
A REVIEW OF THE ROLE OF ARCHITECTURE IN ENCOURAGING SOCIO-COMMUNITY INTEGRATION IN NATURE SCHOOLS

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ABSTRACT

Social-community integration is an important aspect in the development of Nature-Based Schools as an educational model that emphasizes interaction with nature and social collaboration. This study aims to analyze the role of architecture in promoting social-community integration in Sekolah Alam through a literature review. The method used is a systematic literature review of various sources discussing the concepts of educational architecture, social spaces, and Sekolah Alam. The findings indicate that architectural designs that accommodate open spaces, flexible circulation, and the use of natural materials can enhance social interaction and strengthen the sense of togetherness among school community members. In addition, the application of inclusive and multifunctional design principles also contributes to the creation of a supportive and harmonious learning environment. In conclusion, architecture plays a strategic role in building social-community integration in Alam Schools, and thus should be a key consideration in the planning and development of sustainable nature-based schools. This study provides a scientific basis for the design of educational spaces that optimize social interaction and environmental sustainability.

KEYWORDS : architecture, community, nature schools, social integration

Integrasi sosial-komunitas merupakan aspek penting dalam pengembangan sekolah alam sebagai model pendidikan yang mengedepankan interaksi dengan alam dan kolaborasi sosial. Penelitian ini bertujuan untuk menganalisis peran arsitektur dalam mendorong integrasi sosial-komunitas pada sekolah alam melalui kajian literatur. Metode yang digunakan adalah tinjauan pustaka sistematis terhadap berbagai sumber yang membahas konsep arsitektur pendidikan, ruang sosial, dan sekolah alam. Hasil kajian menunjukkan bahwa desain arsitektur yang mengakomodasi ruang terbuka, sirkulasi yang fleksibel, dan penggunaan material alami dapat meningkatkan interaksi sosial dan memperkuat rasa kebersamaan antar anggota komunitas sekolah. Selain itu, penerapan prinsip-prinsip desain inklusif dan multifungsi juga berkontribusi terhadap terciptanya lingkungan belajar yang suportif dan harmonis. Kesimpulannya, arsitektur memiliki peran strategis dalam membangun integrasi sosial-komunitas pada sekolah alam, sehingga perlu menjadi pertimbangan utama dalam perencanaan dan pengembangan sekolah berbasis alam yang berkelanjutan. Studi ini memberikan dasar ilmiah bagi perancangan ruang pendidikan yang mengoptimalkan interaksi sosial dan keberlanjutan lingkungan.

KATA KUNCI : arsitektur, komunitas, sekolah alam, integrasi sosial

INTRODUCTION

Today's education faces increasingly complex challenges, not only in academic aspects, but also in shaping students' character, social engagement, and environmental awareness (Salama, 2016). Curricula that focus too much on cognitive achievement often neglect the emotional, spiritual, and social dimensions that are equally important in shaping a whole person (Mumford, 2016). In response to this challenge, various alternative educational approaches have emerged that emphasize contextual learning and real-life experiences relevant to students' lives. One rapidly developing approach is the nature school, which integrates the learning process with nature and prioritizes social interaction as part of character

building. Nature schools view education as a holistic process involving the connection between individuals, communities, and the environment, with the goal of creating a generation that is not only intellectually intelligent, but also caring, resilient, and responsible for the social and natural ecosystems around them (Escobar, 2018). Through outdoor learning activities, nature exploration, and project-based learning, nature school strives to foster curiosity, independence, and ecological awareness from an early age, making nature a living laboratory full of values and authentic experiences.

In this context, social-community integration is a crucial element that needs to be strengthened in alternative education systems such as nature schools. Schools are positioned not only as formal learning

venues but also as vibrant social spaces, where strong and meaningful relationships between students, teachers, parents, and the surrounding community can be naturally fostered (Carmona, 2021). The school's presence as a community hub allows every element involved to play an active role in the educational process, not merely as observers but also as contributors to the formation of children's social values and character. A learning environment that encourages collaboration, togetherness, and shared care is a crucial foundation for creating an inclusive and supportive school community. In this regard, the learning process is no longer limited to the classroom but extends to social interaction spaces that support participatory engagement, such as learning gardens, shared gardening areas, community kitchens, and open discussion forums involving local residents. However, the formation of these social interactions does not depend solely on the program or teaching methods but is also greatly influenced by the physical design and layout of the school itself. Spaces designed to be open, flexible, and integrated with nature can encourage informal gatherings, spontaneous dialogue, and collaboration across ages and roles. Therefore, an architectural approach that is sensitive to socio-community needs is key to creating a truly holistic and empowering learning ecosystem.

Architecture as an Agent Shaping Social Behavior and Interaction

Architecture holds a strategic role that goes far beyond mere aesthetic or technical functions. It is a dynamic medium capable of profoundly shaping the behavior, interaction patterns, and spatial experiences of its users (Carmona, 2021). Architectural design that is socially and ecologically conscious not only creates practically functional spaces but also spaces that engage the emotional and social dimensions of their occupants, thus creating strong bonds between individuals and their surroundings. The presence of inclusive and accessible open spaces provides opportunities for interactions across ages, backgrounds, and interests, ultimately strengthening social networks within communities. Carefully designed spatial circulation not only optimizes mobility but also encourages spontaneous informal encounters and crucial moments that foster collaboration, creativity, and a sense of community. Furthermore, the use of natural materials and eco-friendly design elements not only enhances thermal and visual comfort but also fosters an emotional connection to the surrounding nature, which in turn strengthens ecological awareness and encourages sustainable behavior. Thus, architecture functions as an active and integral instrument in shaping the quality of social interactions and the sustainability of learning communities, where space is not only a

passive background, but rather a primary facilitator in creating a harmonious, inspiring, and adaptive educational environment to future needs (Escobar, 2018).

Social-Ecological Design for Building Emotional and Social Engagement

The existence of inclusive and accessible open spaces for various groups provides opportunities for interaction across ages, backgrounds, and interests, ultimately strengthening social networks within the community. However, to date, there remains a significant gap in research specifically addressing the relationship between architecture and social integration in the context of nature schools. Most literature and studies related to educational architecture tend to focus on conventional formal schools with a more standardized design approach and less consideration of the unique ecological and social context. Meanwhile, alternative educational models such as nature schools, which emphasize harmonious interactions between students, the natural environment, and the community, have received less in-depth attention within the realm of architectural studies. This highlights the need for a more contextual and holistic approach to understanding how architectural design principles can be effectively adapted and applied to strengthen social integration and build cohesive communities within nature school environments. By conducting a systematic literature review that examines interdisciplinary literature covering architecture, environmental education, social psychology, and ecology, this study aims to develop a comprehensive theoretical foundation while providing practical recommendations. The results of the study are expected to be an important reference for space designers, educators, and policy makers in creating learning spaces that are not only inclusive and collaborative, but also ecologically and socially sustainable, thus supporting the creation of an educational environment that is adaptive to the challenges of the times and the needs of community development as a whole.

METHODS

This study uses the Systematic Literature Review (SLR) method to examine the role of architecture in fostering socio-community integration in the context of nature schools. The SLR method was chosen to obtain a comprehensive and structured understanding based on relevant and reliable previous research (Carmona, 2021). This approach allows researchers to systematically and objectively identify, evaluate, and analyze published scientific literature.

The literature data collection process was conducted using two main tools, namely *Publish or*

Perish and *Google Scholar*. *Google Scholar* was chosen because it is a broad scientific literature search platform and covers various international and national journals, proceedings, and academic documents. Meanwhile, *Publish or Perish* was used as auxiliary software to download, filter, and analyze citations and bibliometric metrics from literature found through *Google Scholar*. The use of *Publish or Perish* also facilitates the evaluation of the quality and impact of the sources obtained, so that only articles with high relevance and quality are used as analysis material (Aldrich & Meyer, 2015).

The literature search process began with determining key keywords relevant to the research focus, such as "architecture," "social integration," "community," and "nature school." These keywords were then combined to broaden and narrow the search scope as needed. Inclusion and exclusion criteria were also applied, including articles published within the last ten years, articles written in both English and Indonesian, and research explicitly addressing the relationship between architecture and social integration in nature-based educational environments.

After the screening and selection process was carried out, the selected literature data was analyzed thematically to identify patterns, concepts, and key findings related to the role of architecture in building and strengthening social relationships within nature school communities. The results of this analysis are expected to provide theoretical and practical contributions to the field of educational architecture and sustainable community development (Mumford, 2016; Escobar, 2018).

Table 1. Literature Search Keywords

No	Indonesian Keywords	Equivalents (English)
1	Architecture	<i>Architecture</i>
2	Social Integration	<i>Social Integration</i>
3	Community	<i>Community</i>
4	Nature school	<i>Nature school/Forest School/ Outdoor School</i>

(Source: Author's Analysis, 2025)

Database

In conducting a Systematic Literature Review (SLR), selecting and managing a literature database is a crucial step in determining the quality and relevance of the sources used. This study utilized Google Scholar as the primary database in the literature search process. Google Scholar was chosen because it provides broad open access to various scientific publications from national and international journals, including articles, proceedings, and theses, thus supporting comprehensive study coverage (Mumford, 2016). To expedite and streamline the bibliographic data extraction process from Google Scholar, Publish

or Perish software was used. This application allows the collection of publication metadata such as title, author name, year of publication, number of citations, and affiliation, which can then be used as a basis for the literature screening and analysis process (Aldrich & Meyer, 2015).

After collecting bibliographic data, a bibliometric analysis was conducted to identify general patterns in the reviewed literature, such as the frequency of keyword occurrences, inter-topic relationships, and the distribution of publications over time. In this stage, VOSviewer software was used to visualize the network of relationships between the literature through a bibliometric map. This visualization enabled the identification of dominant research topics, relationships between concepts, and potential understudied *research gaps*. The combined use of *Google Scholar*, *Publish or Perish*, and *VOSviewer* provided a systematic, transparent, and replicable approach to the literature review, thus supporting the validity and accuracy of the research results (Carmona, 2021).

Inclusion and Exclusion Criteria

Establishing inclusion and exclusion criteria is a crucial strategic step in developing a systematic review, as it plays a crucial role in ensuring the validity, credibility, and relevance of the findings. In this study, only articles written in English were included, with the aim of facilitating the understanding of the scientific content and expediting the literature review process efficiently. Furthermore, the selection of English also considers a broader and more representative scope of global literature (Mumford, 2016). The publication year range was set between 2016 and 2025. This timeframe was deliberately chosen to accommodate literature with a high degree of novelty, thus reflecting the dynamics of contemporary research issues and trends relevant to the study topic (Carmona, 2021).

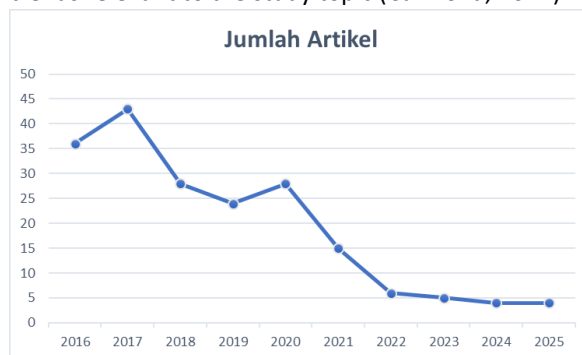


Figure 1. Development of Annual Article Publications

(Source: Author's Analysis, 2025)

The use of VOSviewer in this study aims to identify thematic patterns of relationships emerging from a collection of articles that have been selected based on pre-defined inclusion and exclusion criteria.

Through co-occurrence mapping and network visualization features, VOSviewer allows mapping of knowledge networks that represent the connections between key research topics, the intensity of collaboration between authors, and the distribution of publications in specific journals. This is in line with the approach proposed by (Aldrich & Meyer, 2015), which emphasizes the importance of visualization in understanding social capital and community resilience. Thus, this software makes a significant contribution in presenting informative visual representations, which ultimately support the interpretation of findings in the context of trends and directions of research development in the field being studied. This mapping helps identify dominant topics and potential research gaps that have not been widely studied, as described in the work of (Carmona, 2021).

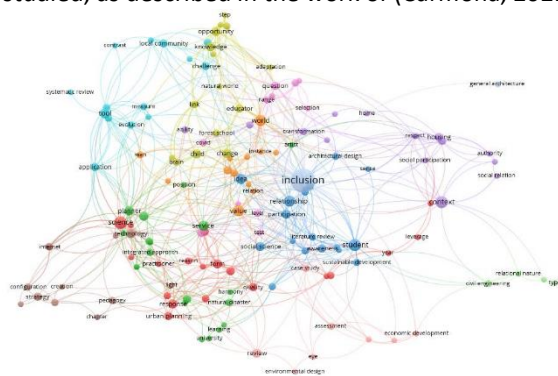


Figure 2. Network Relationship between Key Terms
(Source: Author's Analysis, 2025)

Keyword Visualization Analysis

Visualization of the keyword network using VOSviewer produced a conceptual map depicting thematic interconnections within the scholarly discourse surrounding architecture, education, and social integration. The center of this network is dominated by the term "inclusion", which appears as the largest primary node, indicating the highest degree of connectivity and frequency of occurrence in the data corpus (Wang et al., 2022). The presence of "inclusion" at the center of the map indicates that the topic of social integration through the active involvement of various actors, particularly in educational and community contexts (Carmona, 2021), is a key foundation in the discourse studied. Structurally, the term "inclusion" forms a close relationship with several keywords such as "relationship," "participation," "student," "idea," "awareness," and "social science." This series of terms forms a conceptual cluster that emphasizes the importance of social relations, active participation, and awareness in the learning process (Aldrich & Meyer, 2015). This reflects that social integration occurs not only structurally but also through dynamic interactions between students, teachers, and the environment. In the context of nature schools, this is

particularly relevant given that this alternative educational approach relies on direct experience, community collaboration, and emotional connections with nature and others (Block, 2018).

Furthermore, the visualization shows a yellow cluster that highlights terms such as "forest school," "natural world," "adaptation," "knowledge," "educator," and "opportunity." This cluster indicates a direction of discussion that links nature-based contextual education with the process of adaptation and knowledge development (Klinenberg, 2018; Chawla, 2015). "Forest school" is specifically a term synonymous with the nature school approach, where learning takes place in an open environment, utilizing natural elements as an educational medium. The presence of the word "adaptation" shows that this type of learning space is not static, but rather demands adaptive abilities from students and the architecture of the space itself. In this case, architecture functions not only as a container, but also as an instrument capable of facilitating social and psychological transformation of students through interactions with nature and the community.

Meanwhile, the purple cluster containing terms such as "context," "housing," "respect," "authority," "social relations," and "social participation" emphasizes the importance of architecture's alignment with the social and cultural context (Kiss et al., 2022; Jokilehto 2017). Spaces designed sensitively to community needs can strengthen social participation and build a sense of belonging. In the context of nature schools, the design of flexible open spaces, connected to nature, and supporting collective interaction is an important aspect in creating social integration. Architecture in this case is not only about form, but also about the meaning and social relationships embedded within it. Understanding "context" is crucial to creating truly inclusive spaces, especially in educational environments oriented towards humanitarian values and sustainability.

The red cluster also displays the interrelationship between the terms "urban planning," "environmental design," "form," "response," "harmony," and "natural disaster." This cluster highlights the technical and ecological dimensions of architecture, including how design can respond to environmental issues and natural disasters (Fletcher et al., 2015). In relation to nature schools, architectural planning and design need to consider ecological factors and the dynamic environment. This is crucial because nature-based schools directly interact with the local landscape, climate, and geographic conditions. The concept of "harmony" that emerges in this cluster reflects the design effort to unite humans, space, and nature in a harmonious whole, which will ultimately support the growth of a resilient and inclusive learning community.

Another significant cluster is the green cluster, which emphasizes an interdisciplinary approach with keywords such as "science," "technology," "planner," "integrated approach," and "practitioner." This cluster highlights the need for cross-disciplinary collaboration in realizing adaptive and responsive educational design (Escobar, 2018). In the context of nature schools, the designer's role is not only as a provider of physical form, but also as a facilitator of social and ecological interactions. An integrated approach is needed to connect social, pedagogical, and environmental aspects within a single design system.

Finally, the orange cluster, containing the terms "child," "educator," "value," "change," "reason," and "challenge," demonstrates the values and dynamics of education. This cluster emphasizes that social change can begin with child-centered education, where values such as cooperation, responsibility, and empathy are taught through direct experience (Klinenberg, 2018). In this context, architecture plays a crucial role as an agent of social transformation that accommodates children's needs and supports meaningful learning processes.

Overall, this keyword visualization analysis shows that social integration in the context of nature schools is a complex phenomenon influenced by multidimensional interactions between physical space (architecture), social processes (participation and relationships), and contextual educational approaches (forest school, learning by doing). Therefore, in reviewing the role of architecture in promoting social-community integration, it is necessary to pay attention to the contextual spatial design dimension, participatory values, and deep ecological relationships. The successful design of nature schools is not only determined by its aesthetics, but by its ability to build an inclusive, adaptive, and sustainable learning community.

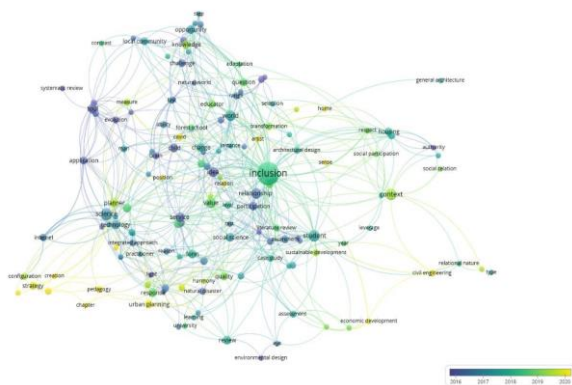


Figure 3. Overlay relationship between key terms

(Source: Author's Analysis, 2025)

The evolution of research themes in the fields of architecture, social integration, and alternative education throughout the period 2016 to 2020. The

colors in the keyword network reflect the temporal distribution, with a color gradation from dark blue (indicating keywords that dominated in the early years, such as 2016) to bright yellow (indicating relatively recent emergence, such as 2020).

1. Early Phase (2016–2017): Dominance of Theoretical and Technocratic Approaches

In this phase, research still focuses on theoretical aspects and general methodological approaches. Keywords such as tool, systematic review, application, science, and technology are used. Mumford (2016), indicates that the scientific discourse at that time emphasized the development of analytical instruments and conceptual frameworks. The role of architecture in the socio-community context had not yet emerged explicitly, and was still positioned as a field that supported the technical aspects of physical development and urban planning (Carmona, 2021; Escobar, 2018). The implications for this research indicate that the idea of the social role of architecture, particularly in the context of alternative education such as nature schools, had not yet become a primary concern in the global literature during this period.

2. Transition Phase (2018–2019): The Emergence of Interdisciplinary Context and Social Awareness

This period was marked by a significant shift towards a more contextual and interdisciplinary approach. Keywords such as context, housing, participation, integrated approach, and practitioner emerged. Aldrich & Meyer (2015) and Escobar (2018), demonstrates the involvement of fields such as urban planning, social sciences, and the environment in architectural discourse. Architecture is beginning to be positioned not merely as an artistic or technical expression, but as an instrument that can mediate social dynamics and community participation (Alexander, 2017). This phenomenon provides a strong conceptual foundation for explaining how architectural design can create inclusive and adaptive spaces, as well as encourage social integration among members of the school community.

3. Contemporary Phase (2019–2020): Strengthening Social, Ecological, and Pedagogical Dimensions

The yellow color appears in keywords such as forest school, pedagogy, creation, strategy, child, and learning, Klinenberg (2018) and Block (2018) marks a shift in discourse toward a more humanistic and values-based approach. The focus has shifted to alternative educational models that bring students closer to nature and local communities. The term forest school, closely associated with the nature school approach, demonstrates the topic's high relevance and topicality in current academic literature.

Furthermore, the emergence of the term COVID in keyword networks indicates the pandemic's impact on the redefinition of educational spaces (Bratman et al., 2019). In this context, nature schools become a concrete representation of how architecture can offer healthy, flexible, and socially integrative open learning spaces. Architecture is not only a learning platform but also a restorative medium, especially during a global health crisis.

4. Thematic Correlation to Research Objectives

The entire keyword network places the term *inclusion* as a central node, which is strongly connected to words such as context, student, participation, and social relations (Carmona, 2019b; Aldrich & Meyer, 2015). This indicates that the dimension of social inclusion in educational spaces has become an issue that has received serious attention, both in the context of architecture and in social and pedagogical approaches. Within the framework of research that examines the role of architecture in encouraging socio-community integration in nature schools, these findings emphasize that architecture needs to be understood holistically. Not only as a physical representation or expression of form, but as a strategic element in building harmonious, participatory, and contextual social relations with the surrounding environment.

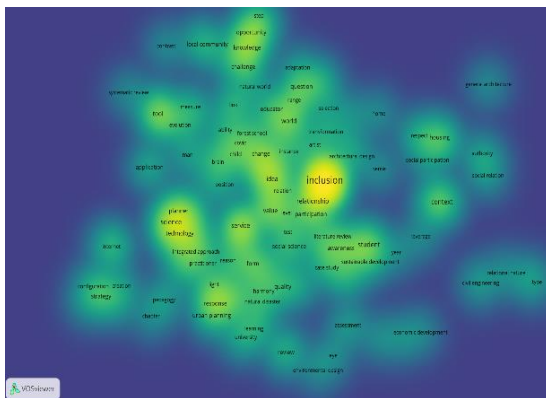


Figure 4. Density Visualization

(Source: Author's Analysis, 2025)

The density visualization map generated using VOSviewer software provides a quantitative overview of the frequency concentration and thematic relationships between keywords in the searched scientific literature. The colors on the map indicate density levels, with bright yellow marking areas of highest frequency and relationships, while dark blue indicates areas of low density or peripherality.

1. Density Center: 'Inclusion' as the Main Thematic Focus

The term "inclusion" is located at the center of the map with the brightest color intensity, indicating that social inclusion is a dominant theme in the analyzed literature corpus. This indicates that current academic attention is very much focused on efforts to create inclusive spaces, both in educational, social, and built environmental contexts. In the context of the nature school, this inclusion can be interpreted as the involvement of all levels of the community—children, parents, educators, and the local community—in an open learning system that prioritizes the values of diversity, equality, and collaboration. Therefore, the architectural design of the nature school plays a strategic role in accommodating the need for inclusive spaces that enable social interaction across groups (Newman, 2020).

2. Secondary Density: 'Context', 'Student', 'Science', and 'Technology'

Keywords such as context, student, science, and technology also show high levels of density, although slightly lower than inclusion. The presence of the word "context" emphasizes the importance of an architectural approach that is sensitive to local conditions, both socially and ecologically. "Student" indicates a focus on learners as the primary actors in alternative education systems, reinforcing the importance of creating learning spaces that are friendly and adaptive to children's needs (Jokilehto, 2017). Meanwhile, the terms "science" and "technology" refer to a knowledge-based and innovative approach in designing the built environment. In practice, this can be translated as the use of environmentally friendly technology or a science-based approach in designing nature schools that are sustainable and responsive to ecological challenges (Fletcher et al., 2015).

3. Peripheral Space: A Related but Less Concentrated Issue

Several terms such as civil engineering, relational nature, internet, configuration, and economic development are located in the peripheral areas of the map, colored blue to green. Although not the main focus, these terms still have relevance to research, particularly in expanding the scope of social integration through infrastructure support, digital technology, and community-based economic development (R. W. Miller, Hauer, & Werner, 2015; Guerry et al., 2015). Terms such as pedagogy, forest school, and natural world also appear in the intermediate area, reinforcing the relevance of the theme of nature education as part of a learning system that facilitates experiential social integration and connectivity with nature (Pawlyn, 2019; Day, 2017).

4. Thematic Correlation to Research Objectives

The results of this density visualization clearly show that the role of architecture in promoting social-community integration in the nature school is closely

related to the dimensions of inclusion, sensitivity to local context, and adaptation to student needs in a dynamic learning environment. Architectural design that is responsive to the main keywords in this visualization, such as participation, relationship, and awareness, will enable the creation of spaces that facilitate social cohesion, a sense of shared ownership, and collaboration between stakeholders. This reinforces the urgency of a design approach that is not only aesthetic or functional, but also socially transformative (Katz & Nowak, 2018).

Quality Assessment

One important element that must be verified alongside the application of inclusion criteria is the quality assessment of the literature used in the study. This quality evaluation aims to ensure that only sources that meet academic standards are worthy of being used as the basis for further analysis (Mumford 2016) (Escobar, 2018). The assessment is based on three main indicators, each designed to measure the extent to which the methodology, data validity, and content relevance of each piece of literature meet accountable scientific standards. Each indicator is then assessed using a specific scoring system, allowing for an objective and transparent selection process, and supporting the overall integrity of the research results (Carmona, 2019a; Aldrich & Meyer, 2015).

Score 2 : Clearly met

Score 1 : Implied or not explicitly stated

Score 0 : Not met or not adequately explained

Thus, the total score for each piece of literature can range from 0 to 6, with higher scores indicating better research quality. The article screening process was carried out in stages until only studies meeting the specified quality criteria were included in the analysis.

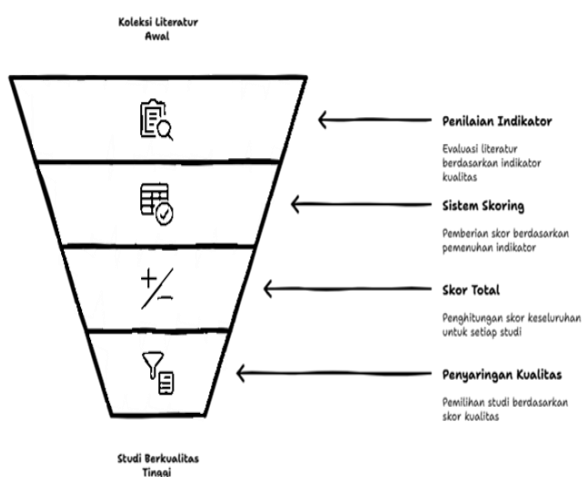


Figure 5. Diagram of Literature Screening Stages
(Source: Author's Analysis, 2025)

Through this screening process, only the best quality literature will be used as the basis for theory

and discussion in the research, thereby increasing the credibility and accuracy of the research results.

RESULTS AND DISCUSSION

This study highlights the significant contribution of architecture in shaping social dynamics and community integration in the nature school environment (Mumford, 2016). Through systematic literature review and bibliometric analysis, it was found that open, flexible, and inclusive spatial design plays a crucial role in creating learning spaces that support cross-role social interactions (Escobar, 2018; Alexander, 2017). Nature school, as an alternative form of education that emphasizes the harmonious relationship between humans and nature, demonstrates the need for an architectural approach that functions not only structurally, but also socially and emotionally (Block, 2018; Green & Haines, 2015).

Bibliometric data visualized using VOSviewer software shows the dominance of terms such as *inclusion, participation, relationship, and context* in the research thematic map (Kabisch et al. 2016) . This indicates that the social and participatory dimensions have become a primary focus in the scientific discourse on nature-based educational architecture (Sennett, 2018). The existence of a central node *in* the term *inclusion* illustrates that architecture that supports the involvement of all elements of the community—including students, teachers, parents, and the community—can strengthen social cohesion and improve the quality of the learning process (Paton & Johnston, 2017).

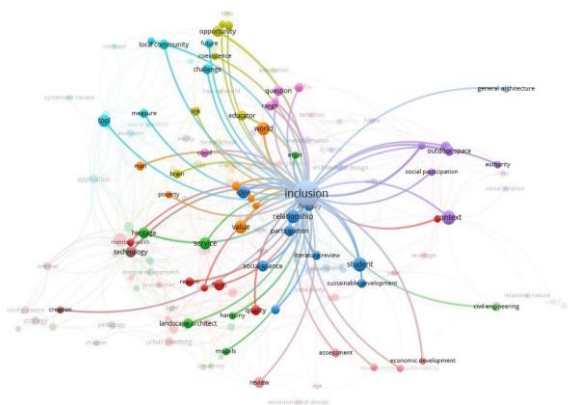


Figure 6. Relationship between Keywords with *Inclusion* as the Main Node

(Source: VOSviewer Output, Author Analysis, 2025)

The spatial typology of the nature school is the result of an architectural approach oriented towards experience and social interaction (Carmona, 2021; Mumford, 2016). Each spatial element is designed not simply as a place for activities, but as a medium for forming inclusive and participatory social relations (Escobar, 2018; Aldrich & Meyer, 2015). For example,

the learning garden is not only a place for students to receive lessons in an open atmosphere, but also functions as a space for cross-age interaction where spontaneous discussions, storytelling sessions, or shared reflections can occur naturally (Block, 2018). This space is often facilitated with soft elements such as circular wooden benches, natural canopies from trees, and open information boards that invite participation.

Green open spaces serve as social centers of gravity, supporting a variety of physical and recreational activities, from light exercise and free play to art performances (Green & Haines, 2015; Alexander, 2017). These spaces encourage informal encounters between students, teachers, and parents, strengthening the emotional bonds within the school community. The outdoor amphitheater, with its semicircular stone or wood design, provides space for performances, debates, and community gatherings. Its open layout allows all participants to sit on equal footing, symbolizing equality and democracy in communication (Paton & Johnston, 2017).

Gardening areas play a vital role in contextual education and character building. Students, along with teachers and parents, are directly involved in planting, caring for, and harvesting plants (Sobel, 2025). This process fosters a sense of responsibility, teamwork, and an understanding of life cycles and ecology (R. W. Miller, Hauer, & Werner, 2015). These activities are often integrated into cross-disciplinary curricula, including biology, mathematics, and art, making them vibrant, multifunctional learning spaces (Hikmawati et al., 2025).

Meanwhile, the community kitchen serves as a symbol of togetherness and solidarity among members of the school community. Here, communal cooking activities not only serve as a means of educating about nutrition and local food culture, but also serve as a platform for shared roles among individuals. For example, children learn to appreciate the process of preparing food, teachers facilitate value discussions, and parents participate in developing healthy community menus (Guerry et al., 2015).

Nature exploration paths serve as transitional spaces between programmed spaces, connecting one element to another. These paths serve not only for circulation but also as spaces for observation, reflection, and independent exploration. Along the paths, ecological information boards, tree trunk seating, and rest stops for observation are common. These spaces facilitate contextual learning and foster direct ecological awareness through sensory and affective experiences (George et al., 2016).

This overall spatial typology forms a cohesive social network, where the boundaries between the roles of students, educators, parents, and the community become more fluid. In this context,

architecture becomes a facilitator for the formation of a vibrant and dynamic social ecosystem (Carmona, 2021). This approach differs from conventional school design, which tends to be hierarchical and compartmentalized. At Sekolah Alam, spaces are designed to encourage interactions across boundaries of age, role, and background, so that the values of mutual cooperation, empathy, and social responsibility grow as a result of the shared experiences shaped by the space (Ching, 2023; Wong 2024).

Table 2. Typology of Space in Nature Schools and Their Functions in Social Integration

No	Space Typology	Social Function	Activity Examples
1	Learning Park	Interaction across classes and ages	Group discussion, book reading
2	Gardening Area	Community collaboration	Planting together, educational harvest
3	Community Kitchen	Cultivating the values of togetherness	Cooking together, sharing the results
4	Nature Exploration Trail	Emotional connection with nature	Expedition, ecological observation
5	Open Discussion Forum	Participation of citizens and parents	Deliberation, open class

(Source: Author's Analysis, 2025)

In addition to spatial functions, designs that adopt local vernacular approaches—such as the use of natural materials (bamboo, wood, soil), cross-ventilation, and tropical roof shapes—have been shown to support psychological comfort and emotional connectivity with nature (Sitte, 2019). These elements not only reduce students' mental stress but also foster a sense of belonging and connection to the spaces they occupy (Escobar, 2018; Block, 2018).

Overlay visualizations of research trends also indicate a shift in focus toward a more holistic and interdisciplinary design approach (Aldrich & Meyer, 2015). In the current period (2019–2023), literature has begun to emphasize the importance of integrating pedagogical, ecological, and social aspects in the design of nature schools. The emergence of terms such as forest school, learning by doing, and child-centered design reinforces the need for learning spaces to be able to address educational challenges adaptively and transformatively (R. W. Miller, Hauer, & Werner, 2015; Alexander, 2017).

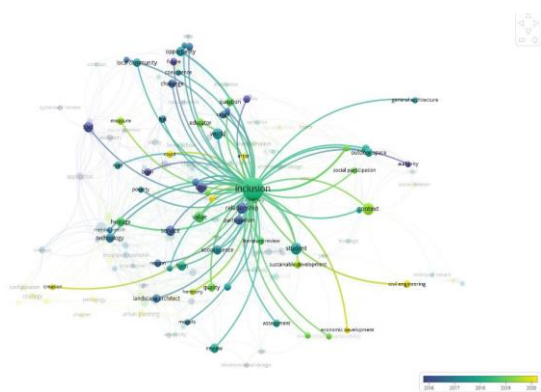


Figure 7. Temporal Overlay Visualization of Research Themes (2016–2023)

(Source: VOSviewer Output, Author Analysis, 2025)

The results of a bibliometric visualization analysis using VOSviewer show significant connectivity patterns among several keywords frequently appearing in the literature related to educational spaces. The resulting density map shows that keywords such as inclusion, student, and context occupy strategic positions with very high connectivity intensity. This indicates that these topics are central to academic and practical discourse in the development of contemporary educational environments (Barrot, 2022).

The keyword "inclusion" indicates a growing focus on the importance of creating educational spaces that accommodate the needs of all children, including those with special needs and those from diverse socioeconomic backgrounds. Inclusion is understood not only physically but also psychosocially, where every child feels accepted, valued, and able to develop optimally in their learning environment (Bosia et al., 2017).

Meanwhile, the emergence of the word "student" with a high degree of connectedness indicates a shift in educational design and policy orientation toward a student-centered approach. Educational spaces are no longer viewed simply as a place for delivering material, but rather as ecosystems designed to support active, collaborative, and enjoyable learning experiences for students. This approach positions students as the primary subjects with the right to safe, comfortable, and empowering learning spaces (Hamilton et al., 2021; Verschaffel et al., 2020).

Furthermore, the keyword "context" is also closely related to the two previous keywords, underscoring the importance of considering social, cultural, and geographic contexts in designing educational spaces (Turan, 2024). This reflects the awareness that each learning environment exists within a unique social landscape and, therefore, cannot be treated uniformly. Applying a contextual approach means that educational spaces are designed

with local values, community character, and surrounding environmental conditions in mind, making them more relevant and sustainable in the long term (Mintrop, 2020).

Overall, the results of this mapping show that academic and professional discourse in education is currently shifting toward a more holistic, inclusive, and focused on the real needs of students in their respective local contexts (George et al., 2016; Bosia et al. 2017). These findings are important as a basis for formulating policies, designing strategies, and developing educational curricula that are more responsive to local challenges and potential (J. P. Miller 2022; Johnson, 2019).

Thus, the results of this analysis clarify that architecture in the nature school serves not only as a physical learning platform but also as an active actor in shaping a harmonious social system. Context-aware design can catalyze the creation of educational spaces that are resilient to change, ecologically healthy, and adaptive to community dynamics (Wong, 2024; Stanek, 2020).

CONCLUSION

The review of architecture's role in fostering social-community integration at the nature school demonstrates that architecture not only functions as a physical structure for the learning process, but also plays a role as a strategic agent of social transformation. The design approach applied at the nature school demonstrates that contextually designed learning spaces foster close connections between students, educators, the natural environment, and the surrounding community. Through the use of local elements such as natural materials, open space, flexible circulation, and participatory spatial planning, architecture creates an inclusive, egalitarian, and collaborative learning environment.

Furthermore, the integration of local values and community culture into school design not only enhances the quality of children's learning experiences but also strengthens social bonds between school members and the surrounding community. Architecture that adapts to social and environmental dynamics acts as a catalyst for the creation of an educational ecosystem that is resilient to changing times, resilient to ecological pressures, and able to respond to the needs of a growing community. Context-aware design also strengthens the ecological dimension of educational spaces through wise resource management, natural lighting and ventilation, and the use of landscape as part of the pedagogical process.

Thus, it can be concluded that the architecture of nature schools plays a strategic role in creating

educational spaces that are not only child-friendly but also rooted in local wisdom and communal values. A design approach that prioritizes community involvement, ecological sustainability, and sensitivity to social context is key to fostering equitable, inclusive, and sustainable educational spaces. These findings provide an important contribution to the development of educational architecture paradigms in Indonesia, particularly in responding to global challenges through transformative local approaches.

Suggestion

Based on the results of the literature review that has been conducted, there are several recommendations for the development of further studies related to the role of architecture in encouraging social-community integration in educational spaces, especially nature schools.

First, a more systematic and in-depth study is needed to examine the correlation between architectural design characteristics and community social dynamics in nature-based school environments. Much of the current literature remains descriptive and has not fully explored the causal relationship between the physical elements of space and the process of forming social bonds or increasing community participation. Comparative studies across regions, both in urban and rural contexts, can provide a broader perspective in understanding the effectiveness of contextual design.

Second, it is recommended that future research integrate an interdisciplinary approach involving architectural theory, the sociology of education, and environmental anthropology in framing the study of educational spaces. This interdisciplinary approach is considered relevant for bridging the gap in understanding between the physical aspects of buildings and the sociocultural realities that occur within them, particularly in alternative educational contexts such as nature schools.

Third, there is still a need to develop a conceptual framework that can explain how architecture can function as an integrative medium within the social system of schools. Many previous studies have addressed spatial and functional aspects separately from community aspects. Therefore, it is necessary to develop a conceptual model that positions architecture as an integral part of a community-based educational social development strategy.

Fourth, in terms of methodology, the existing literature shows limitations in empirical exploration based on quantitative or mixed-method data. Most studies are still dominated by exploratory qualitative approaches. Therefore, further research could be directed at quantitatively examining architectural design variables and their impact on social integration indicators, such as parental participation levels,

community involvement, or school community resilience to crises.

By paying attention to these gaps, it is hoped that studies on the relationship between architecture and social-community integration in educational environments can develop in a more critical, structured and contributive manner to the development of inclusive and contextual educational theory and practice in the future.

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