



## The effect of ecologically based playgrounds on the child's sensory and motor functions

Ayşem Ecem Özdemir<sup>1</sup>  
Bahar Nur Kanbur<sup>2</sup>

### Abstract

Children actively learn themselves, their immediate environment and the world through play. It is observed that the environment plays a major role in increasing the physical activity levels of children and ensuring their functional development.


Being intertwined with nature is very important for children in environmental education. However, the importance of physical planning of ecological playgrounds for children is often overlooked. It is known that natural spaces designed within the framework of ecological principles and containing different habitat types (water, soil, plants, animals, etc.) are more suitable for environmental education than classical green spaces, especially for children living in cities. It is known that a flexible and changeable environment provides more opportunities for positive behavior in environmental education. In addition to the positive aspects that the natural elements in the environment contribute to the psychological, emotional and social integration of the child, there are also contributions in terms of motor and sensory development. In addition, the areas designed in this direction reveal the feeling of freedom of children and are effective in making them more sensitive to environmental issues.


**Keywords:** Children, children playgrounds, ecological playgrounds, sensory function, motor function.

### INTRODUCTION

Urbanization is increasing rapidly in the world. It is estimated that 65% of the world population will live in cities by 2025 (Li et al., 2005). As a result of rapid and unplanned urbanization, which is one of the biggest problems of our age, cities have turned into heaps of glass and concrete, and the air is polluted; ecosystems have been destroyed as a result of unplanned urbanization (Etili, 2002).

The World Health Organization states that there should be 9 m<sup>2</sup> of urban green space per person in order to reduce and benefit from the negative effects of the environment (Thaiutsa et al., 2008). However, it is seen that most of the cities in our country do not provide the specified amount of green space (Bibilgi et al., 2011). It is observed that the environment plays a major role in increasing the physical activity levels of children and ensuring their functional development. In addition to the positive aspects that the natural elements in the environment add to the child's psychological, emotional and social integration, their contribution to motor and sensory

<sup>1</sup> Research Assistant, Istanbul Gelisim University, Faculty of Health Sciences, Physiotherapy and Rehabilitation English Department, [acozdemir@gelisim.edu.tr](mailto:acozdemir@gelisim.edu.tr)  Orcid ID: [0000-0002-6930-9490](https://orcid.org/0000-0002-6930-9490)

<sup>2</sup> Assistant Professor, Istanbul Gelisim University, Faculty of Health Sciences, Nursing Department, [bnkanbur@gelisim.edu.tr](mailto:bnkanbur@gelisim.edu.tr)  Orcid ID: [0000-0002-9150-476X](https://orcid.org/0000-0002-9150-476X)



development is also important (Broekhuizen et al., 2014). In order to create environments more suitable for the needs of children and to contribute to their physiological and psychological development, it is necessary to shape the child's environment in line with these needs (Aksoy & Akpınar, 2011).

### **Child and Play**

Children actively learn themselves, their immediate environment and the world; through play (Köklü & Eraslan, 2020). Game is defined as “For a specific purpose or not, with or without rules, in which the child takes part willingly and with pleasure; it is defined as the basis of physical, cognitive, language, emotional and social development, a part of real life and the most effective learning process for the child.” (Aral et al., 2006; Köklü and Eraslan, 2020). Gross defined the game as a practice and said that our behavior patterns in the future are acquired through play. Freud, on the other hand, stated that the child matures thanks to the game and that the game helps the child find his/her self (Toksoy, 2020).

Play has an impact on the child's physical, sensory, psychomotor and social development. The ecological structure of the play area and the width of the free environment also affect the intelligence development of children. In addition, children develop their psycho-motor abilities from birth through play. Playing with intense activity such as running, climbing, and friction helps children to develop and strengthen muscles, and also help regulate their digestive, respiratory, etc. systems (Cengiz & Doğdaş, 2015).

Television and electronic games have begun to form the life universe of children. The computer age has caused children to lose their connection with their natural environment (Çukur and Özgüner, 2008). The shift of play from outdoor to indoor (computer, television, playgrounds in shopping malls) causes sedentary life, internalization of speed and violence, and isolation from other people, resulting in negative consequences (obesity, cholesterol, irritability, attention deficit, depression, etc.) (Çukur, 2011).

### **Children Playgrounds**

Today, with the effect of urbanization, the presence of green areas, the number and quality of children playgrounds are decreasing (Küçükyağcı et al., 2015). In the cities, playgrounds are designed for children, which are limited on four sides and where standard playgrounds are located. There is not enough quality and quantity of open space for children, and since the existing playgrounds cannot meet the desire to move, the child's creativity and communication with nature cannot develop (Turgut & Yılmaz, 2010).

The ground material of the playgrounds is generally gravel soil and sand, and age groups of children are not differentiated in the selection of playgrounds, and natural materials such as sand and water are not used (Çukur, 2011). Considering the use of planting, generally undesirable plants (*Thuja orientalis*, *Juniperus sabina*, *Symphoricarpus albus*, *Robinia pseudoacacia*, *Euonymus europens* etc.) were used, and design criteria such as shading, sunbathing, large grass area, surrounding with hedge plants, noise reduction were not taken into account. In the majority of playgrounds, there are no lighting elements, garbage cans, fountains, toilets, guard boxes (Akbulut and Önder 2011). In addition, in terms of landscape design, the equipment of children's gardens is insufficient and consists of standard, factory product (plastic) playground equipment which are not made of natural materials (Çukur, 2011).

In the evaluation made by Akbulut and Önder (2011) to reveal the months in which the existing parks are used intensively, it was concluded that the parks are used with a rate of 30% in the summer months and a rate of 46% in warm days, regardless of the seasons. When the frequency of children's visits to the park is considered, it is seen that 44% of them come to the park more than once a week. Due to parents' safety concerns, it has been determined that children have negative effects on their use of open-green space alone (Ünal 2009).

Children playgrounds are one of the important urban green spaces for sustainable and healthy environments (Küçükyağcı et al., 2015). Children playgrounds are an important part of the city and should be designed with the right design principles both in terms of quality and quantity (Türkan, 2009). These structures, which should be compatible with nature; can be defined as areas where the building is designed with a holistic understanding of social and environmental responsibility, starting from the selection of the land, in accordance with climate data, consuming as much as it needs, oriented towards renewable energy sources, using natural and non-waste-producing materials, encouraging cooperation, and sensitive to ecosystems (Hoşgör, 2014). Children playgrounds, which form a part of open/green systems in cities, can be used by children in the 0-14 age group, meet their play and movement needs, contribute to their spiritual, physical and mental development and are safe, enables children to spend their free time and also encourage them to play and order (Uy and Nakagoshi, 2008).

In a study by Fjortoft and Sageie (2000); as a playground for children, a small forest was chosen and the role of this natural place in eliminating the deficiencies of children in traditional playgrounds was investigated. As a result, it has been revealed that natural landscape areas are playgrounds that meet the needs of children. It has been emphasized that playgrounds with sloping areas, wide grass areas and plants are effective in the body (motor) development of children.

### **Kinds of Children Playgrounds**

**Traditional Playgrounds:** The most common type of playground. It consists of standard materials. The tools on the playground are generally qualified to respond to a single use. The equipment is usually used alone and is geared towards large muscle activity and motor development. Traditional playgrounds consist of muscle-building devices such as swings, slides, seesaws, but do not allow cognitive and social play (Ünal 2009; Turgut and Yılmaz 2010).

**Contemporary (Sculpture) Playgrounds:** These are one-off aesthetic designs which are designed by architects. Sculptural playgrounds are often static; nothing moves in it but children. They can have features such as water, fountain, hill, slope and tunnels. It is a structure that is less in number, costlier, loved more by children than traditional playgrounds, and that encourages children to use the game in educational terms (Ünal 2009; Turgut and Yılmaz 2010).

**Adventure Playgrounds:** Adventure parks provide children with equipment to create their own playgrounds. Nothing is fixed or static. Adventure playgrounds have "participatory play" instead of "directed play" for the child. The venue has a leader who gives advice and takes part in children play; this person is usually a voluntary adult. Children are expected to use the elements in the space creatively and reshape their environment by using them. These playgrounds are safe and allow children to learn to help each other (Ünal 2009; Turgut and Yılmaz 2010).

**Creative Playgrounds:** These playgrounds are diversified in design and equipment. There are generally malleable materials such as sand. Complex units can be found for wheeled vehicle area, water and sand area, climbing, swinging and fantasy play. Creative play provides the child with the opportunity to gain a flexible approach to problem solving; but it is difficult for the designer to provide this game. Flexible elements that can be moved or changed provide more creative play (Ünal 2009; Turgut and Yılmaz 2010).

**Special Playing-Learning Areas:** These are playgrounds with soft surfaces, gentle slopes, sounds and colors specially made for children with disabilities. These areas provide normal play experience to children. However, keeping disabled children in a separate environment and isolating them from other children is often considered an undesirable situation (Ünal 2009). Playground facilities, in which all children participate, should be made available for disabled children with minor changes because social interaction between children is important (Pouyo et al. 2016).

### **Natural Structure of Ecologically Based Playgrounds**

Being intertwined with nature is very important for children in environmental education (Özgüner & Şahin, 2009). Land forms and topographic changes, water, soil-sand, animals and

plants have been defined as natural play tools (Yücel, 2005). Soil, sand and water; they provide opportunities for experience, exploration and creativity. Water is an important play tool for the development of the sense of touch and for the child to get rid of tension (Çukur, 2011). In addition, the areas designed in this direction reveal the sense of freedom of children and are effective in making them more sensitive to environmental issues (See & Forbes, 1997).

The presence of nature in the child's close environment offers the opportunity to get to know closely and to obtain information about it (gaining information through experience with his senses). Therefore, it is necessary to design children playgrounds on an ecological basis (Çukur and Özgüner 2008). The child with ecological self-consciousness will perceive themselves as a part of nature, will respect other beings in nature, and nature protection will occur spontaneously by identifying with self-preservation without the need for rules such as environmental morality (Çukur and Özgüner 2008). Some of the features that should be present in the design of ecologically based children playgrounds are listed below:

- First of all, undisturbed natural areas that could be playgrounds should be identified. The rugged form of the land that makes up the natural areas and rocks, water, sand, plants, etc. elements are used (Cengiz and Doğtaş 2015).
- Toxic, allergic and prickly plants should be avoided. Plants must be resistant to damage by children. Plants that attract a large number of bees and insects should be avoided. In addition, plants and flowers contribute to the development of diversity perception. Plant cultivation activity is also important in terms of recognizing plants, learning their life cycle and enabling the development of children's manual skills (Çukur 2011).
- Necessary arrangements should be made for the use of school gardens as playgrounds and sports fields in neighborhoods where there are no playgrounds and sports fields (Akbulut and Önder 2011).
- It is an ideal size for the playground to be at least twice the width of the school building (Ünal 2009).
- In terms of functionality, ecological playgrounds should be suitable for children anthropometric measurements. Because children field of vision is narrower than adults. For example, the average height of a 6-year-old is 1,130 mm; eye level / vision height 475 mm when sitting on the floor and 1,051 mm when standing. The viewing angle of a 6-year-old child is 12 degrees, while an adult's viewing angle is 54 degrees (Çukur 2011). Very large and/or high spaces may cause fear and anxiety in children.
- The kindergarten should be at a maximum distance of 5 minutes from the residences, and the playgrounds should be within 10 minutes. For children aged 1-5, approximately 50 m<sup>2</sup> (distributed among the housing groups), for the 6-10 age group approximately 450 m<sup>2</sup> + 100 m<sup>2</sup> (free and open spaces for quiet games) and for the 8-15 age group, approximately 400 m<sup>2</sup> (excluding the sports field) should be allocated.
- Another important factor in terms of functionality is the construction of a fountain and toilet in this area. In addition, garbage bins should be included in order to raise the awareness of protecting the environment in the child (Turgut and Yılmaz 2010).
- It is necessary to start gaining the love of nature from the pre-school period, to develop applied activities (by doing and living) in this direction, to make the relevant lessons productive, to prepare appropriate educational materials and to cooperate with the Ministry of Environment and voluntary organizations in this regard (TUBITAK, 2006).

### **The Effect of Ecologically Based Playgrounds on Child Health**

Ecological spaces are natural spaces that reduce child's physical symptoms and stress. It is emphasized that its design should include flora (plant, flower, fruit tree etc.), fauna, soil and water. For example, considering the psychological effects of color; the colors of water, plants and flowers are said to be important for children undergoing treatment. It has been determined that water blue

reduces the electricity and muscle tension in the human skin, yellow is an energetic color and makes the patients alive, and green calms the patient (Çukur 2011). It emphasizes the ecological design of the gardens for children at risk who are treated in children hospitals or child rehabilitation centers, taking into account the child's developmental characteristics and play (Bulut and Göktuğ 2006).

Children at an early age primarily use their senses to gain information with the outside world by touching and feeling. In a study conducted it has been stated that children enjoy touching flowers, grass, sand and other textures in playgrounds (Ripat & Becker, 2012). The countless structures and textures that ecological playgrounds offer contribution to the development of their tactile senses. It is not just the tactile sense acquired by touch; in the development of visual and auditory sense, the ecological environment provides more than the opportunities provided by the interior spaces. Wind breeze, playing with the water in the pond, interactions with different plants and animals, the feeling of sand or soil on the ground, countless colors and structures in the environment, all the sounds in the environment; provides endless opportunities for the child's sensory development (White & Stoecklin, 1998).

In addition to looking healthier, children playing in ecological and natural environments; it has been stated in studies that they exhibit improved motor fitness, balance and coordination (Fjortoft, 2001; Fjortoft, 2004;). For example; gross motor activities such as climbing grasses and hills, descending from bushes and making shelter, sliding down slopes, running and catching in open areas are used for games played in the natural environment (Maynard and Waters, 2007). During the activities, children need to be able to integrate the inputs they receive from different movements, changes in the center of gravity and after making their motor planning, they should be able to stimulate the necessary systems and provide the coordination for creating correct answers (Chambers et al., 2019). Studies have revealed that children playing in the forest display better motor skills than children playing in traditional playgrounds (Fjortoft & Sageie, 2000). For this reason, ecological playgrounds which are created to support motor development of children contribute to the integration of the musculoskeletal system and functional motor activities.

Games played in an ecological environment have aspects that contribute not only to gross motor development but also to fine motor development. The development of fine motor skills is important for the child to gain and develop independence (Strooband et al., 2020). Fine motor movements with the activation of small group muscles enable to perform functions such as holding and shaping small objects and require a great deal of hand-eye coordination (Luo and Jose, 2007). There are numerous stimuli in the ecological environment such as tree branches, flowers, sawdust, soil, sand and water (Bento and Dias, 2017). The use of functions such as holding small objects, shaping or forming a whole in the child's contact with these stimuli contributes to fine motor development.

## Plants

Seasonal color changes, blooming, budding, seed formation and re-sprouting events help the child learn by experience, learning nature, establishing cause-effect relationships and comprehending the life cycle by revealing the sense of curiosity inherent in the child's creation. They can spend time enjoying a complex system with the senses of exploring, observing, smelling, touching and hearing. Children can feel the sun, see shades and colors, smell fragrances by experiencing them all (Pouyo et al. 2016). Playing games will help children to complete their motor development such as; holding small objects, jumping with both feet and one foot, squatting, running on tiptoe, climbing, hiding and collecting flowers (Yapıcı and Yapıcı 2006). It has been demonstrated by some studies that plants have positive effects on the psychological structure of humans, such as calming and pain-relieving effects. It has been determined that the users of the rest area designed with natural elements in the city are more cheerful, happier and more concentrated (Söderback et al. 2004).

## Water and Soil

Water games are quite diverse. While water games help children relax, they also help develop their emotional and motor skills. Sand and water are essential play materials for all ages from 24 months onwards. As a result of the observations, it was determined that the children had slower distribution of concentration when they were playing with water (Ünal 2009). In addition, children will be able to learn some physics rules without realizing it while playing. For example, a child who builds a pool with soil and water or tries to create a dam by piling sand in front of the water will see the effect of water pressure. Children who build towers with complex blocks made of water and sand or mud will be able to learn balance and carrying capacity (Turgut and Yılmaz 2010).

## Animals

Helicopter beetles, ants, butterflies, worms, fireflies, birds, rabbits, lambs and many more are just a few of the creatures that arouse children interest when they encounter them in the natural environment. By seeing how the ant takes food to its nest, looking at a helicopter beetle or a firefly, they will gain very serious gains for their school years and perhaps future scientific discoveries (Turgut and Yılmaz 2010).

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