



Evaluation of the Architectural Features and Physical Environment in Early Childhood Education Framework

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Abstract

Many initial childhood settings worldwide have started to create an environment and educational system that would increase the children's environmental awareness and the ways to minimize it. A newly built ecological kindergarten in Antalya, Turkey, has adopted an educational system in which children are getting involved with nature in most of their daily routines. This study intended to learn if the physical environment of the declared setting responds to the early childhood environmental education work frame. Accordingly, the study has adopted "Guidelines for Excellence, Early Childhood Environmental Education Programs" as the primary resource for an evaluation checklist. Data collection is conducted via an in-depth site analysis, as well as the questionnaire survey of teachers and parents regarding their perception of the kindergarten's physical environment. The results showed that the physical environment of the kindergarten does not meet the requirements of the early education environmental framework. This study underlines the importance of profound research studies that analyze the architectural features of an early environmental education setting and the ways improving its physical attributes may promote the children environmental education.

Keywords: Kindergarten; Physical Environment; Architectural Features; Early Environmental Education; Nature-Oriented.

1. Introduction

"Time in nature is not leisure time; it's an essential investment in our children's health" (Louv, 2008).

Social awareness regarding nature and preserving natural resources has significantly increased in recent decades. The increasing concerns over the concept of sustainability resulted in developing approaches and strategies adopted by different industrial and professional sectors, among them the Early Childhood Education System. Both the environmental setting and the educational system of early childhood institutions shifted to the ways that put children in direct contact with nature and increase their awareness about the ways they may impact on it [1]. The youth-nature relationship studies suggest that outdoor activities in natural environments improve children's social and cognitive development [2] increases children's stimulation and encourages them to engage in more learning opportunities [3]. However, the parents' imbalance work-life schedule and the fast-paced technological era have limited the exposure of children to nature, thus its benefits [4]. Yet, nature is well-referred to as a general classroom that provides children opportunities for better social, cognitive, and learning skills [5]. In recent years, an increasing number of Early Childhood Education Systems such as kindergartens and childcare settings adopted nature-oriented education on their curriculum.

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A survey conducted by the North American Association for Environmental Education (NAAEE) in 2017, introduced 250 nature-oriented preschools and forest kindergartens operating across the U.S [6]. A study in Scandinavia confirmed that children attending nature nursery schools and used the forest as their outdoor playing area had a higher engagement in the education process. Similarly, in Australia, some early childhood centers created nature-based outdoor play spaces to put children in direct relation with nature [7].

Eco Farm Kindergartens (EFK) is another innovative project adopted by seven countries including Estonia, Italy, Lithuania, Norway, Portugal, Romania, and Turkey, that focuses on enhancing dynamic eco-farming activities [8]. In Turkey, an ecological kindergarten located in Döşemealtı, Antalya, adopted the EFK project's principles in its educational system and provided opportunities for the children to have an interactive relationship with nature upon their daily routines.

Following its opening in September 2017, the nature-friendly educational setting for children gets popular among parents. Many other kindergartens in surrounding areas advertised nature-friendly activities in their slogans as well as their social media, in a short time. While this kindergarten promotes a positive impact on public awareness towards the notion of nature-friendly activities in early education its physical environment's eligibility in responding to the initial concept is yet to discuss. The specific concerns of this paper are: 1) to develop a checklist for evaluating the relevance of the physical space of kindergarten in response to 'Early Childhood Environmental Education Programs' 2) to explore the strength and weaknesses of an ecological kindergarten's physical space in Antalya meets the stated framework; 3) to review the teachers and parents' opinions about the significance of an ecological kindergarten in Antalya.

Consistent with the concerns above, the developed checklist was implicated through in-depth site analysis. Furthermore, parents and teachers have participated in a questionnaire survey to answer a couple of questions that seek their evaluation of the ecological kindergarten. Data collected from both stages of research has compared and interpreted. The strength and weakness of the kindergarten's architectural design in terms of environmental education have been defined accordingly.

This study's methodological approach adopts the in-depth analysis of the ecological Kindergarten's spatial environment alongside conducting a questionnaire survey with both parents and teachers regarding this setting's physical attributes. The ultimate findings of this study will contribute to the existing knowledge of the field concerning the early childhood environment's spatial quality. It also shed lights on the impacts of enhancing the architectural features of the early childhood environment on youth education and their dual relationship with nature. Analytic studies on architecture of ecology/environmental kindergarten will contribute to the existing knowledge about improving the physical quality of early childhood setting. Since physical quality of learning space affects children's development and learning, improving the architectural features matters as much as the early education programs.

2. Review of the Literature

"It might be speculated that in some schools the physical environment may not be a necessary condition of effective learning ... [however] a key component in the strategy for improvement has been the close attention paid to the physical environment" (National Commission on Education, 1996).

An expanding body of literature entitles the early childhood years as the prominent periods of life, upon which the rest of one's life is constructed, developed, and progressed. This phase of life is referred to as a significant step in one's improvement of imagination and curiosity, which are the essential motivators for lifelong learning [9-11].

The importance of nature-based learning activities in early childhood education has been realized since the early nineteenth century. Yet neither the ecological approaches nor the sustainability concepts are clearly defined in early childhood learning curriculums [12, 13]. In recent years, however, some advanced schools are broadcasting the concept of sustainability and opportunities for children to experience ecology-based activities on their curriculum. Similarly, the crucial importance of exposing to an environmental-friendly setting in early childhood education has increasingly flagged, entitled with different names such as "nature-based preschool", "forest kindergarten", and "ecological kindergarten". In all these programs, nature forms the core of the educational philosophies and approaches. [14, 15].

Although some studies decline a strong relationship between early childhood ecological education and environmental-friendly behavior of one, later in life [16, 17], nature-based learning activities and outdoor recreational experiences such as gardening and caring for animals are claiming as an essential part of the formation of environmental behaviors [18, 19].

Most of the nature-based early childhood programs are following three criteria to develop their professional plan and principals. In these criteria: 1) Nature is the core concept that ties the entire preschool program with the classroom design, outdoor spaces, and public identity. 2) The teaching staff are required mostly to have skills and experience in both early childhood education and environmental education. 3) The school physical environment should use the

natural world to promote the children skills in all domains (cognitive, physical, social, emotional, aesthetic, and spiritual) concerning an ecological identity or environmental ethic [20].

The physical environment is addressed as the 'third educator,' alongside the teachers and educational program in a child's physical, social, and cognitive development. Therefore, it is essential to examine the spatial characteristics of any early childhood educational settings in the context of the interior (e.g., rooms size, rooms layout, and lighting) as well as the exterior (e.g., outdoor spaces, nature, play equipment) spaces [21-23].

For a long, the early childhood education centers' spatial environment has been seen only as places where the school is "kept", and just by the end of the 1980s they have been addressed as places that can directly support or restrain learning. Yet, the design of innovative buildings in the early 1990s, introduced the concepts of sustainability, disability movement, use of green materials, micro-climates, and fuel-efficient approaches to pre-school educational buildings [24].

Early environmental education studies vastly, addressed the importance of natural playgrounds, available green areas, efficient access to solar energy and natural daylighting and easy passage between interior and exterior environments for children. In a better word, the physical environment is discussed as the 'third educator,' alongside the teachers and educational program in the process of a child's physical, social, and cognitive development [25, 26]. Therefore, it is essential to examine the spatial characteristics of any early childhood educational settings in the context of the interior (e.g., rooms size, rooms layout, and lighting) as well as the exterior (e.g., outdoor spaces, nature, play equipment) spaces. More specifically, it is essential to investigate the active and passive spots with different angles and levels and open and closed points that may encourage children to explore and experience the environment and participate in social activities that develop their sense of place and self-identity [22, 23]. Yet, a limited number of studies focused on early childhood institutions' physical environment and the dual relationship of architecture layouts and learning process in preschools [13, 25].

Following this gap in the literature, this study investigates the physical characteristics of an ecological kindergarten in Antalya, Turkey, to explore its layouts and features' strengths and weaknesses. The current study is one of the first in Turkey that investigates the physical environment and characteristics of a so-called nature-based pre-primary school, responding to the Environmental Education Programs. Applying the "Guidelines for Excellence in Early-Childhood Environmental Education", for its analysis, this study has a specific look into the size, location, and layouts of this kindergarten and the impacts of such features on the interaction between students and teachers.

3. Research Methodology

This study is established through two stages of data collection. In the first stage, the kindergarten's physical environment evaluated by a checklist that has been developed based on the "Early Childhood Environmental Education Programs: Guidelines for Excellence" [27]. Guideline mentioned above helps this study set up terms to define the kindergarten's compatible architectural features with an environmental education program. These items incorporated in the evaluation checklist include the main six categories below:

1. Items that enhance children's development in space and place;
2. Items that signify nature and natural environment;
3. Items that provide comfort for children and adults;
4. Items that offer maintenance and usability;
5. Items that support health and safety and prevent risks;
6. Items that improve environmental sustainability.

By regular site visits and qualitative site analysis, the evaluation checklist developed and completed. Additionally, data is collected from teachers and staff who actively engaged with the Kindergarten's spatial environment. This part contributed to the more comprehensive data analysis (checklist and its implementation methodology noted in the Appendix I). Each item evaluated as negative (not available/responded to the evaluation guideline), neutral (available but not relevant/impartial with the evaluation guideline), or positive (available and responded to the evaluation guideline) (Figure 1).

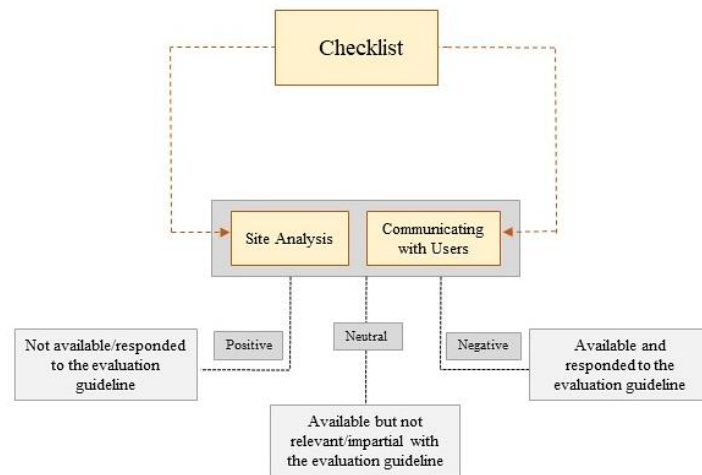


Figure 1. Schematic presentation of checklist criteria

Data collected from the questionnaire survey, targeting the parents and teachers as population study, from whom almost all the teachers and 50% of the parents have accepted to participate. Except for one specific question concerning parents, the questionnaires' structure stayed the same for both target groups. The questionnaire survey is designed to explore and compare the target groups' highlighted points with the study's checklist criteria.

The questionnaire survey includes the following research questions:

- Why did you prefer to send your child to this kindergarten? (Targeting parents)
- Question Objective: Does ecological/environmental architectural features play any role in making this choice.
- What are the features that you like most in this kindergarten?
- Question Objective: Space analysis and development of the checklist evaluation criteria
- What are the features that you dislike most this kindergarten?
- Question Objective: Space analysis and development of the checklist evaluation criteria
- Name the positive features of this ecological kindergarten.
- Question Objective: To compare the survey findings with the evaluation checklist criteria
- Name the negative features of this ecological kindergarten.
- Question Objective: To compare the survey findings with the evaluation checklist criteria
- Do you think that ecology kindergarten has added any new dimension to the surrounding context?

Question Objective: Find out if the concept of 'ecology' or the 'identical architecture' has played a role in promoting this kindergarten. Data collected from both groups of participants were analyzed and interpreted, and the outcome has been compared with the evaluation checklist criteria. The outcome classified the kindergarten's physical environment based on its strength and weak points. This could develop the ultimate criteria for evaluation of early childhood settings which promote nature-child relation concepts. Highlighting the significant scholarly gap regarding this topic, make it critical to conduct further studies to identify the design elements of a nature-oriented early educational environment for children.

4. Findings

Developing an evaluation checklist, and through several site visits, this study examined the physical environment of the Ecological Kindergarten (Appendix I). Addressing the checklist' items with staff and teachers promotes a better understanding of the preferences, failures and straightness of the spatial design, re-evaluated in the research framework. The evaluation checklist's first criteria identify if the kindergarten's spatial environment supports children's skills development. Findings confirm that while this kindergarten is rating highly effective regarding some items, it fails to address others. (Table 1). According to the findings, the Kindergarten's outdoor facilities and exposure to nature via different activities promote children's nature-friendly behaviors and attitudes and improve their learning skills through the interactive process. Yet, the questionnaire survey confirms that the kindergarten has a significant lack of semi-open spaces and sports fields while a substantial part of the interior and exterior areas covered with artificial greeneries.

Table 1. Evaluation of the spaces and places to enhance development in the ecological kindergarten

1. Spaces and places to enhance development		
Evaluation Items	comments	Rating
1.1	There are no natural elements available. Instead, the garden is equipped with artificial objects in the playground.	Negative
1.2	Collecting natural pieces and materials from the garden, children created artworks. They were also constantly observing and appreciating plants growing as well as petting animals kept in the yard.	Positive
1.3	Sensory experience: Touch: The sand pool, the soil and the plants create a touch scape for the children. They can touch a variety of organic and natural materials in a variety of activities such as cooking and science-based games. Smell: Although there is not a dominant scent at the Kindergarten teachers are using a mixture of organic ingredients to teach the smell scape. This follows by the cooking activities. Sight: Children have a full view of the outdoors from all the rooms and classrooms. Also, there is complete visual access to the central garden from the corridors. Taste: While there are local fruits and vegetables available for the children, they collect the self-growth ones from the garden as well.	Positive
1.4	All learning materials are displayed in open shelves and cupboards in the classrooms.	Positive
1.5	Sprinkler, Piles, and shelves are only the materials that children can use in the yard. They are kept in storage under the supervision of teachers.	Positive
1.6	Lack of a semi-open space makes it difficult to use the outdoor spaces during the winter. Moreover, the lack of shading elements limits the use of outdoor spaces during the hot summer days.	Negative
1.7	There is no ample shade in the garden. Instead, there is an out of scale pergola to be used by children. Although having bright sunny indoor spaces is mostly appreciated due to the transparent facade of the building, it is not responding to the climate of Antalya during hot summer days. There are no windbreaks. The teacher believes that it would be better to offer larger areas to the central garden. Children have no access to the passive spaces inside the Kindergarten as teachers do not let them be anywhere alone. Besides, due to the lack of physical spaces these spaces are used as storage for the books and gaming objects. The small gathering area is unavailable due to the built-in furniture. Art activities are happening inside the classrooms, but according to the teacher's lack of passive spaces and corners did not allow them to create learning stations. There is a separate room for 'music and movement.'	Negative
1.8	There are plants all over the place, and children participate in watering them inside and outside. Children also feed the animals in the garden.	Positive
1.9	Except for the eating area, there is no other space that all the children and teachers can share. The entrance is too small, and the children cannot gather all together there.	Negative
1.10	Indoor spaces are well-defined, to enter and exit the space and the activities do not interfere with one another.	Positive
1.11	Use of soft and neutral colors in most of the rooms and classrooms prevent children from over stimulating. There is a lack of sleeping room that makes resting time a challenging phase.	Negative

On the next step, this study evaluates the natural components used in the Ecological Kindergarten physical environment, which proved to be insignificant and limited (Table 2). There is no sign of using sustainable, nature-friendly materials used in the building. Due to technical problems with the watering system, the outdoor pound never filled with the water and stayed empty.

Table 2. Evaluation of the availability of natural components in the ecological kindergarten

2. Natural components		
Evaluation Items	Comments	Rating
2.1	There is no asphalt outdoors, and the artificial stones and tiles cover the walking paths. No natural materials are used to define the pathways.	Negative
2.2	No natural material is used in the indoor and outdoor play area.	Negative
2.3	There are loose parts and earth materials, but there is no rough ground.	Neutral
2.4	There is no water source outside. There is a pool, but it is empty due to technical problems.	Negative
2.5	There have been some human-made bird nests located in the garden, but no birds have ever lived in them. There is a Palm tree in the central garden that turned out to be a natural habitat for the birds and children visited this tree from time to time.	Neutral
2.6	There are plants located in indoor space.	Positive
2.7	Maki tree is Antalya's local Tree. There is no Maki tree inside, but there are a couple of Maki trees visible from the window in the surrounding areas. Except for the fruits, children are not exposed to any other local heritage.	Negative
2.8	Natural materials such as seasonal fruits, local organic food, and natural materials are used in hands-on activities. Due to lack of enough space entrance is mainly used to exhibit these materials. Transparent façade allow children to observe climate change through seasonal changes.	Positive

The third theme examined is the level of space users' including teachers and students comfort in the Kindergarten spatial environment. This study finds out that a significant lack of space is incompatible with different activities. This makes it a challenge to access the equipment and materials and perform well (Table 3). The same problem noted for the outdoor areas and enough opportunity for children re-creative activities.

Table 3. Evaluation of the children and teachers comfort in the ecological kindergarten

3. Comfortable for both children and adults		
Evaluation Items	Comments	Rating
3.1	There are nooks and furniture for children's interaction but teachers have personal areas. There is a lack of a functional gathering area and children do not use the particular areas.	Negative
3.2	Sufficient seating areas are provided.	Positive
3.3	While the spaces are safe and inviting, this Kindergarten is not a barrier-free one, and physically impaired children cannot have access to the second floor.	Negative
3.4	Only the small zoo looks adventurous, whereas the corners remain unused and shallow.	Negative
3.5	Shading elements and wind protections are missing.	Negative
3.6	They use natural ventilation by opening windows on both sides. Transparent façade brings in natural light and keeps the area warm in winter. Solar panels provide the electricity for heating and cooling.	Positive
3.7	Use of colors and soft materials together with the transparent facades make the indoor space look attractive. The Circular form of the building along with the transparent walls makes the architecture attractive.	Positive
3.8	There is not enough play area inside and outside. There is a chest area inside, but the chest is not a local play. Hide and Seek and Hopscotch are local plays which children play from time to time with their teachers.	Neutral
3.9	Outdoor looks more exploratory in comparison to the interior and the adventures are more activity-based rather than physically-based.	Negative
3.10	There is storage in the garden separate from the main building for keeping the children's art crafts, and also they store natural materials in this storage. The manager and teachers believe that it would be better if they had bigger storage inside.	Negative

Providing spatial maintenance was one of the strongest characteristics in this kindergarten, and most of the necessary items were rated as positive (Table 4). Although the kindergarten adopted "Ecology" to introduce itself, nature-based development of its features and spaces evaluated insufficient and poor.

Table 4. Evaluation of the spatial maintenance in the ecological kindergarten

4. Maintenance and usability		
Evaluation Item	Comments	Rating
4.1	Children are using sprinklers to water the plants. Taking planting tools from the storage under the supervision of teachers, children make organic composting.	Positive
4.2	Lack of record on sustainable construction materials.	Negative
4.3	Indoor signage is appropriate and outdoor paths are defined, but fences are not from natural materials.	Neutral
4.4	Appropriate items are accessible to the children via open shelves, and inappropriate things are kept out of the reach of children.	Positive
4.5	All facilities meet applicable regulatory standards.	Positive
4.6	Children clean their classrooms every Friday. They also participate in collecting their dishes and garbage after their meal and to clean the used area.	Positive

Risk assessment criteria and safety measures are positively rated in this Ecological Kindergarten (Table 5). This is an essential element to concern as the lack of safety measures in any functional space would make it hazardous. Yet, this study did not recognize the spatial environment of the ecology kindergarten, a disable-friendly one. There is a lack of universal design parameters in this building's design features, and it may discourage any child with limited physical abilities to be able to choose this kindergarten as an education system in the future.

Table 5. Evaluation of health, safety and risk' in the ecological kindergarten

5. Health, safety and risk		
Evaluation Items	Comments	Rating
5.1	Risk assessment concerning the environmental, biological, chemical, and structural hazards.	Positive
5.2	The Established Americans with Disabilities Act (ADA) is not applied, but health and safety standards are followed, and a risk management plan is in place.	Negative
5.3	Emergency plans are established, shared, and understood by staff.	Positive
5.4	Outdoor activity has been emphasized by most of the parents as a positive feature of the kindergarten.	Positive
5.5	Staff are well trained by participating in ongoing training; emergency and first aid supplies are available.	Positive
5.6	Staff members know their disposition toward risk.	Positive

The evaluation checklist's final criteria examine environmental sustainability, which the findings of the study validate as weak-developed and insufficient (Table 6).

Table 6. Evaluation environmental sustainability in the ecological kindergarten

6. Environmental sustainability		
Evaluation Items	Comments	Rating
6.1	A solution to collect the rainwater is not considered even though Antalya rains all winter. However, from time to time children water the plants with the buckets that have to collect the rainwater. Children participate in gathering the recycled materials. Children prepare food, Jam, and tea by using the fruits and vegetables they collect from the garden. Solar panels on the roof support the electricity of the building.	Positive
6.2	Design of the building does not meet the validation criteria for the sustainability, regarding material and layouts.	Negative
6.3	Materials are easy to clean and prevent sliding. But no other special consideration.	Neutral
6.4	Except for the solar panels, there is no other consideration that contributes to indoor sustainability.	Negative
6.5	Chemical poison used for the mouse in the garden but children's access to the yard was denied at this time. No other insect emergency has reported.	Positive
6.6	Maintenance practices and supplies are not used with sustainability in mind	Negative
6.7	Rainwater is collected occasionally by using buckets.	Negative

Table 7 discloses a detailed analysis of Ecological Kindergarten's physical environment. Although, the building's architectural characteristics are mainly rated inadmissible to the values discussed in evaluation criteria, the nature of suggested activities in educational curriculum praised. It confirms that a nature-based program is highly promoted in the education panel rather than the physical and spatial quality of the kindergarten.

Table 7. Evaluation environmental sustainability in the ecological kindergarten

Strengths	Weaknesses
<ul style="list-style-type: none"> - Availability of the appropriate activity areas - Providing a variety of sensory experiences - Availability of an outdoor storage areas - Central courtyard - Well-defined activity areas (Music room and cinema room) - Various comfortable seating elements - Transparent façade for natural lighting - Natural ventilation - Availability of zoo in garden - Solar panels - Safe and secure environment 	<ul style="list-style-type: none"> - Lack of natural play elements - Lack of semi-open spaces - Lack of enough outdoor spaces - Lack of a well-design indoor storages - Lack of common areas - Failure of design in creating various active and passive adventurous spaces for children and their interaction with environment/nature - Lack of a water source in outdoor - Insufficient use of natural materials in indoor and outdoor - Design solutions to collect rainwater and windshield - Lack of enough play area - The inappropriate design approach for disabled users - Failure of response to the sustainability

Figure 2 summarizes the findings from the 1st question of the survey, indicating the reasons for parents to choose this educational setting for their children. While some parents mentioned more than one reason behind their choice, for most of them, the originality of the education system offered in this school was the main reason to choose it over other places. This choice is confirmed with the evaluation checklist as the program given in this pre-school is highly noted as a creative, practical one.

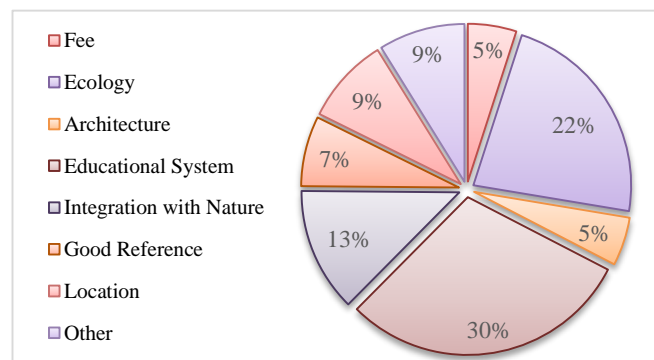


Figure 2. Parents' reasons for choosing the ecological kindergarten

The second question asked parents and teachers to name the features that reflect the environmentally friendly approach in the kindergarten. The participants may provide more than one answer to the questions. The findings of this part are categories in four different groups (Figure 3). While the evaluation checklist confirmed the lack of outdoor spaces and greeneries, these features were repeatedly mentioned in the questionnaire survey. This study concludes that referring to the word 'nature' might have led the participants to choose the outdoor area as an option.

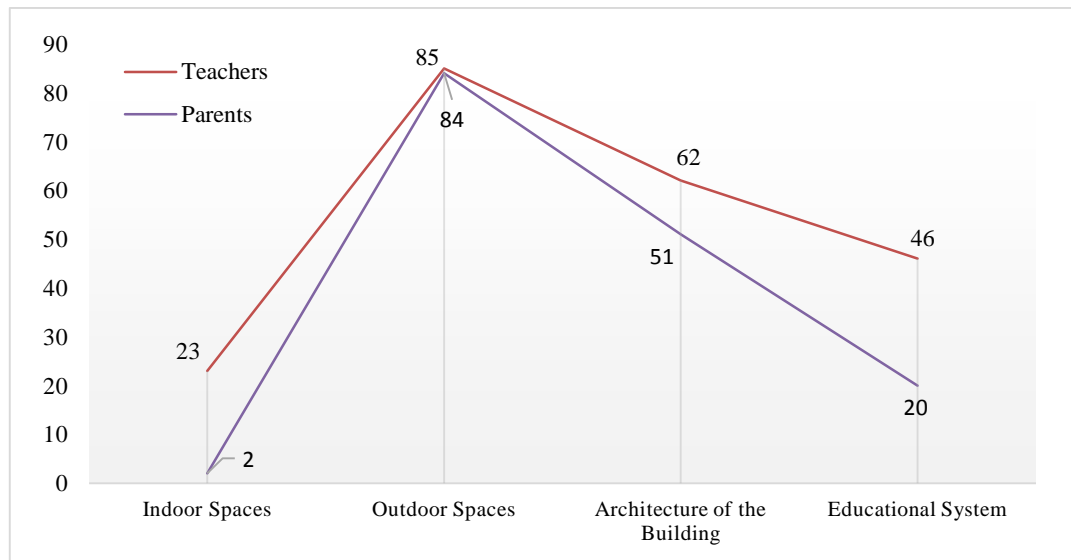


Figure 3. Features that reflect the environmentally friendly approach of the ecological kindergarten according to teachers and parents

In another question, both parents and teachers were asked to mention the features they may like or/and dislike the kindergarten's physical environment (Table 8). Providing more than one answer to the questions, this section's general outcome shows parents are generally satisfied with the kindergarten's physical environment, praising its transparent, colorful façade. About 14% of parents didn't like the indoor spaces, citing the narrow corridors, insufficient carpet coverage, small dining and lack of sport zones.

Table 8. Feature parents and teachers like/dislike the most about the physical environment of the kindergarten

		Teachers	Parents
Likes	Outdoor spaces	38%	22%
	The architecture of the building	69%	62%
	Indoor Spaces	69%	14%
Dislikes	Outdoor space	38%	4%
	The architecture of the building	31%	11%
	No dislikes	0%	66%

On the other hand, analyzing the teachers responds as the permanent users of the space show that 38% of the teachers have liked the indoor spaces, referring to the availability of washrooms inside classrooms, availability of music and cinema rooms, and employing wood as the main material covering interior spaces. The other 69% criticized indoor spaces regarding the lack of a sleeping room, the size, and the classrooms' shape, the furniture and inadequate toilets on the ground floor. 69% of the teachers liked the kindergarten's architecture, referring to the transparent facade, direct access of the classrooms on the ground floor to the garden, and the building's round shape, which helps to its unique form (Figure 4).

Table 9. Positive and negative features of this kindergarten according to parents and teachers

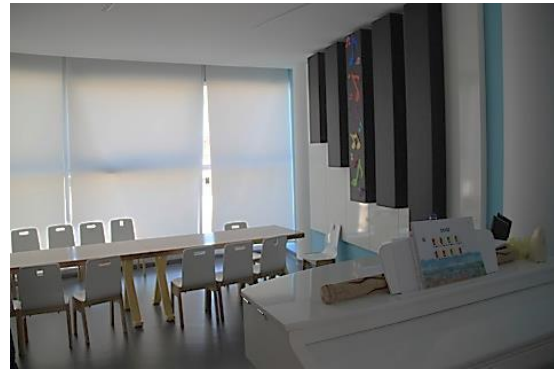
Positive features based on participants responses	Percentages
Architecture	14%
Garden and animals	11%
Ecological concept	20%
The education system and teachers	70%
Location	2%

Facilities	14%
The activities	9%
Washrooms in class	4%
Other (monthly fee, food, hygiene, reliability, being institutional, etc.)	20%
Negative features based on participants responses	
Percentages	
Lack of enough space for parking area	4%
The education system and teachers	20%
Location	6%
Kids are getting sick a lot because of being outside in cold weather	%
Difficulties in finding natural materials for daily activities	6%
Security	6%
Lack of enough ecological design solutions	6%
Other (monthly fee, being institutional, lack of school bus, insufficient activities, etc.)	14%

Lack of a solution to collect rainwater, lack of appropriate storage to store natural materials and lack of semi-open space are mentioned as weaknesses of this kindergarten. Mismanagement in collecting water from heavy rainfalls, lack of storage to keep natural products coming from the garden, are also cited as other critical points. In the end, both groups were asked if this kindergarten adds a new dimension to its surrounding context. All teachers and most of the parents' agreed that Ecological Kindergarten, with its name, design, and the educational system, may added socio-economic and architectural values to Döşemealtı area.



(a) Transparent façade



(b) Music room



(c) Main entrance



(d) Animal shelter

Figure 4. Photos of the ecological kindergarten

5. Conclusion

There is an ongoing concern regarding nature and preserving natural resources in different domains, including early childhood education settings. Recently, an increasing number of Early Childhood Education Systems such as kindergartens and childcare settings adopted nature-oriented education on their curriculum. An ecological kindergarten in Turkey (Döşemealtı region, Antalya, Turkey) has adopted the EFK project's principles, to provide opportunities for the children for a proactive relationship with nature in their daily routines. Due to its environmental approach, this

Ecological Kindergarten has gained popularity among local people and promoted a positive impact on public awareness towards the notion of nature-friendly early education program. However, the eligibility of this Kindergarten's physical environment in response to this initial concept is yet to discuss.

Current study intended to evaluate the physical characteristics of Ecology kindergarten and identified the strengths and weaknesses of its physical environment according to the 'Early Environmental Education' chart of evaluation. Finding shows that kindergarten has achieved more success with the offered educational program rather than its physical space. The kindergarten's spatial context, cited as a failure to promote nature-friendly interaction for children mostly blamed on the lack of greeneries and natural icons, insufficient semi-open spaces, the usage of artificial materials, and limited active common areas. Similarly, the building does not meet the requirements of a sustainable or ecological design. This study suggests that the ecological Kindergarten's spatial quality should meet additional design solution to promote an environmental-friendly setting for children. Otherwise, an ecological kindergarten's environmental-friendly environment will remain on the theoretic educational curriculum rather than practicing in real by children. This research emphasizes the importance of investigating architectural features that will improve early environmental education's physical quality. With attention to the significant scholarly gap regarding this topic, it is essential to conduct further studies to identify the design elements required for a nature-oriented early educational environment.

6. Declarations

6.1. Author Contributions

Conceptualization, S.I.; methodology, S.I.; software, S.I., P.P., Y.Ş.; validation, S.I., P.P., Y.Ş.; formal analysis, P.P.; investigation, S.I., P.P., Y.Ş.; resources, P.P.; data curation, S.I., P.P., Y.Ş.; writing—original draft preparation, S.I., P.P., Y.Ş.; writing—review and editing, S.I., P.P., Y.Ş.; visualization, Y.Ş.; funding acquisition, S.I., P.P., Y.Ş. All authors have read and agreed to the published version of the manuscript.

6.2. Data Availability Statement

The data presented in this study are available in insert article.

6.3. Funding

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6.5. Conflicts of Interest

The authors declare no conflict of interest.

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Appendix I

Spaces and places to enhance development

1. Natural components on which to climb, crawl through, jump on and off, lift, and move in other special ways are available
 2. Developmentally appropriate tools to observe, manipulate, collect and construct are provided.
 3. A variety of sensory experiences, textures, sounds, tastes, smells, and sights are included in the child's environment
 4. Objects to encourage language skills, math skills, and artistic and creative expression are readily available.
 5. Tools to create products from nature — e.g., applesauce maker, spiles to collect sap, and child-appropriate construction tools (such as saws, hammers, and nails) are provided under careful supervision.
 6. Variations in seasonal and daily weather are carefully considered to ensure the child's comfort and safety.
 7. The physical environment is varied and includes a spectrum of possibilities—ample shade, sunny spaces, windbreaks, open areas, small hiding places or refuges, gathering areas, areas for building, and areas for art and music and movement.
 8. Physical spaces used and their associated programs encourage a respect for nature and living things.
 9. "Sharing spaces" are included where children meet to get tools, supplies, look at bulletin boards, and so forth.
 10. Space is divided into clearly defined areas for different kinds of activities, making sure that one activity does not interfere with another.
 11. Space is not visually overwhelming or over stimulating. Enough space is provided for contemplation and quiet personal time.
-

Natural components

1. In outdoor areas, use of asphalt is reduced; gardens, woods, natural pathways, and other natural elements are incorporated.
 2. Natural materials are used to create the environment and objects for play both indoors and outdoors.
 3. Abundant "loose parts" (sticks, leaves, seeds, logs, stones), earth materials (soil, sand, and rocks), and "rough ground" (uneven, rocky, challenging areas) are included in the outdoor environment.
 4. Safe and supervised water features are provided.
 5. The outdoor areas are landscaped so as to be inviting to appropriate wildlife, including birds and bugs.
 6. Plants are incorporated into the indoor environment.
 7. Native plants are used in outdoor areas to help children know what their biological heritage is, to reduce maintenance, and to support native fauna such as butterflies and birds.
 8. Outdoor and indoor areas incorporate a wide variety of natural features and materials to promote interest and encourage interaction. Materials indoors are changed frequently and seasonal changes in the natural world are featured.
-

Comfortable for both children and adults

1. Individual and group gathering areas are included
 2. Sufficient seating for adults and children are provided.
 3. Places feel safe and are obviously accessible and inviting.
 4. Nooks and crannies are provided to encourage discovery and allow a sense of refuge.
 5. Shade and protection from wind and inclement weather are provided.
 6. Whenever possible, natural features for warming, cooling, shelter, and lighting are provided.
 7. Places are aesthetically pleasing.
 8. The play space is fitted to the local culture and climate.
 9. Areas are designed to encourage a sense of adventure and exploration.
 10. Easy access and storage of natural materials are provided.
-

Spatial Maintenance

1. Means to care for the natural environment (tools, water, composting, accessible storage) are provided.
 2. Materials used in the construction are chosen with sustainability in mind.
 3. Appropriate fencing, signage, and paths through outdoor spaces are incorporated.
 4. Appropriate items are within reach of children; inappropriate items are not.
 5. Facilities meet applicable regulatory standards.
 6. Opportunities for the children to care for their space are provided.
-

Health, safety, and risk

1. Risk assessment has been completed that considers environmental, biological, chemical, and structural hazards.
-

2. Established Americans with Disabilities Act (ADA), health, and safety standards are followed and a risk management plan is in place.
3. Emergency plans are established, shared, and understood.
4. Parents understand the nature of the child's experiences and have realistic expectations of the outdoor activities.
5. Staff is adequately trained; emergency and first aid supplies are available.
6. Staff members each know their own disposition toward risk.
7. Adults understand their responsibilities as supervisors, coaches, and role models.

Environmental sustainability

1. Facility design and program implementation feature environmentally responsible practices such as energy and water conservation, solid waste management (e.g., recycling and composting), food production and preparation, and minimal use of disposable materials.
 2. Materials are chosen with sustainability in mind.
 3. Materials are chosen with the health of users in mind.
 4. Outdoor design contributes to indoor sustainability (e.g. " access to solar heat).
 5. Pest management, when appropriate, uses nontoxic alternatives.
 6. Maintenance practices and supplies are used with sustainability and health in mind.
 7. Where appropriate, rainwater is collected and stored for use in gardens.
-

The following is a sample of Rating Scale explaining the definitions for each value on the scale.

Scale	Definitions (Choose and/or Modify as Appropriate)
Positive	Physical environment provides extremely effective performance.
	Considered design solutions are above criteria for successful job performance.
	Environment provides the requirements.
	Design requirements to provide the requirements are truly excellent.
Neutral	Space/Place requirements to provide the item fully meets competency requirements.
	Physical environment provides an approximate effective performance.
	Environment provides one or two of the minor requirements.
Negative	Space/Place requirements to provide the item to some extent meets competency requirements.
	Physical environment insufficient or significantly below criteria required for supporting the item.
	Considered design solutions are not sufficient. Environment is not competent.
	Space/Place requirements are not sufficient to provide the item's requirement.