articles from the initial search, the next step was to select them as research data sources for further analysis. This process aimed to ensure that the analyzed articles were relevant, methodologically sound, and aligned with the study's focus on ecology-based learning management in early childhood education. The selection process was conducted in stages through identification, screening, eligibility assessment, and final inclusion.

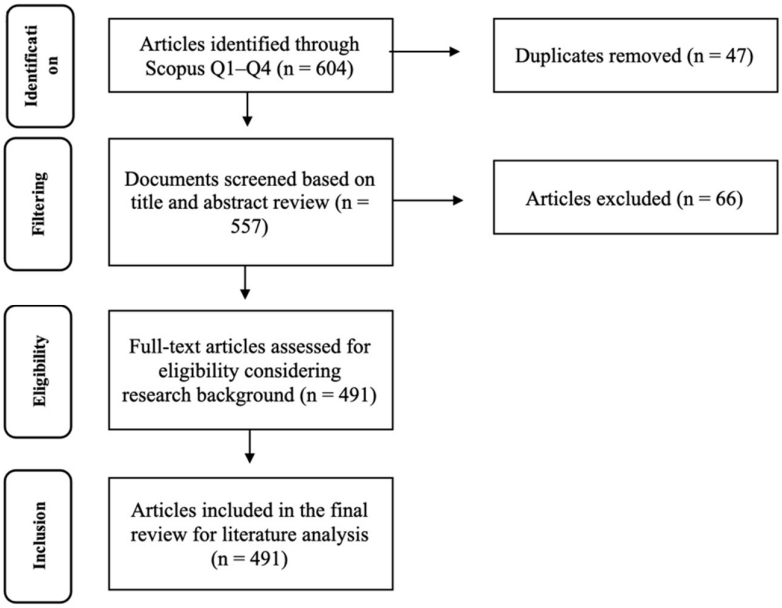


**Figure 1.** Article Selection Flow in Systematic Literature Review
*Source: Author's elaboration based on Covidence analysis (2026)*

**Figure 1** illustrates the article selection process in this study. In the identification stage, 604 articles were obtained through a Scopus database search using the Publish or Perish application. During this stage, 47 duplicate articles were found and removed, leaving 557 articles for analysis. The next stage involved screening by reading titles and abstracts to assess article relevance. At this stage, 66 articles were deemed irrelevant because they did not discuss learning management, early childhood education, or ecology-based learning. After screening, 491 articles met the initial criteria. Subsequently, eligibility was assessed through full-text review.

Articles were analyzed based on their research background, objectives, methods, and their contribution to the study's focus. This step ensured that the articles met the required academic standards and were relevant. The assessment confirmed that all articles passing the screening stage met the eligibility criteria. In the inclusion stage, 491 articles were included for in-depth literature analysis. These articles served as the primary sources for data synthesis and discussion. This systematic selection procedure demonstrates that the literature was chosen in a planned and controlled manner, ensuring the validity and reliability of the review. The next step involved analyzing the selected 491 articles using VOSviewer, as described below.


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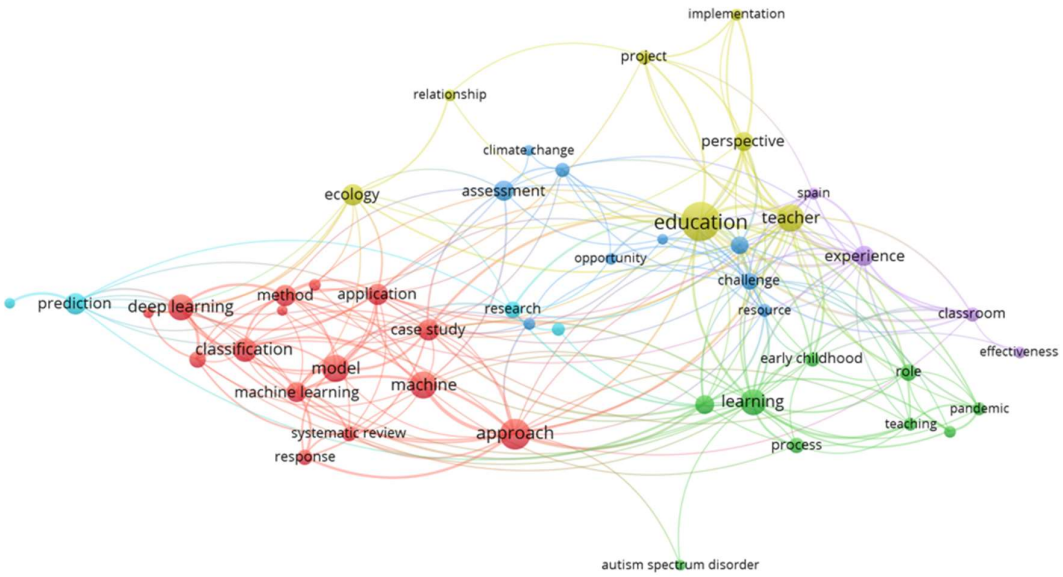


**Figure 2.** Keyword Network Mapping Using VOSviewer
*Source: Processed using VOSviewer (2026)*

**Figure 2** shows the keyword network mapping results from VOSviewer for the selected articles. The visualization illustrates relationships among key concepts in ecology-based learning management in early childhood education. Each node represents a keyword, while connecting lines indicate the degree of co-occurrence between keywords in scientific publications. Several clusters are visible, distinguished by color. The red cluster is dominated by keywords related to research approaches and analytical methods, such as approach, model, machine learning, classification, and systematic review, reflecting research that emphasizes methodological aspects. The blue cluster centers on keywords such as research, assessment, climate change, and opportunity, highlighting research on learning evaluation, environmental issues, and opportunities for applying ecology-based education.

Strong connections among keywords in this cluster indicate the relationship between environmental research and learning assessment. The green cluster includes keywords such as learning, teaching, role, process, and early childhood, reflecting studies focused on the learning process, teacher roles, and characteristics of early childhood learners. This cluster indicates that pedagogical aspects are a major research focus. The yellow and purple clusters are dominated by keywords such as education, teacher, perspective, project, experience, classroom, and effectiveness, representing research on learning practices, teacher experiences, and program implementation effectiveness. The connection between these clusters and the green cluster shows the link between teaching practices and classroom management.

The keyword education occupies a central position in the network, indicating its role as a bridge among clusters. Its position highlights that education serves as a nexus connecting environmental, pedagogical, methodological, and management aspects. Node sizes reflect keyword frequency in publications; larger nodes, such as education, learning, approach, and teacher, indicate widely discussed topics, while smaller nodes represent less-studied areas. The cluster relationships demonstrate that ecology-based learning research is integrated with



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methodology, curriculum development, and learning evaluation, rather than existing in isolation. This visualization provides an overview of the scientific structure and research trends in environment-based early childhood education.

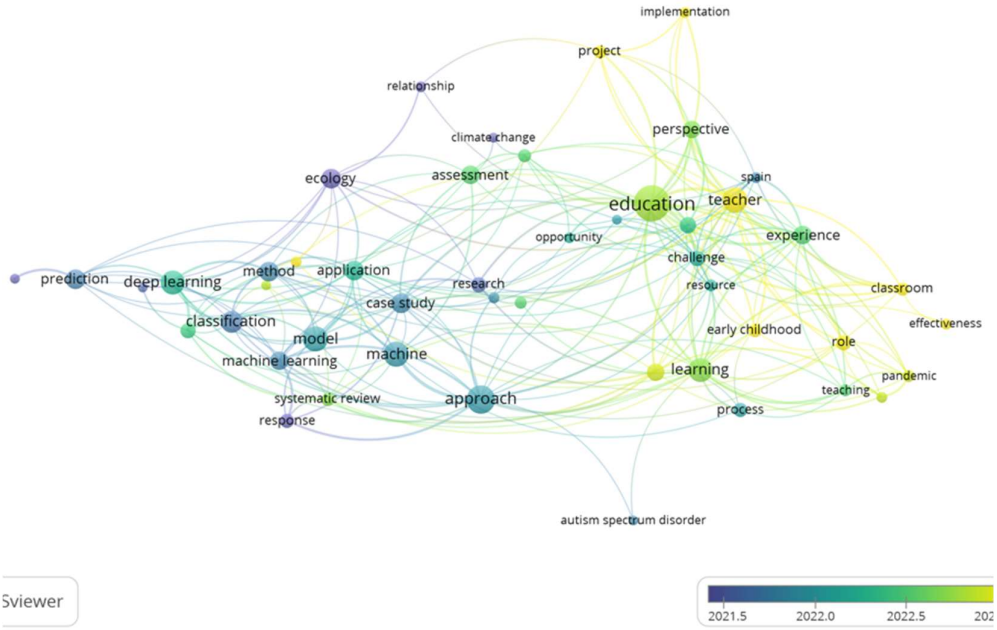


**Figure 3.** Overlay Visualization of Keyword Network Using VOSviewer
*Source: Processed using VOSviewer (2026)*

After clustering, an overlay visualization was performed to examine the development of the research theme over time. **Figure 3** shows the keyword distribution over the research period, with color gradients indicating the average year of occurrence. Blue to dark green indicates keywords that appeared more frequently in the early period, such as prediction, deep learning, classification, and machine learning, showing an initial emphasis on analytical and technology-based approaches.

Light green to yellow represents keywords that emerged later, such as research, assessment, ecology, education, learning, and teacher, indicating a shift toward integrating environmental learning into educational practice. Yellow keywords, including classroom, effectiveness, role, and experience, reflect relatively recent themes that have been widely studied, indicating growing attention to the implementation of ecology-based learning in classroom and management contexts. The centrality of education underscores its ongoing role as a core concept linking different themes over time.


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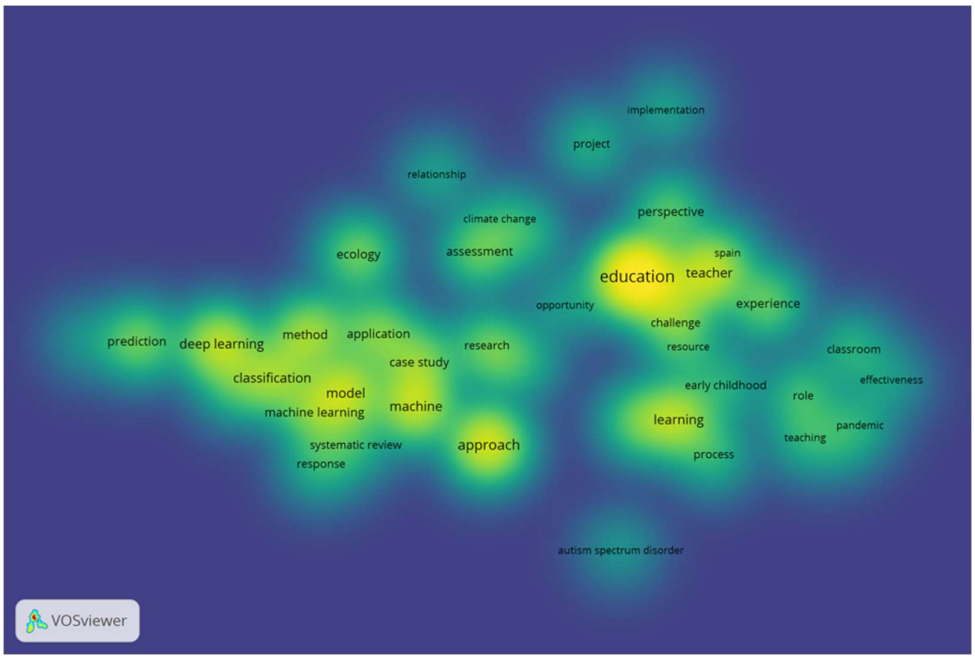


**Figure 4.** Density Visualization of Keyword Network Using VOSviewer
*Source: Processed using VOSviewer (2026)*

Following network and overlay analysis, density visualization was performed to assess keyword frequency intensity. **Figure 4** displays areas with varying color intensity, representing keyword frequency and co-occurrence strength. Yellow areas indicate the highest density, highlighting frequently mentioned keywords with strong connections, such as education, teacher, learning, approach, and machine. These findings show that education, teacher roles, learning processes, and learning approaches are primary research focuses.

Green areas indicate moderate density, with keywords such as ecology, assessment, research, application, and experience, reflecting significant attention to environmental aspects, learning evaluation, and learning experiences in early childhood education. Blue areas indicate low density, highlighting less-studied keywords such as autism spectrum disorder, relationship, and implementation, suggesting topics with opportunities for further research. Overall, the density pattern demonstrates that research on ecology-based learning management focuses primarily on educational and learning aspects, while studies linking specific conditions or in-depth implementation remain limited. This visualization provides insight into the concentration of research themes and potential areas for future development.

## Discussion

The bibliometric analysis shows that studies on ecology-based learning in early childhood education develop through the interconnection of pedagogical aspects, teachers' roles, and learning experiences. The dominance of the keywords *education*, *learning*, and *teacher* indicates that research is still concentrated on classroom practices and learning activities. This pattern aligns with findings that position nature-based learning as a primary approach in early childhood education (Wolff & Skarstein, 2020). Other studies also highlight that environmental learning contributes to children's cognitive and social development (Johnstone



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et al., 2022). These findings indicate that existing research continues to focus on learning impacts and general pedagogical approaches. Network mapping also shows that teachers play a central role in implementing ecology-based learning. The connections between *teacher*, *role*, and *learning* indicate that educators' competence is a key factor in learning success. This is consistent with studies emphasizing the importance of teaching skills in early childhood education (Nasution et al., 2023). Other research also highlights that effective classroom management influences learning quality (Masfufah et al., 2023).

This comparison shows that teachers' roles have been widely studied, but their integration with ecology-based learning management has not yet been systematically explored. The overlay visualization indicates that recent studies increasingly focus on strengthening learning experiences, improving learning effectiveness, and developing innovative methods. This finding aligns with research showing that game-based innovation can significantly enhance children's development (Hafiansyah & Yatri, 2025; Zafar et al., 2021). Other studies also emphasize the importance of developing learning models to improve educational quality (Harfiani & Fanreza, 2019). This comparison indicates that research tends to prioritize methodological innovation rather than comprehensive learning management systems. This suggests that management aspects remain the main focus of recent studies. The presence of methodological clusters containing the keywords "approach", "model", and "systematic review" reflects the growing development of research methods.

This trend aligns with studies that highlight the usefulness of systematic approaches in educational research (Masykuri et al., 2024). Other research also confirms that systematic review methods are effective in synthesizing environmental education studies (Ardoin & Bowers, 2020). However, most studies still position learning management as a supporting aspect rather than the main focus of analysis. The density visualization reveals that learning and teacher-related themes have the highest concentration. This finding is consistent with studies showing that early childhood education is still strongly focused on learning activities (Nakato et al., 2025). Other research also emphasizes the importance of value-based educational management in supporting child development (Supriadi et al., 2023). This comparison indicates that the sustainability of system-based learning management and implementation remains a major concern. This suggests a gap between learning practices and structured learning management systems.

The literature also shows that character values, spirituality, and emotional development are often studied separately. This is consistent with research indicating that storytelling contributes to children's emotional development (Suyadi, 2019). Other studies also highlight that nature-based learning supports holistic child development (Johnstone et al., 2022). This comparison shows that integration between values, environment, and learning management has not yet been developed within a unified framework. This highlights the need for a more integrated approach in future research. Based on network and density mapping, it can be understood that existing studies mainly focus on nature-based learning, methodological innovation, and teachers' roles. This aligns with research emphasizing the importance of contextual learning approaches in early childhood education (Kiviranta et al., 2023).

Other studies also show that environmental learning experiences positively impact children's understanding (Permatasari et al., 2025). This comparison indicates that ecology-based learning management as a core focus is still not dominant. This reveals opportunities for


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more integrated future research development. This Systematic Literature Review shows that existing studies have not consistently examined ecology-based learning within a structured and sustainable learning management framework. This finding aligns with research emphasizing the importance of systematic learning management (Hanita et al., 2023). Other studies also highlight that integrating planning, implementation, and evaluation is crucial for effective learning outcomes (Fitri et al., 2022). This comparison shows that studies integrating all these components remain limited. This reinforces the contribution of this research in addressing the gap in ecology-based learning management studies in early childhood education.

## CONCLUSION

Based on the results of the Systematic Literature Review, research on environment-based learning in early childhood education has developed across learning practices, educators' roles, and children's learning experiences. Bibliometric mapping shows that the themes of education, learning, and teachers remain central in the literature. Network and keyword density analyses indicate that learning activities and methodological innovation still dominate studies. In contrast, ecology-based learning management, including planning, organizing, implementation, and evaluation, has not been widely examined in an integrated manner. The integration of these components into a comprehensive learning management system remains limited. Research trends show a shift toward implementation-oriented studies and classroom learning experiences. Attention to environment-based learning continues to increase, yet systematic learning management has not become a primary focus. Ecology-based learning is still more often positioned as a learning approach rather than as part of an educational management system. This study highlights that the development of ecology-based learning management in early childhood education still offers broad opportunities, particularly by integrating environmental, pedagogical, and managerial aspects to produce structured, contextual, and sustainable learning models.

## AUTHOR'S NOTE

No potential conflict of interest was reported by the authors.

## REFERENCES

Abbas, N., Sholihah, M., Syafe'i, M., & Dzakia, F. (2025). Digital media-based learning for early childhood in the era of Society 5.0. *Al-Athfal: Jurnal Pendidikan Anak, 6*(3), 45-58.

Anggereni, D., & Azizy, M. (2025). Early ecological intelligence: strategies for introducing environmental and sustainability concepts in early childhood education. *IJIS Edu: Indonesian Journal of Integrated Science Education*, *7*(2), 33-44.

Aquije-Mansilla, M. (2025). Analysis of theoretical foundations on environmental awareness in early childhood education: a systematic review. *Health Leadership and Quality of Life*, *4*(3), 21-34



https://doi.org/10.17509/curricula.v5i2.566

Ardoin, N., & Bowers, A. (2020). Early childhood environmental education: a systematic review of the research literature. *Educational Research Review*, *31*(1), 15-40.

Brđanin, E., Ramović, S., & Kurpejović, J. (2025). The impact of environmental education on the development of ecological awareness, ethics, and responsibility in preschool children. *Univerzitetska Misao*, *4*(6), 52-66.

Fitri, A., Steffani, C., & Afifah, S. (2022). Understanding the PAUD Beyond Centre and Circle Time (BCCT) model for early childhood learning. *Jurnal Anak Usia Dini Holistik Integratif (AUDHI)*, *4*(2), 101–112.

Gea, A., & Zega, R. (2025). Creative learning methods in early childhood education. *Khirani: Jurnal Pendidikan Anak Usia Dini*, *3*(1), 25–36.

Hafiansyah, M. B., & Yatri, I. (2025). The influence of Bingo games on learning outcomes of fraction arithmetic operations. *Curricula: Journal of Curriculum Development, 3*(2), 1855-1866.

Hanita, H., Suryono, Y., & Fauziah, P. (2023). Project-based learning management in early childhood education. *Jurnal Warna: Pendidikan dan Pembelajaran Anak Usia Dini*, *8*(1), 12–23.

Harfiani, R., & Fanreza, R. (2019). Implementation of lesson study practicum model in tourism to enhance concept understanding and creative thinking in students. *Intiqad: Jurnal Agama dan Pendidikan Islam*, *11*(1), 88–100.

Hudaifah, H., & Mashudi, E. (2024). Enhancing cognitive abilities in early childhood science learning through experimental methods. *Kumarottama: Jurnal Pendidikan Anak Usia Dini*, *3*(2), 55–67.

Johnstone, A., Martin, A., Cordovil, R., Fjørtoft, I., Iivonen, S., Jidovtseff, B., ... & McCrorie, P. (2022). Nature-based early childhood education and children's social, emotional, and cognitive development: a mixed-methods systematic review. *International Journal of Environmental Research and Public Health, 19*(1), 201–230.

Kiviranta, L., Lindfors, E., Rönkkö, M., & Luukka, E. (2023). Outdoor learning in early childhood education: exploring benefits and challenges. *Educational Research*, *66*(1), 102–119.

Kresnawaty, A., Supriatna, N., Erawati, E. R., Heryati, T., & Mulyanah, U. (2025). A POAC-based academic quality management model to enhance the quality of seminars and research proposals in higher education institutions. *International Journal of Advanced Technology and Social Sciences*, *3*(12), 1561-1570.

Kresnawaty, A., Yusuf, Y., Dahlan, R., & Siswadi, A. (2024). Implementation of P5 project in PAUD: curriculum innovation and assessment system for character education. *Ijobba: International Journal of Bunga Bangsa Cirebon*, *3*(2), 279-290.

Lestiawati, M., Hartati, S., & Sumantri, M. (2025). Exploration and formulation of an appropriate environmental education approach for early childhood learners. *Edelweiss Applied Science and Technology*, *9*(4), 88–101.



https://doi.org/10.17509/curricula.v5i2.566

Manora, H., Khasanah, N., & Putri, F. (2024). The impact of technology use in Islamic early childhood education learning management. *Bouseik: Jurnal Pendidikan Islam Anak Usia Dini*, *2*(2), 60–72.

Masfufah, E., Sari, E., Munafi'ah, A., & Kusmawati, H. (2023). Strategi pengelolaan kelas dalam meningkatkan proses dan hasil pembelajaran yang efektif dan efisien. *Journal of Student Research*, *1*(1), 215-230.

Masykuri, A., Zubaidah, T., Apologia, M., & Abdillah, I. (2024). Correlation between moral and religious value learning and cognitive development in early childhood: a systematic review. *Nusantara Educational Review*, *2*(1), 11–26.

Nabihasnah, H., Alhayyu, M., & Gusmaneli, G. (2025). Strategi pembelajaran pendidikan Islam melalui pendekatan storytelling untuk membentuk akhlak mulia anak usia dini. *Reflection: Islamic Education Journal*, *2*(2), 197-212.

Nakato, J., Onyeibor, C., & Ekanem, C. (2025). Integrating co-curricular programs for holistic early childhood development. *International Journal of Applied Research in Social Sciences*, *7*(5), 90–104.

Nasution, F., Tanjung, K., Rahayu, A., Sari, I., & Yulianti, N. (2023). The role of basic teaching skills in improving the quality of early childhood education. *Tarbiatuna: Journal of Islamic Education Studies*, *4*(1), 18–30.

Ninsiana, W., Septiyana, L., & Suprihatin, Y. (2024). Introducing eco-literacy to early childhood students through digital learning. *Journal of Education and Learning (EduLearn)*, *18*(1), 45–60.

Permatasari, G., Putri, E., Lailatul, A., Andriani, D., & Yuniar, D. (2025). The implementation of nature-based learning to foster creativity and independence in early childhood. *Nak-Kanak: Journal of Child Research*, *2*(2), 50–63.

Priadi, A., & Fatria, E. (2024). The development of early childhood naturalist intelligence through environmental education. *JPUD: Jurnal Pendidikan Usia Dini*, *18*(1), 22–36.

Rohaeni, S. (2020). Development of a learning system in the implementation of the 2013 curriculum using the ADDIE model for early childhood. *Instruksional*, *1*(2), 122–130.

Sakila, S., Hibana, H., & Tumbularani, T. (2023). Application of project-based learning in the implementation of the merdeka curriculum. *Edukasi: Jurnal Pendidikan dan Pembelajaran*, *4*(2), 66–80.

Supriadi, S., Arikarani, Y., Pasiska, P., & Helandri, J. (2023). Manajemen Pengelolaan Pendidikan Islam Anak Usia Dini (PIAUD) berbasis Al-Quran. *Bouseik: Jurnal Pendidikan Islam Anak Usia Dini*, *1*(1), 15–28.

Suyadi, S. (2019). Storytelling in early childhood learning within Islamic educational neuroscience studies. *Jurnal Ilmiah Islam Futura*, *18*(1), 55–70.

Wolff, L., & Skarstein, T. (2020). Species learning and biodiversity in early childhood teacher education. *Sustainability*, *12*(9), 36-55.

Zafar, A., Patah, B. M., & Fatya, S.N. (2021). Use of gamification to increasing motivation in learning. *Curricula: Journal of Curriculum Development, 1*(1), 33-42.



https://doi.org/10.17509/curricula.v5i2.566