



## ASSOCIATION OF LEARNING SPACES WITH NATURE: THE EXAMPLE OF KIRKLARELİ ZÜBEYDE HANIM KINDERGARTEN

Gülcan MİNSOLMAZ YELER<sup>1\*</sup> 

<sup>1\*</sup>Kırklareli Üniversitesi, Mimarlık Fakültesi Mimarlık Bölümü, Kırklareli, Türkiye

### Abstract

Nature is a necessary need for everyone, so knowing, exploring and learning about nature are processes that must be acquired during childhood. Exterior and interior spaces need to be reorganized as spaces that children use and get benefit from so, they will want to learn, raise their sense of discovery, and provide them to be individuals who are self-confident. Innovative approaches are required for children to protect them, support a healthy life style, and strengthen their bond to the nature in their daily life. Therefore, access to nature through “biophilic design” is possible in terms of children’s daily lives. Supporting children’s development in the best way possible is an important start for a qualified education period. Thus, a qualified pre-school education environment is the most effective tool to provide children’s psychomotor, cognitive, and socio-emotional spaces. The aim of this study is to investigate how children can make a connection to nature during their pre-school education and determine how the interior and semi-open spaces they live in can be integrated to biophilic elements. In this context, developed a design proposal in Zübeyde Hanım Kindergarten, which is chosen as the pilot application area in Kırklareli city.

**Keywords:** Nature, Biophilic design, Learning spaces, Closed space, Semi-open space, Kırklareli, Zübeyde Hanım Kindergarten.

## ÖĞRENME MEKANLARININ DOĞA İLE İLİŞKİLENDİRİLMESİ: KIRKLARELİ ZÜBEYDE HANIM ANAOKULU ÖRNEĞİ

### Öz

Doğa, kişiden kişiye değişen göreceli bir kavram olmayıp herkes için zorunlu bir ihtiyaçtır. Doğayı tanıma, doğanın dilini öğrenme, doğadaki farklılıkları keşfedebilme çocukluktan aktarılması gereken bir süreçtir. Çocuklarda öğrenmeyi isteme, keşfetme duygusunu arttırma, merak duygusu uyandırma, doğa ile uyumunu sağlayarak kendine güvenli ve yaşamla barışık bireyler olmasını sağlamak üzere iç ve dış mekânların kullandıkları ve faydalandıkları mekânlar olarak düzenlenmesi

Sorumlu Yazar: Gülcan MİNSOLMAZ YELER, gulcan.yeler@klu.edu.tr



gerekmektedir. Çocukları korumak, sağlıklı yaşam tarzlarını desteklemek ve günlük yaşamlarında doğa ile bağlarını güçlendirmek için yenilikçi yaklaşımlar gerekmektedir. Bu nedenle çocukların günlük yaşamlarının odak noktasında “biyofilik tasarım” aracılığı ile doğaya erişim mümkündür. Çocukların gelişimini en iyi şekilde desteklemek kaliteli bir eğitim sürecinin önemli bir başlangıcıdır. Böylelikle nitelikli bir okul öncesi eğitim ortamı çocukların psikomotor, zihinsel ve sosyal-duygusal alanlarda gelişmelerini sağlamada en etkili araçtır. Bu çalışmanın amacı, okul öncesi eğitim dönemindeki çocukların öğrenme ortamlarında doğa ile nasıl bağlantı kurabileceğini araştırmak, yaşadıkları iç ve yarı-açık mekânların biyofilik elemanlar ile nasıl bütünleştirilebileceğini saptamaktır. Bu kapsamda Kırklareli ilinde pilot bir uygulama alanı olarak seçilen Zübeyde Hanım Anaokulu üzerinden mimari bir bakış açısıyla tasarım önerisi geliştirmek çalışmanın sürecini ortaya koymaktadır.

**Anahtar Kelimeler:** Doğa, Biyofilik Tasarım, Öğrenme mekanları, Kapalı mekan, Yarı-açık mekan, Kırklareli, Zübeyde Hanım Anaokulu.

## 1. INTRODUCTION

Pre-school education, which includes children in the 0-77 month group and is called early childhood; It is defined as an educational process that takes place within the basic education integrity that is suitable for children's development levels and individual characteristics, provides rich stimulating and environmental opportunities, supports their physical, mental, emotional and social development, guides them in the best way in line with the cultural values of the society and prepares them for primary education [1]. Preschool education, which is also emphasized as the "sensitive period" or "critical period", is very effective in the development of the child's innate abilities and personality. Habits and skills, social communication, beliefs and value judgments gained at this age shape the child's later personality structure and enable him to be productive and participatory [2]. Therefore, the understanding of education aimed at multi-faceted interaction in this period also necessitates a safe and comfortable physical environment that offers multi-faceted experiences to the child. However, when existing schools are examined, it is seen that children spend most of their time indoors, devoid of nature, and that physical spaces do not provide adequate conditions. Especially places that do not interact with nature bring along many diseases (attention deficit, hyperactivity disorder, etc.). This makes the design of preschool learning spaces important. As Dutt [3] states, it becomes a necessity to investigate and determine which aspects of a school's



built environment improve students' relationships with the natural world. Similarly, Moore [4] states that a child's environment is very important for physical and cognitive development, and that educational environments are rich in stimulants, providing children with the opportunity to explore and test. With these aspects, it turns out that a built environment rich in natural elements plays the most important role in learning, as it has a positive effect on activities such as children's display of physical abilities, expressing multiple abilities, and seeking social contact [5].

Many researchers such as Moore and Cosco [6]; Kellert [7]; Phenice and Griffore [8]; Heerwagen [9]; Moore and Marcus [10]; Louv [11]; and Chawla [12] reveal through their studies that nature has positive effects on children. Generally, through a direct and versatile interaction that children make with nature, they acquire many aspects that include physical and social abilities, and the integration of all senses. A versatile interaction, however, brings about a multidimensional spatial experience and, likewise, versatile activities. Aiming to let children want to learn, raise their sense of discovery, and arouse curiosity, it is necessary to organize the closed, open, and wide spaces of the learning spaces that allow for experience and as spaces that can be benefited. Variability and richness of the activities done in such spaces raise the efficiency of spaces in the relationship with the nature. Taking into consideration the multi-sensory relationship between the architectural space and the individual, Öktem and Ökem [13] define the efficiency term as a place which includes the experience of the body in the space and the psychological and mental intensity that it feels in the design. Pallasmaa [14] also defines the efficient architectural experience as a multi-sensory experience and states that eye, ear, nose, skin, tongue, skeleton, and muscle have the equal share to experience of the space. In this vein, space, which can be defined as efficient, is an architecture that is powerful enough to make a mental difference on the subject and is about how much space touches the body and the mind [13]. Accordingly, in addition to the closed spaces that provide for various perceptive spaces where the child can perceive with his senses, efficient spaces, which are intertwined with nature and where nature is the ultimate learning space, develop children's abilities to grasp, internalize, and analyse as well as their imagination and creativity. With its endless richness (colours, textures, tastes, smells, actions etc.), nature provide a full use of senses and this sensory variety encourages curiosity in children, forming a more creative learning environment [15, 16]. Thus, space, with its educational value, gives the child the idea of good design at an early



age, change him with the opportunities it presents, and affect his life [17]. The child acquires a certain identity who identifies himself with a well-designed space.

Providing opportunities for participation, observation, and experience, these learning spaces become natural living and experience spaces where ecological processes can be observed on-site by enriching the with living materials [18]. In this aspect, getting acquainted with nature at an early age is not only an important need in terms of child development, but it also provides for the awareness that nature is a part of their lives [19]. The studies mentioned above assert that learning spaces can be designed so that they will be an intermediary for children's relationship with the natural world. In this vein, it can be seen that biophilic design has significant effects that by transforming learning, raising creativity, and implementing nature in the learning space deliberately [20], it provides significant gains in terms of health and well-being, feelings, and behaviour and cognition [21], and enables designers to produce new ideas who pay attention to children's connection to the natural world.

It becomes important to grasp the child-learning-nature-space relationship in order to correctly practice the principles of biophilic design in the design. In this vein, the main frame of the study focuses on this issue and foresees that learning spaces have a large potential to help bring children and nature together. Within the context of the study, it was considered that biophilic design would produce solutions to the aforementioned issues to strengthen children's access and relation to nature in their daily lives, since it is an innovative design approach. Based on the foresight that learning in early childhood is not limited to indoor spaces, it is inevitable that biophilic design principles should be integrated with the design of indoor, outdoor and transition spaces between learning spaces. However, within the scope of the study, indoor and semi-open spaces were taken as a basis, especially for Kırklareli Zübeyde Hanım Kindergarten, since open spaces should be handled from the perspective of the discipline of landscape architecture. First of all, it has been tried to reveal the extent to which biophilic design elements are present in all of the mentioned spaces. Afterwards, design proposals based on the integration of closed and semi-open spaces with nature were developed. While creating the design proposals, it was aimed to make spatial improvements with affordable budgets, where children can experience nature at first hand, without making extensive structural changes.



## 2. LITERATURE REVIEW

### 2.1. Biophilia and Biophilic Design Concepts

Biophilia, meaning the love of life and life processes, is a term first mentioned by the psychoanalyst Erich Fromm in his book “Heart of Man” in 1964, and later popularized by the Nobel winning biologist Edward Wilson in 1984. Wilson defined biophilia as “the innate tendency to focus on life and close-to-reality processes” in his book “Biophilia”, and used the “biophilia” term to define the deep feelings of connection to the nature during a discovery and submerging in the natural world process [22, 23]. Scientists from different disciplines gathered to think and discuss the concepts introduced by Wilson in 1993, and came up with a book titled as “The Biophilia Hypothesis”. Beyond a basic necessity, Wilson and the ecologist Kellert assumed that strengthening the innate affection and bond to the nature is necessary for the well-being of the modern urban human. They asserted that humans are biologically designed to positively respond to nature; and as Fromm states, this relationship would help humans with intellectual, emotional, and spiritual content [24]. In a conference held in America in 2006, benefits of biophilia were discussed in terms of their application in urban planning and architecture; and later the discussion led to a book titled “Biophilic Design: The Theory, Science, and Practice of Bringing Buildings to Life” which forms an interdisciplinary foundation for a biophilic design approach in the built environment. This book has received interest and presented the birth of biophilic design. Introducing a new approach in idea and design by defining an alternative human-nature relationship for urban citizens, the preface of the book describes biophilic design as “the expression for the need for the human to form a relationship with nature in the design of the built environment” [25]. By developing their ideas through their collaboration with Roger Ulrich and Bill Browning in later periods, Kellert and Heerwagen have encouraged the use of biophilic design in architecture [26].

Biophilic design emerged as a concept in which the human being feels affection for nature again and integrates his inner bond to nature, and has been a new approach blended with the parameters of the modern architectural design that is the contemporary trend [27]. The basic aim of biophilic architecture has been to, for the performance and well-being of the humans, provide and sustain the need for positive experience with the natural systems and processes that continue to be critical in the modern life with the built environment. Biophilic design in architecture includes aspects such

as the use of natural materials, natural air conditioning, natural light, shapes and forms inspired by nature, and historical and ecological bonds [25].

## 2.2. Principles of Biophilic Design

Application of biophilic design includes the application of various design strategies that we call as experiences and qualifications. Kellert et al. [25] established the elements of biophilic design in the widest sense as six features and seventy qualifications. These features are environmental features, natural shapes and forms, natural patterns and processes, light and space, place-based relations, and developing human-nature relations (Table 1).

**Table 1.** Elements of biophilic design [33].

<b>Environmental Features</b>
Color, Water, Air, Sunlight, Plants, Animals, Scenic view, Views and Scenes, Geology, Habitats and ecosystems, Fire.
<b>Natural Shapes and Forms</b>
Botanical motifs, Tree and columnar supports, Animal motifs, Shells and spirals, Egg, oval and tubular forms, Arches, vaults and domes, Shapes resistant to straight lines and right angles, Simulation of natural features, Biomorphy, Geomorphology and Biomimicry.
<b>Natural Patterns and Processes</b>
Sensory variability, A wealth of information, Age, change and time, Growth and flowering, Center focus, Patterned integrity, Hierarchically arranged ratios and scales, Transition spaces, Connected series, Integration of parts, Complementary contrasts, Dynamic balance, Fractals.
<b>Light and Space</b>
Natural light, Filtered and diffused light, Light and shadow, Reflected light, Light as shape and form, Warm light, Space as shape and form, Spatial variability, Light pools, Spatial harmony, Indoor and outdoor spaces, Refreshment.
<b>Place-Based Relationships</b>
Geographical connection, Historical connection, Ecological connection, Cultural connection, Integration of culture and ecology, Local materials, Landscape features defining the building form, Avoiding space, Landscape harmony, Landscape ecology, Spirit of the place.
<b>Evolved Human-Nature Relationships</b>
Expectation and refuge, Order and complexity, Curiosity and fiction, Change and metamorphosis, Security and protection, Expertise and control, Love and attachment, Attraction and beauty, Research and invention, Knowledge and cognition, Fear and awe.



Then, Kellert and Calabrese [28] introduced the first theoretical frame for biophilic design that includes human experience in three categories that are “direct nature experience, indirect nature experience, and space and place experience”. Ryan et al. [29] produced a list consisting of 14 nature-based design models that are nature in the space, natural analogues, and nature of the space. The aforementioned principles of biophilic design can be applied on interior and exterior spaces with various scales and budgets in cities [30], and the present and new buildings. In the urban environment where we are the most distant to nature, however, they have the largest effect to create positive spaces [31]. Architectural theorists think that designs based on the principles of biophilic design will enhance human health, appease the climate change, appropriately manage the sources for a renewable society, and help communities to reconnect with the ecosystem [32]. The choice of which design practices will be used vary according to certain building and landscape uses, project scale, and changing economic, logistic, and regulative factors as well as the conditions and restrictions of the project along with cultural and ecological conditions [28].

Parameters have been determined so they are applicable and flexible models which have a wide application opportunity for interior and exterior spaces. These design models focus on appeasing stress factors and raise the spatial qualities [34].

### **3. MATERIAL AND METHODS**

The main material of the study is Zübeyde Hanım Kindergarten which is on Bademlik neighbourhood of the central Kırklareli city. The access to the school, which is situated in a residential area, is possible through the Sağlık 1 Street which connects to Fahri Kasapoğlu and Bademlik avenues. Established in 1997 and giving a full-time education, the school has a capacity of 330 students (Figure 1).



**Figure 1.** Location map of the study area and front view of Zübeyde Hanım Kindergarten (Author, 2022).

Biophilia concept is the main and propelling component of the design idea initiated to enhance the closed and semi-open spaces of the Kırklareli Zübeyde Hanım Kindergarten by unifying them with the beneficial aspects of nature. In this frame;

**1. The theoretical study** serves as the theoretical framework by establishing the biophilia-design-children relationship. “Biophilic Design Principles”, which is determined by Stephen R. Kellert, were taken as the basis to apply the biophilic design elements in learning spaces.

**2. The analysis** tries to show to what degree biophilic design elements are present in the pilot school (in closed, semi-open spaces) through observation and on-sight studies.

**3. Project-based study** aims to integrate biophilic design elements with the closed and semi-open spaces of the pilot school, and has disclosed applications and general approaches through the produced models.

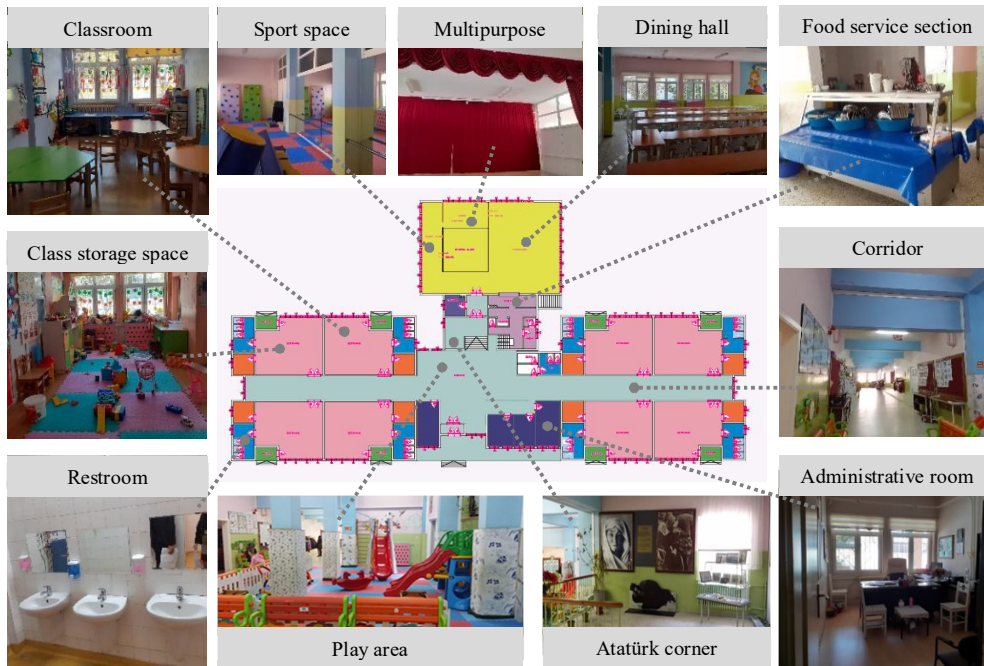
## **4. DETERMINING THE BIOPHILIC DESIGN ELEMENTS**

### **4.1. Closed Spaces**

The school has 3.088 m<sup>2</sup> ground area, and was planned to have a semi-basement and a ground floor. The structure, which is determined by two axes horizontally and vertically, consists of two



buildings with rectangle shapes of different sizes and are on different elevations. While the main building houses 8 classes and the administrative quarter, the other building, which is elevated with a half floor, an Atatürk corner, dining hall, and a multipurpose hall. Under the latter mass, there is a semi-basement where there is a kitchen, the heating unit, and personnel quarters. There is a cloakroom and a waiting area in the entrance, and the administrative wing is situated on a separate corridor on the right of the entrance. On the point where the axes of two masses intersect and opposite the entrance, there is a play area for children. The classes, which are situated symmetrically on both sides of a horizontal corridor, include restroom (WC and sink), and storage spaces (Figure 2).



**Figure 2.** Closed spaces of Zübeyde Hanım Kindergarten (Author, 2022).

When evaluated in terms of biophilic elements, the building design shows that students and other users cannot experience nature directly. Although the lighting and air conditioning, which are provided in the closed space passively, are on an adequate level, the students' interaction to the exterior/nature is limited since the windows are high up from the floor and are covered with gratings. Furthermore, a natural environment does not exist so it will improve this view. While



water and fire cannot be used in closed spaces, plants have a limited use. There are generally pot plants in common areas. A few pets such as birds and hamsters are in care of the administration and students are allowed to pet them for a limited time. Plants and animals are rather of an indirect and symbolic value. Classroom and common area walls feature pictures of flowers, trees, and animals. While natural floor covers such as marble and wood have a limited use, plastic-based materials have a wider use. Natural colours such as green, yellow, orange, and blue are generally the preferred colours. Few data have been obtained in the closed spaces in terms of experiencing the space and place.

As closed transition spaces, corridors are structured with a simple planning that are on horizontal and vertical axes. There is a children's play area on the intersection of the axes. There is not a condition that will cause complexity and security issue for children and other users. However, they do not have features that will stimulate children from an aesthetic point of view, particularly natural elements. The only connection to the nature of the interior corridors as closed transition spaces are the few windows at the end of the corridor. Thus, the corridors are mostly dim and need to be lit artificially even during the day time. The waiting area at the entrance is light and spacious as there are more windows here.

#### **4.2. Semi-open Spaces**

The entrance and classroom terraces, which are semi-open transition spaces, are too small (Figure 3). They do not allow for all children to make an activity together. Moreover, they do not have the necessary precautions that will protect from negative air conditions. Only a stair is used to balance the elevation difference. Upon examining from a biophilic point of view, the terraces neither include natural elements not let children experience nature directly.



**Figure 3.** Semi-open transition spaces of Zübeyde Hanım Kindergarten (Author, 2022).

## 5. APPLICATION OF BIOPHILIC DESIGN ELEMENTS

Through the observations on the present spaces, it was understood that design of the closed and semi-open spaces of Zübeyde Hanım Kindergarten do not provide sustainability between interior space-exterior space-nature. We also found out that natural elements are not used enough in open spaces, and thus, the rich environmental and spatial experiences that will provide an environment to learn nature and raise creativity, transform learning as well as providing physical, spiritual, and cognitive benefits are not provided.

In this context, it can be seen that integrating the pre-school education building with biophilic design elements is a necessity so children's connection to the natural world will not be broken from their early childhood. It was aimed that children would be able to experience nature from the first hand while developing design proposals. Furthermore, a spatial upgrade with an appropriate budget is more preferable rather than radical structural changes in the design.

As closed transition spaces, corridors have a significant feature as they are spaces where children first meet each other along with the entrance, they spend the most time together after the classroom, come together and play, spend free time, and rest, rather than a mere transition space. Because of the aforementioned features, corridors have been spaces which was paid attention most while choosing for biophilic design elements to create a difference in spatial quality with a good design. Living plants and trees are the elements that strengthen the human-nature bond. Including plants in the interior space brings a softness, life, and rhythm in the space [35]. For this, a green wall on

the right wall of the stairs has been implemented so students will be exposed to living plants constantly independent of spatial conditions and not to limit the usable area. As stated by McCullough et al. [36], a green wall has the potential to inspire critical thinking by combining project-based learning strategies and environmental education. As another aspect that strengthens the interaction with nature is the animal [37], it was aimed to design an embedded aquarium in the wall for students to relax and create a focal point (Figure 4).



Figure 4. Biophilic design elements in the corridors and play area (Author, 2022).

For closed spaces to benefit entirely from natural light at a maximum level, we designed niches on the walls on the interior walls of classrooms so the light from outside will make corridors more spacious. Moreover, we aimed to create a different and effective space in the corridor through play of light with the use of glasses in different colours in these niches. The height of present windows

at the end of the corridor are elevated. Roof windows are not preferred as their cost would be excessive (Figure 4).

The fact that forms inspired from nature are curvilinear, soft, and fluid, and remind of nature strengthens the biophilic sense [33]. For this, two honeycomb shaped niches were applied on walls one of which is an embossed tree image and the other is a colourful shape consisting of the geometric formation of nature near the seating unit on the upper elevation. Suitable to children's sizes, these honeycombs form secure spaces that look like a nest (Figure 4).

In the activity and dining areas of the building, formations inspired from nature are repeated on wet surfaces. Honeycomb and circular shaped niches on the activity space, relief that refer to the tree branches on the canteen ceiling, and the cellular form of a leaf on the separation units in the restroom were used (Figure 5).



**Figure 5.** Biophilic design elements in the dining hall, multipurpose hall and restroom (Author, 2022).



Spatial functions, sizes, accessories, furniture, and light to be used on surfaces are effective for the colour that will be used on the wall, ceiling, and floors of the space; also, their physical and psychological effects on the users are taken into consideration [38].

Upon considering the fact that children are extroverted and active as a result of their nature during this period, a warm and bright colour scheme would complete this tendency, and thus, decreases tenseness, anger, and anxiety; also, colours of contradicting warmth can be used as a highlight. Therefore, pastel colours of the nature such as the ones from water, sky, sun, plant, and soil were preferred according to the function of the space in order to stimulate students, increase their creativity and motivation, and calm them when needed (Figure 5).

The primary aim in the design of learning spaces is to provide an uninterrupted sustainability between the interior and exterior spaces. Sheltered transition spaces, which let users to experience both the closed and open spaces simultaneously, are structured with an idea making them independent and at the same time open and accessible. These provide suitable pedagogical spaces where students can experience and interact with nature, and not merely comfortable spaces. Transition spaces, which are also seen as the best play and learning spaces for children, also provide a psychological relief when connected with the natural environment [39, 40].

In this vein, the fact that the building is a one-storey one provides an important advantage. The terraces organized in the corner of the classroom are widened so as to include classrooms as they are too small in their present condition. They are reorganized so children can use these spaces as learning and play areas. The eaves of the terrace roof are prolonged for protection from weather conditions. Furthermore, classrooms have mobile sunshade units to protect from the negative effects of the sun in the terrace. Openings on the walls, such as windows and doors, are rearranged without interrupting the supportive structure of the building so that children can experience nature directly in these spaces. The openings on the façade shape the characteristics of the main architecture as well as playing a critical role in the rearrangement of the entire space by providing an opening for the flux of heat, light, sound, air, and view. Classroom windows are lowered to the floor by taking into consideration these features. When needed, windows can be opened entirely to semi-open terraces; or, with open classroom organization, unity with nature and a maximum level of light can be achieved. The surface of windows is widened, the door was moved to the middle

and the entrance is therefore highlighted. Green walls and pot plants are situated in the semi-open spaces in front of the entrance and the administration spaces (Figure 6).



**Figure 6.** Biophilic design elements in transition spaces (Author, 2022).

## 7. CONCLUSION

Judging from the research, on-site observation, and analysis done within the context of the study, it was determined that Zübeyde Hanım Kindergarten does not include elements of nature in its interior and semi-open space designs. Because there was a lack of experience between nature and space both directly and indirectly, as it was mentioned in the previous parts of the study, the school does not provide the rich environmental and spatial experiences in terms of using nature as a learning place and increase creativity, and transform learning as well as providing physical, spiritual, and cognitive benefits by using biophilic elements during the design.

We have presented a design proposal in which spaces are integrated with nature so as to provide students with a healthy, creative, and innovative learning environment in Kirklareli Zübeyde Hanım Kindergarten. Based on the direct experience among the biophilic design principles, the design proposal is an attempt to revive the connection between the built environment and nature. As a probable design approach, biophilic design should be widened to cover all learning spaces



and form the minimum standards during the design and application process. During this process, in order to help students to be in close connection to nature, design, planning, and physical investment in biophilic schools should be encouraged. Also, education programs should be rearranged so as to cover nature, and the main aim should be to provide the connection between natural world and, children and society. In this vein, aiming to create different experiences instead of common ones, conscious decisions of architects will positively affect the design process, who wish to integrate interior and semi-open spaces to nature. The study was limited to indoor and semi-open spaces. In associating the mentioned spaces with nature, the architect's taking into account the outdoor arrangement and collaborating with the landscape architect will strengthen the design. A successful application of biophilic design, based on the realisation of experiences of nature, will serve as a foundation for a generation who is healthy, productive, responsible, and sensitive all of which starting during early childhood. Therefore, the application model proposed for Zübeyde Hanım Kindergarten serves as an important guide.

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