

Conference Paper

## Study of Nature-Based Education on PAUD Buildings in Pandemic Era

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### ABSTRACT

Early childhood education schools (PAUD) are considered very vulnerable during the face-to-face learning period during the COVID-19 pandemic. Therefore, nature-based educational applications in collaboration with architectural elements are expected to reduce the risk of being exposed to viruses. This study aimed to describe the relationship between nature-based educational activities and architectural elements. The application of architectural elements appears on the exterior (building form and building facade) to the interior (spatial layout and furniture arrangement). The concept of nature-based education (educational goals) is slightly similar to the concept of nature-assisted therapies (rehabilitation goals). The research design is qualitative, while the research strategy is phenomenology. The data collection method uses research studies on similar themes and research studies on similar topics. This research uses content analysis and inductive analysis. There are at least five architectural elements related to nature-based educational activities from this research, namely: (1) building form; (2) building facade and material; (3) spatial layout, (4) layout of furniture and (5) landscape design.

*Keywords: nature-based education; PAUD school; pandemic period; architectural elements; activity.*

### Introduction

This research seeks to collaborate in the field of education (nature-based education), and the architectural field (architectural embodiment) during the COVID-19 pandemic. During this pandemic period, Early childhood education (PAUD) students—who are identical to having low immunity—are prone to being exposed to the COVID-19 virus, especially during face-to-face sessions. During the suspension of learning activities, it turned out to have several consequences, namely: the consequences of learning difficulties for students (Engzell et al., 2021), (2) for parents (Asbury et al, Engzell, Frey, & Verhagen, 2021) and (3) the teachers (Firmanto et al., 2020) namely the consequences of experiencing loss, worry and changes in mood and behavior.

Basically, early childhood education (PAUD) focuses on shaping: character (Kholilah & Anwar, 2018); on developing the social, emotional, literacy, and motor skills of children in which they must optimize for their lifetime (Firmanto, Sumarsono, & Nur, 2020). Early childhood education level (PAUD)—during the COVID-19 pandemic—requires learning that has the following characteristics: maintain social distance, reduce the duration of face-to-face meetings with many people, stay away from crowds (Firmanto, Sumarsono, & Nur, 2020); full of games and inherent supervision of teachers and parents (Firmanto, Sumarsono, & Nur, 2020).

The Director General of Early Childhood Education, Primary and Secondary Education (PAUD Dikdasmen) of the Ministry of Education, Culture, Research and Technology (Kemendikbudristek) allows face-to-face learning if the area has entered PPKM levels 1-3 (voi.id, 2021).

When the face-to-face learning period has been and/or is being started, then nature-based education (Nature-Based Education) can already be applied.

Nature-based learning offers positive effects in the form of having a link between nature dose (frequency/duration/intensity of contact with nature) and mental and social health, increased physical activity, and nature orientation (Cox et.al, 2019); found a feeling of being connected to nature was significantly related to lower levels of anxiety specifically Martyn & Brymerdalam (Morrow, 2019); nature as partner or co-therapist in the healing process and belief in 'using the relationship with nature as the key reference point for therapy' (Berger & Mcleod, 2017).

In recent years, new ideas of the arts and the creative function of the psyche that are more congruent with the ecological movement emerged as a result of some innovative ideas in the field of expressive arts therapies. The considerable similarity between modern environmental and Eco psychological understanding of the arts and world traditions, with their practices of collective expressions as a means to establish a human connection with the environment, can be found (Kopytin, 2017).

Several previous studies have discussed a lot of Nature-assisted Therapy (NAT). However, in Indonesia, research on Nature-assisted Education (NAE) is still very rare. Therefore, the purpose of this study is to explore what are the architectural manifestations of NAE in PAUD school buildings in Indonesia.

## **MATERIAL AND METHODS**

### ***Material***

This study uses two analytical processes, namely: (1) Outdoor design criteria (Yücel, 2013) and (2) Architectural embodiment (Febrianto, 2019). The elements forming the Outdoor design criteria (Yücel, 2013) are Accessibility, Visibility, Flexibility, Sustainability, Feeling of Control, Feeling of Security, Physiological comfort, Quiet, Familiarity. The elements forming the architectural embodiment (Febrianto, 2019) are the shape of the building, the facade, and building materials, spatial planning, furniture layout, landscape layout.

Similar function research on PAUD schools is: (1) the environmental care movement through learning by doing and Experience with nature through the Adiwiyata School concept (Kholilah & Anwar, 2018); (2) learning model located in and integrated with a forest area (Fauzi & Novikasari, 2019); (3) outdoors in risky play and child development (Harper & Obee, 2020).

The following are some researches on similar themes on Nature Assisted Education (NAE): designing a therapeutic garden for children with Autism Spectrum Disorder (Barakat & Ali Bakr, 2019); learning environment with the aid of a sustainable system for autism (Zhi et al., 2020); explored how children with additional needs experience interaction with 'green care' approaches in health (Morrow, 2019); supporting children's engagements with and relations to non-human animals (Born, 2018).

### ***Method***

The research design is qualitative (Cresswell, 2012), which seeks to explore what are the architectural manifestations of nature-assisted education (nature-assisted education) in PAUD school buildings. The second characteristic of qualitative designs according to Creswell (2012) is the type of design that develops (emergent design) where the research process is always chang-

ing dynamically. These changes can be seen when determining the indicators of the unit of observation and the formation of themes and categories.

The research strategy is a phenomenological type (Cresswell, 2012), namely the formation of existing categories, themes, and units of observation to form a general description. The second characteristic of the phenomenological research strategy is to identify a phenomenon of nature-based education.

The data collection method was taken from previous research on similar themes (nature-assisted education) and similar functions (PAUD schools). This research is a literature review; therefore, the data is taken from international journals and proceedings. The first step is to determine indicators and units of observation from these journals and proceedings. The second step is to determine the themes and categories of the existing units of observation.

There are two methods of data analysis, namely: discourse analysis (content analysis) (Bengtsson, 2016) and inductive analysis (Cresswell, 2012). Discourse analysis (content analysis) (Bengtsson, 2016) has the function of organizing and obtaining meaning from the data collected, namely determining indicators and units of observation from the journals and proceedings, namely determining indicators and units of observation from these journals and proceedings. From the results of discourse analysis (content analysis) it is known that this research is broad and widespread (a manifest analysis) not a sharp and deep type of research (a latent analysis). Inductive analysis (Cresswell, 2012) in this study seeks to determine the themes and categories of the existing units of observation. The inductive analysis seeks to form from specific things general things.

## RESULTS AND DISCUSSION

### Results

The restrictions on face-to-face learning during the COVID-19 pandemic have had a major impact on students, parents, and also educators (Engzell, Frey, & Verhagen, 2021). Everyone's hope is that the pandemic period will pass soon and learning will be normal as usual. Nature-assisted Education (NAE) is expected to reduce the risk of being exposed to viruses by involving natural elements in the form of plants. The concept of nature-based education (NAE) has almost the same function as the concept of animal-based education (AAE), that is, to blend the children with the elements of nature.

Some other names for nature-based education are Nature-based preschools, forest kindergartens, and informal EE settings (Born, 2018); outdoor learning (Entrich in Zhi, Aziz, & Taib, 2020); Forest and nature schools (Engzell, Frey, & Verhagen, 2021).

Based on the results of the literature review, the main categories were found in the form of five architectural embodiments (Febrianto, 2019), namely: (1) building forms suitable for Nature-assisted Education (NAE); (2) facades and building materials suitable for Nature-assisted Education (NAE); (3) appropriate spatial layout for Nature-assisted Education (NAE); (4) suitable furniture layout for Nature-assisted Education (NAE) and (5) suitable landscape layout for Nature-assisted Education (NAE).

Based on the results of the literature review, themes were also found, namely the elements forming the Outdoor design criteria (Yücel, 2013), namely: (1) Accessibility, (2) Visibility, (3) Flexibility, (4) Sustainability, (5) Feeling of Control, (6) Feeling of Security, (7) Physiological comfort, (8) Quiet, (9) Familiarity.

## A. building form

- Using natural objects (objects of regular shape) and or interesting objects (bounce houses to attract attention/promotional features) (Barakat & Ali Bakr, 2019)
- Create small space for the child as patio and terraces and/or large open space (Barakat & Ali Bakr, 2019)
- Use of plants and buildings to provide dense shady areas and/or use of tree leaf out to provide sunny areas for tactile stimulation. (Barakat & Ali Bakr, 2019)

## B. building facade

- Use fine-textured plants (smooth leaves, bark, and flowers) and hardscape (smooth finished walls and walkways) (Barakat & Ali Bakr, 2019) dan Use coarse-textured plants (rough leaves, bark, and flowers) and hardscape (rough finished walls and walkways)
- Plants with monochrome colors and/or varied colors (Barakat & Ali Bakr, 2019)
- Provide tall walls to prevent wind effects for tactile sensations or Create open spaces to allow wind movement for tactile stimulation (Barakat & Ali Bakr, 2019)
- Use of (horizontal spreading vase-shaped) plant and shrub forms (Barakat & Ali Bakr, 2019)
- Provide plant material that attract butterflies, birds and domestic animals (Barakat & Ali Bakr, 2019)

## C. spatial layout

- Human-animal cohabitation design by Jon Coe (Jon Coe Design, 2014)
- Create open spaces at the end of pathways (Barakat & Ali Bakr, 2019)
- Front porches and Roof terraces (Yücel, 2013)
- Use of pastel colors in plants and flowerbeds and/or Use of vivid colors in plants and flowerbeds. (Barakat & Ali Bakr, 2019)

## D. furniture layout

- Using vegetation with repetition elements and/or unity elements
- Use of straight, curved, and horizontal lines with a symmetrical design which gives natural relaxed character and/or vertical and diagonal lines which give a feeling of activities and movement (skiing and running) character and make space look larger. (Barakat & Ali Bakr, 2019)
- Use of bean bag chairs or ball pens Tents for restorative time outs and/or Use of Rocking chairs or hammocks (Barakat & Ali Bakr, 2019)

## E. landscape design

- Gardening zone (Barakat & Ali Bakr, 2019)
- Curved ranch layout by Temple Grandin (Grandin, 2001) in (Zhi, Aziz, & Taib, 2020)
- Use dominant tree and shrub grouping and/or Use focal points with different textures and shapes (Barakat & Ali Bakr, 2019)
- Similar plant size and proportion of open space and planted space and/or Different plant sizes (Barakat & Ali Bakr, 2019)
- Create a 'savannah' type landscape or Use of mass collection by organizing plant material (Barakat & Ali Bakr, 2019)
- No variation in ground cover / Use of multiple ground cover forms (Barakat & Ali Bakr, 2019)
- Use fragrant plants and soft textured plant materials and/or Provide aromatic plants and plants with different textures for tactile stimulation (Barakat & Ali Bakr, 2019)
- Provide soft textured plant materials (Barakat & Ali Bakr, 2019)
- Create water fountain and or embedded nozzles in a running zone (Barakat & Ali Bakr, 2019)
- Park games, outdoor gyms as well as 'green' gyms which incorporate gardening activities

to individuals exploring ways to exercise for free (Morrow, 2019)

- Landscaped grounds, Landscaped setbacks, Courtyards, Plazas, Healing gardens, Viewing gardens, The viewing/walk-in garden, Edible gardens (Yücel, 2013)
- Use patterns in the planting beds and/or Use unpredictable and spontaneous planting beds. (Barakat & Ali Bakr, 2019)

## Discussion

### A. Architectural Impact

#### 1. Accessibility & Visibility

- Unity and Harmony: Curved ranch layout (Grandin in(Zhi, Aziz, & Taib, 2020)
- Unity and Harmony: Using vegetation with elements of repetition and/or elements of unity (Barakat & Ali Bakr, 2019) on building facades, furnishings, and landscape layouts
- scale or proportion: Using irregular vegetation (a kind of savannah type landscape) and/or regular vegetation (Barakat & Ali Bakr, 2019)
- scale or proportion: using Similar plants and/or Different plants in open space and planted space both in terms of size and proportion (Barakat & Ali Bakr, 2019)
- scale or proportion: designing small spaces for the child (such as patios and terraces) and/or large open spaces (Barakat & Ali Bakr, 2019)
- rhythm and sequence: Use patterns in the planting beds and/or Use unpredictable and spontaneous planting beds. (Barakat & Ali Bakr, 2019) to give impact based on rhythm and sequence
- Emphasis: Using natural objects (objects of regular shape) and/or interesting objects (bounce houses to attract attention/promotional features) (Barakat & Ali Bakr, 2019) surrounded by plants
- Emphasis: Using dominant tree and shrub grouping and/or Use focal points with different textures and shapes (Barakat & Ali Bakr, 2019)
- texture: Use fine-textured plants (smooth leaves, bark, and flowers) and hardscape (smooth finished walls and walkways and/ Use coarse-textured plants (rough leaves, bark, and flowers) and hardscape (rough finished walls and walkways) ) ( Barakat & Ali Bakr, 2019) to create impact based on plant texture
- form and volume: Use of (horizontal spreading vase-shaped) plant and shrub forms and/or Use of (pyramid-weeping grounded) plant and shrub forms (Barakat & Ali Bakr, 2019) form and volume: No variation in ground cover / Use of multiple ground cover forms (Barakat & Ali Bakr, 2019)
- microclimate: Use of plants and buildings to provide dense shady areas and/or Use of tree leaf out to provide sunny areas for tactile stimulation. (Barakat & Ali Bakr, 2019)

#### 2. Flexibility & Sustainability

- water absorption and multifunction: park games, outdoor gyms as well as 'green' gyms which in-corporate gardening activities to individuals exploring ways to exercise for free (Morrow, 2019)
- water catchment and multifunction: Landscaped grounds, Landscaped setbacks, Courtyards, Pla-zas, Healing gardens, Viewing gardens, The viewing/walk-in garden, Edible gardens (Yücel, 2013)
- view: Human-animal cohabitation design by Jon Coe (Jon Coe Design, 2014)
- view: Gardening zone (Barakat & Ali Bakr, 2019)

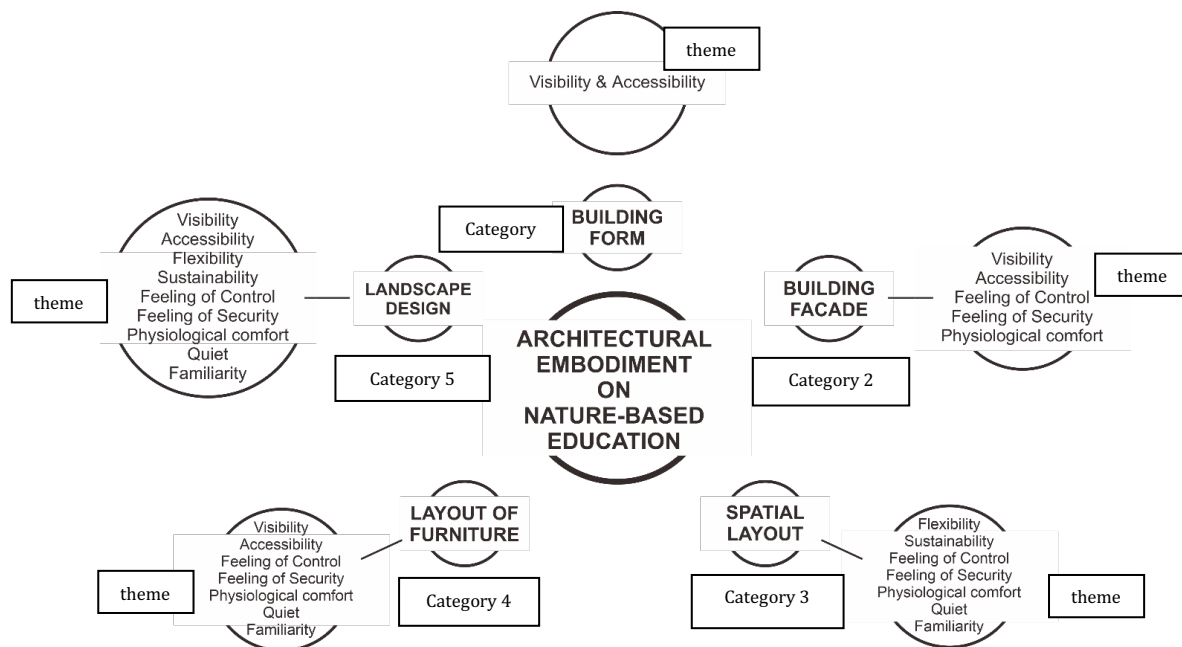


Figure 1. Embodiment of Architecture in Nature-Based Educational Activities  
Source: Author (2021)

## B. Psychological and Educational Impact

### 1. Feeling of Control, Feeling of Security, and Physiological comfort

- lines: Use of straight, curved, and horizontal lines with a symmetrical design which gives a natural relaxed character, and/or vertical and diagonal lines which give a feeling of activities and movement (skiing and running) character and make space look larger. (Barakat & Ali Bakr, 2019)
- circulation: Create open spaces at the end of pathways and or Create heights and
- topography (Barakat & Ali Bakr, 2019)
- other elements: Provide plant material that attracts butterflies, birds, and domestic animals (Barakat & Ali Bakr, 2019).
- Textures: Plants with monochrome colors and/or varied colors (Barakat & Ali Bakr, 2019)
- microclimate: Provide tall walls to prevent wind effects for tactile sensations and or Create open spaces to allow wind movement for tactile stimulation (Barakat & Ali Bakr, 2019)

### 2. Quiet & Familiarity

- views: Use of pastel colors in plants and flowerbeds and/or Use of vivid colors in plants and flowerbeds. (Barakat & Ali Bakr, 2019)
- plant materials: Use fragrant plants and soft textured plant materials and/or Provide aromatic plants and plants with different textures for tactile stimulation (Barakat & Ali Bakr, 2019)
- water feature: Create a water fountain and or embedded nozzles in a running zone (Barakat & Ali Bakr, 2019)
- site furniture: Use of Bean bag chairs or ball pens Tents for restorative time outs and/or Use of Rocking chairs or hammocks (Barakat & Ali Bakr, 2019)
- plant materials: Provide soft textured plant materials (Barakat & Ali Bakr, 2019)

Table 1. NAE Activity Impact

No	Impact	Theme	Observation unit
1	Architectural	Accessibility Visibility	unity and harmony
			scale or proportion
			emphasis
			texture
			rhythm and sequence
			form and volume
			microclimate
2		Flexibility Sustainability	water absorption and multifunction
			view
3	Psychological and Educational	Feeling of Control Feeling of Security Physiological comfort	line
			circulation
			another element
			texture
			microclimate
4		Quiet Familiarity	views
			plant materials
			water feature

Source: Author (2021)

## Discussion

NAT and NAE shared many similarities. The difference between NAT and NAE is that NAT focuses on a three-way, living therapeutic/healing relationship between the therapist, child, and the natural world (Courtney, 2017), while NAE focuses on the educational linkages between students, teachers, and the elements of nature. NAE is expected to be carried out during a pandemic (plant elements function to reduce the impact of viruses) and in normal times (plant elements function as learning media to improve especially in the motoric field and generally in the cognitive and affective fields).

The basic concept of NAE is particularly touching and directly related to nature (Berger, 2017). In the architectural field, the NAE concept can be applied to five architectural embodiments, namely (1) building forms that are suitable for Nature-assisted Education (NAE); (2) facades and building materials suitable for Nature-assisted Education (NAE); (3) appropriate spatial layout for Nature-assisted Education (NAE); (4) suitable furniture layout for Nature-assisted Education (NAE) and (5) suitable landscape layout for Nature-assisted Education (NAE). The relationship between NAE and the embodiment of this architecture refers to what is called one of the architectural themes/styles/genres, that is Biophilic Architecture.

Biophilic architecture is identical with the connection between humans and nature in terms of an evolved innate affiliation to the natural world (Wilson in (Morrow, 2019) and also connected with nature, and explores ways to amplify its psychological and physiological benefits (Birke-land, 2016). The concept of biophilic architecture also understands that humans have an innate need to get along with other living things, including non-human plants and animals (Wilson in (Born, 2018).

## Conclusion

The concept of Nature-based Education (NAE) has a function that is almost the same as the concept of Animal-based Education (AAE), that children can blend with the elements of nature.

The concept of Nature-assisted Therapy (NAT) also has almost the same function as Nature-assisted Education (NAE). NAT focuses on the therapeutic/healing relationship between the

therapist, child, and the elements of nature (Courtney, 2017), while NAE focuses on the educational linkages between students, teachers, and the elements of nature. During the Covid pandemic, NAE functions as a virus exposure reducing agent & tranquilizer, during normal times NAE functions as a psychomotor supporter.

Collaboration between the embodiment of architecture and Nature-based Education (NAE) can be in the form of (1) the shape of the building; (2) facades and building materials; (3) spatial layout; (4) furniture arrangement and (5) landscape arrangement. The relationship between NAE and the embodiment of this architecture refers to what is called one of the architectural themes/styles/genres, namely biophilic architecture (Biophilic Architecture).

## Acknowledgment

We express our gratitude to the Head and the Secretary of the Architecture Study Program for assisting the administrative process of this international seminar. Our acknowledgment is also addressed to the Institute of Research and Community Service (LPPM) of ITN Malang.

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