PRESCHOOL INTERIORS THROUGH THE MONTESSORI EDUCATIONAL MODEL

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ABSTRACT

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Master's Program in Design Studies

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Preschool education is crucial for children's physical, mental, emotional, and social development. As an alternative education method, the Montessori aim to train independent and responsible individuals at an early age with the help of modular interiors. The Covid-19 pandemic has rapidly affected the entire world since March 2020, and education has been one of the areas most affected by the coronavirus pandemic. However, the strong relationship of the Montessori Method of education with nature has allowed children to continue their education outdoors. There are three types of Montessori schools in Turkey; full-time, part-time, mixed (MEB and part-time Montessori) education programs. The study aims to evaluate adequacy. The study was carried out with 60 participant teachers by online survey due to pandemic

conditions. The spatial characteristics of Montessori schools are gathered under nine concepts as; Freedom, Embodying, Natural Environment, Socialization, Individualization, Feeling of Confidence, Place Attachment, Dynamism, and Perceptibility. The evaluation of the participant teachers from three different types of Montessori schools through these nine concepts is tested through a Likert scale. The results show that full-time and half-time Montessori schools are evaluated highly in all nine concepts compared to mixed system schools. It is seen that the interior design criteria and requirements are ignored in the transformation process of mixed schools that were later included in the Montessori education program. It is also indicated that well-planned interiors that meet the requirements of Montessori system spatial design criteria help for better educational conditions. The study examines the interior design of Montessori schools and reveals the relationship between design and learning from an interior architectural perspective.

Keywords: Interior architecture, Learning environments, Montessori Preschools.

ÖZET

MONTESSORİ EĞİTİM MODELİ ÜZERİNDEN OKUL ÖNCESİ İÇ MEKANLAR

Yüceel, Cemran

Tasarım Çalışmaları Yüksek Lisans Programı

Tez Danışmanı: Prof. Dr. Özgen Osman Demirbaş

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Okul öncesi eğitim, çocukların fiziksel, zihinsel, duygusal ve sosyal gelişimleri açısından çok önemli bir dönemdir. Alternatif bir eğitim yöntemi olan Montessori, modüler iç mekanlar yardımıyla erken yaşta bağımsız ve sorumluluk sahibi bireyler yetiştirmeyi hedefliyor. Covid-19 pandemisi Mart 2020'den bu yana tüm dünyayı hızla etkisi altına almış ve eğitim, koronavirüs pandemisinden en çok etkilenen alanlardan biri olmuştur. Ancak Montessori eğitim yönteminin doğa ile olan güçlü ilişkisi, çocukların eğitimlerine açık havada devam etmelerini sağlamıştır. Türkiye'de üç tip Montessori okulu vardır bunlar; tam zamanlı, yarı zamanlı, karma

(MEB ve yarı zamanlı Montessori) eğitim programlarıdır. Çalışma, Türkiye'de mevcut programları uygulayan okulları mekânsal yeterlilik bağlamında değerlendirmeyi amaçlamaktadır. Çalışma, pandemi koşulları nedeniyle çevrimiçi anket yoluyla 60 katılımcı öğretmen ile gerçekleştirilmiştir. Montessori okullarının mekansal özellikleri; Özgürlük, Bedenlenme, Doğal Çevre, Sosyalleşme, Bireyselleşme, Güven Duygusu, Yere Bağlılık, Dinamizm ve Algılanabilirliktir. Üç farklı Montessori okulundan gelen katılımcı öğretmenlerin bu dokuz kavram üzerinden değerlendirmeleri Likert ölçeği ile test edilmiştir.. Sonuçlar, tam zamanlı ve yarı zamanlı Montessori okullarının, karma sistem okullarına kıyasla dokuz kavramın tamamında yüksek düzeyde değerlendirildiğini göstermektedir. Montessori eğitim programına sonradan dahil edilen karma okulların dönüşüm sürecinde iç tasarım kriterlerinin ve gereksinimlerinin göz ardı edildiği görülmektedir. Montessori sisteminin mekansal tasarım kriterlerinin gerekliliklerini karşılayan iyi planlanmış iç mekanların daha iyi eğitim koşulları için yardımcı olduğu da belirtilmektedir. Çalışma, Montessori okullarının iç tasarımını incelemekte ve tasarım ile öğrenme arasındaki ilişkiyi iç mimari bir bakış açısıyla ortaya koymaktadır.

Anahtar Kelimeler: Montessori anaokulları, İç mekan tasarımı, Öğrenme ortamları.

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LIST OF ABBREVIATIONS

AÇEV	: Mother Child Education Foundation (Anne Çocuk Eğitim Vakfı)
C	: Tome (Cilt)
CD	: Compact disc
Dr.	: doctor
et al.	: and others
etc	: etcetera
m	: meter
MEB	: Ministry of Education (Milli Eğitim Bakanlığı)
NAEYC	: National Association for the Education of Young Children

CHAPTER 1: INTRODUCTION

The Preschool education period is the most crucial developmental period in which children's mental, social, emotional, and physical development rapidly, and every individual can feel the effects throughout their lives. This period is a process that can affect children's outlook on life and create awareness of their characteristics and tendencies. In addition, the preschool period provides the basis for the individual's interaction with the environment and other people. (Koleva et al., 2015) For this reason, the design of the educational environments for small children are better designed through the consideration of validified educational approaches. Spatial configurations and articulations in these kinds of educational environments have a direct relationship with the educational approach. It is essential in terms of an education-space relationship that these environments are designed to convey teaching and learning in the best way possible. In early education, the child's interaction with the space directly relates to the effectiveness of the education. For an effective preschool education; the children's emotional, social, mental, and physical characteristics as the users of this specific space need to be carefully taken into consideration. Together with interior and exterior spatial arrangements, educational environments meet the qualities that positively affect the teaching-learning process. In preschool education institutions, the design of the spaces that make children's characteristics most visible, entertaining with various activities, and transform education into practice needs to be well planned in a configuration that supports the education program.

Many alternative education approaches have emerged as a reaction to the traditional education system around the world. Waldorf, Reggio Emilia, Montessori, and High Scope educational approaches are the most common of these approaches on the theories based on the development and spatial relationship of the child (Aljabreen, 2020). The Montessori educational method has an educational understanding that focuses on the nature and developmental needs of the children. The Montessori educational approach supports careful space design criteria that meet all the needs of children and provide suitable space and flexibility for the development of skills and interests. Among the alternative education approaches examined within the scope of the study, Montessori education is still the most common alternative education understanding all over the World (Al, Sari and Kahya,

2012). It has an environmental principle prepared with its educational materials, the flexible relationship of learning spaces and playing spaces, and reflecting its educational understanding of spatial arrangements that make the difference.

Examining the preschool environments designed according to the Montessori education system and analyzing the relationship between the design criteria and the priorities of educational outcomes are essential for preschool education.

This work consists of five chapters. The study's aim, scope and method are explained in the introduction. The theoretical foundations that form the second part of the study are based on comprehensive literature research. There are two titles in this section. First of all, the child's physical, social, emotional and cognitive developmental processes are explained. Secondly, within the scope of the relationship between child and place, learning environments in preschool education and the effects on learning physically, psychologically and spatially are mentioned.

Finally, since the approach adopted among alternative methods is an educational understanding that shapes the space design, some international examples have examined the interior and exterior features of Montessori educational environments. This helps the researcher to pose a general space design perspective through the concepts that constitute the Montessori educational approach.

1.1. Research Question

The main research question is:

- What is the impact of preschool interiors on learning in the context of the Montessori Method?

This main question is considered through some secondary questions:

- How does the physical setting enhance or hinder learning?
- What would you like to see different in the future in terms of design in schools that provide education with the Montessori method?
- How can schools that provide education with the Montessori method be improved in terms of design in the future?

1.2. Aim Of The Research

This study aims to examine the places of educational environments arranged according to the Montessori education system and analyze the relationship between Montessori education principles and interior design criteria. Effects of the Montessori education program on spatial design are expected to be useful for understanding the importance of spatial arrangements in preschool education and for

developing design proposals to increase the quality of Montessori preschool education spaces.

1.3. Methodology

This study consists of two basic stages. In the first stage, preschool education, the relationship between children and space, and preschool education environments have been conveyed in the literature review, and preschool alternative education approaches are discussed by considering existing educational environments. In this way, the relationship of preschool education with children and space and the design criteria of preschool education environments are determined through Montessori's educational approach and criteria. Within the scope of Montessori education, preschool environments' interior and exterior spaces are examined through some examples around the world. In the second stage, the evaluation of teachers from these kinds of schools are considered through a Likert scale.

CHAPTER 2: CHILDREN AND LEARNING ENVIRONMENTS

2.1 Development in Early Childhood

Early childhood covers the period from the time the child is born to the start of primary school. In this period, the child's first experiences and first learning affect the child's life in the coming years (Güral, 2017; Koçyiğit, 2014; Yaşar and Kaya, 2018). Most of the physical, intellectual, emotional, and social personality developments occur during the child's learning (Yaşar and Kaya, 2018). It is also stated that the perceptions of the child in this early childhood period are very clear. Accordingly, the child wants to know the value judgments and cultural values of the environment in which he lives in the best way, and he internalizes this situation himself (Altay et al., 2011).

Early childhood is a crucial period for the child's brain development. In the 0-3 age range, brain formation grows by 90% physically, and the connections between the neurons in the 3-6 age range show the highest level (Yaşar and Kaya, 2018). Therefore, this early childhood period is significant for the child's brain development to be healthy; the child should have a healthy environment as well as a healthy diet (Akyol, 2014). However, it is not expressed as a significant investment for the child's future social life with the adaptation to the growth and development of the child in early childhood (Evans, 2015).

Children's learning in early childhood; takes place with what they experience, their interaction, and concentration. In this period, children realize their learning; they touch objects, create visuals, take models, speak, sing, act, establish their knowledge effectively by applying their ideas and plans, and perform by playing games (Tunçeli and Zembat, 2017; Faccini and Combes, 1998).

As can be understood from the studies on the early childhood period, in this period, when the appropriate environment and conditions are provided for the child's learning, it is observed that the learning capacity of the child increases (Black et al., 2017; Evans, 2015; Kartal, 2007). The developments in the early childhood period of children are examined under five headings. These are:

- Cognitive development,
- Social development,
- Physical and psychomotor development,
- Emotional development,

- It is expressed as sensual development.

For children's growth to occur in a healthy environment and in a healthy way, these five main topics need to develop in the whole relationship with each other.

2.1.1 Physical and Psychomotor Development

They act as a body without feeling tired while playing games. Thanks to the children's movements, there are improvements in the functioning of the respiratory tracts and hearts and the great and small muscles (Poyraz, 2003). During the child's movement, the heart rhythm, blood circulation, and respiratory level are above normal, expressed as the extension and stretching of the muscles during the movements. Accordingly, the amount of oxygen passing through the blood increases, and the tissues increase with the increase in breathing frequency. It needs nutrients, and thus it is beneficial to take more (Yalçınkaya and Çağlak, 1998).

The body movements such as jumping, crawling, climbing, and running, which children perform during play, contribute positively to the child's respiratory, circulatory, digestive, and excretory systems and help them work regularly. Again, with the help of games, the consumption of excess fat in the body contributes significantly to the growth and development of the child, together with the development of muscles and better functioning of the organs that secrete hormones (Koçyiğit, 2007).

Playing games contributes to children. Every game played contributes to physical development, but it is stated that the contribution to the muscle area is more than in other fields (Kadim, 2012). It has been observed that there is a difference between games played in indoor and outdoor games, and it is known that games played in outdoor spaces have a more significant impact on muscle development. Sports activities such as outdoor cycling, tennis, football, volleyball, basketball, and gymnastics are shown as examples. In addition, playing flour in the open air allows the child to get fresh air and the necessary vitamin D. It is observed that children are happier when playing outdoors (Akandere, 2006).

During the child's play, all the muscles, big and small are activated, and the child gains specific skills by repeating these movements. In addition, while jumping, jumping, and running affect the big muscles, activities such as using scissors, folding the paper, and playing with dough affect the small muscles and improve hand and

eye coordination. Children gain experience thanks to the movements they constantly repeat, and they become familiar with that movement. The fact that children do the movements they know instead of doing the movements they do not know contributes significantly to the development of their muscles. These movements help the muscles to accelerate and strengthen. Climbing, jumping rope, using stairs, and cycling activities in early childhood are used to develop large muscles; The games played about standing on the balance board, and handicraft activities affect the development of small muscles (Poyraz, 2003).

The play has different effects on the physical development of the child. These effects are expressed as follows;

- With play, the child's small and large motor skills develop.
- Outdoor games make use of the sun and air, and their physical development is accelerated.
- With play, the child’s blood circulation accelerates, his appetite increases, his sleep is regulated, he expels harmful substances from his body with sweat, and he spends his excess energy (Çoban and Nacar, 2006).

Psychomotor development in individuals occurs through physical growth and activation of the nervous system. In other words, it is expressed as the acquisition of human abilities that start in the mother's womb before birth and continue throughout life (MEB, 2013c).

Psychomotor skills consist of seven concepts in total, and these seven concepts act as interconnected and unified integrity. These seven concepts are as follows;

- Power,
- Being ready for reaction,
- Speed,
- Stagnant attention,
- Dynamic attention,
- Coordination (coordination),
- It is expressed as flexibility (Seyrek and Sun, 2003).

The psychomotor development of the child develops more during play. Some of the children use expressions such as "I cannot do this, I am afraid" to make an act

of remembrance during the game. This situation shows the timidity and timidity of the children. The child is unable to use his will. However, there is no disorder in their muscles, nerves, or any abnormality in their walking or running in children's bodies. The child shows timidity in an activity that he has not done before. Using games is expressed as the best way to normalize such shy children (Karadağ and Çalışkan, 2005). In short, children can bring the actions that children are afraid to do alone and show shyness by playing games with other children (Seyrek and Sun, 2003).

With this given information, play affects the psychomotor development of the child as follows;

- Increases strength,
- Improves the ability to react,
- To learn to use big and small motor skills at the required speed,
- Ensures that it develops with an attic and dynamic attention,
- Ensures harmony and balance between organs,
- It gives agility to skills and abilities,
- It gives flexibility to the body (Çoban and Nacar, 2006).

2.1.2. Social Development

In social development, individuals learn the knowledge skills and value behaviors accepted by the society that effectively communicates and organizes their relations with the society they live in. In addition, as an adult individual, developing the sense of sharing and communicating with people improves (Aral and Kadan, 2018; Kılıçgü, 2016; MEB, 2013c). Therefore, the social development process that continues throughout life becomes essential in early childhood. Other things that affect social development in early childhood are environment and development areas. Accordingly, age, gender, family relations, peer individuals, teacher and school relations, and mass media are also effective in social development (Kılıçgün, 2016).

The foundations of adult social development are laid in my early childhood. For this reason, it is vital to create social skills at an early age. In children who show improvement in their social skills; it is known that abilities such as helping each other, empathizing, decision making, self-management, and being in positive social relationships have improved. On the other hand, in children whose social skills are not developed and who cannot acquire the skills mentioned above, there is a constant

state of unhappiness and not going to school (Aral and Kadan, 2018; Body et al., 2005; Darling Churchill and Lippman, 2016; Küçükturan and Keleş, 2018).

According to the research made in this area, While it is observed that there is an increase in number and thinking skills due to the increase in social adaptation of children, it is stated that this social adaptation is not effective in language development (Kandır and Orçan, 2011). According to teachers, in the development of children's social skills in the early childhood period; While it is stated that families have a significant influence on this area, according to families; It is stated that teachers have a significant influence on this area (Özyürek and Ceylan, 2014). In social development skills, it is stated that children are highly influenced by their immediate environment. (Özyürek, Begde, and Yavuz, 2014). Television use affects the child's social development in early childhood, but it is stated that excessive and uncontrolled use negatively affects the child's social development (Erdoğan, 2010).

2.1.3. Emotional Development

The word emotion is used to express what is happening in the inner world of man. Human beings have been in a state of emotion from birth, and they struggle to understand emotions, define emotions, control their emotions, and express their feelings correctly at the point of adapting to life. Early childhood has a great impact on emotional development. For this reason, it is necessary to provide all kinds of benefits that will contribute to the emotional development of the child in early childhood, and a suitable environment is created to contribute to the child's development (Novick, 2004; Antidote, 2003)

The development of emotions and other stages of development are closely related. At first, the baby can only perceive the sound but can also understand the emotion in this sound with the elapsed time and experiences. As time passes, the feelings learned are associated with the events experienced (Ergin and Yıldız, 2016). Emotional competence is experienced in children by recognizing their own emotions and the emotions of others, using emotional language, controlling personal difficulties, coping with situations, a sense of self-efficacy and empathy towards other people, and realizing that the emotions expressed in these behaviors differ from internal emotions. (Ersay, 2009; Saarni, 2011). With these developments in children,

the child not only develops in the emotional field but also achieves to be stimulated emotionally by the social and non-social environment (Thompson, 1991).

When we look at the effect of the education programs on the emotional development of children, it is observed that the full-time training is more effective than the half-day training when the training given is compared full and half days. It is crucial to make a strong start in developing skills in the emotional field; it is stated that the social-emotional training given thanks to the strong start has a positive effect on the emotional skills of children (Beceren, 2012). Furthermore, it is determined that the education given about values within the training provided contributes to the emotional development of children (Samur, 2011). Again, it is claimed that activities with clay, sand, and water used in activities in the playground have an impact on the emotional development of children (Kökcü, 2019).

2.1.4. Cognitive Development

The cognitive development process; is expressed as factors that help the individual understand and learn the world, be active in the activities in his mind, and understand what is happening around the individual. In addition, cognitive development enables the individual to use the information he/she acquired. Reasoning, making assumptions, and logical thinking are the cognitive development goals (Angın, 2016; Senemoğlu, 2002).Cognitive development:

- Learning processes,
- Thinking styles,
- Coding knowledge,
- It consists of processes such as storage and retrieval.

These processes differ in different periods of human life (Sağlam, 2018). The period in which the processes in the cognitive development process are the fastest is expressed as early childhood. When the child reaches the end of this period, it is seen that the shaping of his mental abilities, language skills, behavioral habits, and some physical characteristics has taken place to a great extent. Depending on these developments, it is stated that there are improvements in reasoning, self-regulation, comprehending spatial relationships, ranking, making comparisons, and comparison skills (Didin and Akyol, 2018).

According to a study about this period; the faster the cognitive development process progresses and the more qualified this progress is, the faster and more qualified development is in social skills (Koçak, Pınarcık, and Ergin, 2015). It is stated that there is a direct proportion between cognitive development and language development (Çapan, 1996). It has been demonstrated that playing games affect cognitive skills (Türkoğlu, 2016). It is claimed that children's cognitive development between 36-60 months is very effective in early childhood education (Demir, 2010). The proportion of concepts such as belief, memory, spatial reasoning, logical thinking, and creative thinking in early childhood differs between normal children and children with autism (Bashrin, 2015). Another factor that is effective in cognitive development is the book factor. It is said that the book has a 33% more impact on cognitive development compared to the media (Mara, Tackett, and Moorec, 2009). When communicating with children who cannot hear, communicating with sign language instead of talking to them contributes more to their cognitive development (Courtin, 2000).

2.1.5. Sensual Development

In the first years of life, children need a suitable environment suitable for their needs and developmental characteristics and for developing their senses. Therefore, it will be offered to them to develop their senses, especially in homes and educational institutions where babies and children live.

It can be achieved by planning the stimuli in the environment so that there can be more than one sensory interaction. As in the active learning model, learning becomes more permanent in an environment where the baby learns by touching, seeing, hearing, and doing. In addition, while creating a supportive environment, it is crucial to provide a safe environment for the baby and child (Özyazıcı et al., 2021).

The child's presence in environments rich in senses enables the brain to develop faster, move from concrete to abstract faster, and complete cognitive development faster. With sensory development, the capacity to understand subtle differences in stimuli develops. Sensory development allows children first to realize themselves and then their environment. This enables the child to use and develop their existing skills with what they see in the environment. Some of the skills that the child will gain with sensory development are as follows:

- The child's curiosity about the environment and nature increases,
- It enables them to discover different worlds by developing their imagination.
- It allows him to interpret all aspects of events, places, locations, and similar situations.
- Effective use of senses allows children to direct their attention where they want.
- Brings out their energies
- Develops higher-order thinking skills
- It helps protect them from danger
- It develops self-confidence and self-efficacy. (Korkmaz, 2015)

2.2. Learning Environments; Preschools

Each building was formed as a result of surrounding the physical space with some materials based on the construction methods of that era, responding to a specific need for society. Architectural space emerges when people turn to this physical environment, limiting and clarifying a specific part of that space. This makes the architectural space observable and palpable. The space that emerges from covering a specific part of the physical environment with walls and ceilings, interior space; the volumes outside the interior space can be defined as exterior spaces (Altan, 1993).

In the whole process of humanity, the studies in the educational field, people have always gained meaning by becoming a whole with the places. Historical information, societies within a determined period; In line with the results of their scientific, philosophical and religious developments, it shows that they have developed suitable spaces according to the aims of the education programs (Atabay, 2014).

Educational environments are defined as learning spaces in which learning is expected to be strong. All educational environments can perform their education-teaching function properly, provided that the required space and conditions are provided. Acquisition-based changes to be made with interior and exterior spaces can provide impact and success on learning. Educational structures follow and assimilate socio-cultural, historical, economic, and technological advances in the world and our country, transfer them to new generations, and support social development.

Expectations towards educational environments are the preservation of the culture owned and the development of the society. For this reason, schools should be mobile and dynamic structures. This dynamism is made possible by creating a suitable physical environment in schools (Atabay, 2014).

Educational environments, including internal and external areas, in schools ought to be responsive to their needs. Therefore, a school program needs to be determined in detail with the cooperation of educational scientists, architects, and people with administrative authority. Then, the necessary technical and architectural solutions can be developed according to the day's requirements to create a good educational environment (Roth, 1999).

Preschool education environments and their interior and exterior spaces play a significant role in shaping education. Therefore, the physical environment and environments defined for various educational activities are essential and contractor stakeholders of the educational process. The environments created in line with the regulations made according to the method and system in the educational environments; meet with the planned following the purpose, principle, and process of education.

Today, with the outcomes of modern life, children spend more time in educational settings. From a developmental perspective, the early years of childhood seem to be of particular importance. The 0-6 age period is an important process in which development foundations are formed, essential personality traits are shaped in the following years, 60-70% of learning is gained, and rapid changes are seen in all development areas. Therefore, preschool education environments are important in educational structures (Bredekamp and Copple, 2006; Şahin and Dostoğlu, 2012).

The preschool period, which covers the years from the child's birth to the day he/she starts primary education, should be spent with appropriate experiences and in good conditions since it has an important role in the later periods of life. In the preschool years, when the child is most open to learning, high-quality and developmentally appropriate preschool education can positively affect the child's language, literacy, mathematics, social and emotional competence, and cognitive functions in the short and long term. Qualified preschool education is possible with a well-planned and prepared education program and a well-organized educational

environment (Zembat, 2005; Özdemir Beceren, 2012; Koçyiğit, 2012). For this, systematic, long-term, planned-programmed aid should be provided to the child in this period, and preschool education institutions should be prepared in an ideal way to respond to the necessary needs more consciously and appropriately (Oğuzkan and Oral, 2012; NAEYC, 2009; Güleş, 2013).

Many contemporary approaches to preschool education have drawn attention to the importance of educational environments and have addressed this in their approaches. Special learning environments have been prepared for children in the Head Start approach. Water, construction, heat, light, color, and sound arrangements were given importance in these environments. The general aim of this approach is to maximize the child's social, emotional, mental, and physical development (Aral et al., 2002). For learning to take place in another approach, High Scope, the learner must have various materials. In this approach, teachers aim to prepare an educational environment that will enable effective learning and is shaped according to the interests and needs of children (Hohmann and Weikart, 2002). In the Montessori approach, children are allowed to research, try, make mistakes, and correct them. It provides an accessible environment for children to explore the unknown properties of materials, shapes, and colors using their sense organs. This reveals the necessity of preparing an environment suitable for the child's development. Obstacles for children are kept to a minimum, and by allowing the child to use his or her energy in this environment, children are provided with the pleasure of playing, talking, thinking, and exploring the unknown together, alone, with their peers and adults (Temel, 1994; Aral et al., 2002; Danışman, 2012).

In the Waldorf approach, Rudolf Steiner states that children are sensitive primarily to their environment and gain experience through their bodies. That is why classrooms in Waldorf preschools feel like a continuation of the home with their design and functions. An atmosphere that replaces a traditional home environment that provides the rhythm of family and community life is created through daily work (Williams and Johnson, 2005). Since it is aimed to provide consistency between preschool and home, there are usually wooden kitchen areas where children can gain daily life skills, wooden tables, chairs, and desks suitable for children's sizes. Colors are important, so it is suggested that walls be painted in plain colors without

wallpaper. This aesthetic beauty both activates children's imagination and creates a calming effect on them (Stehlik, 2008).

In the Reggio Emilia approach, the environment is accepted as the third teacher, and for this reason, special attention is paid to the organization of the classroom and school environment. Aesthetics is evident in every aspect of the Reggio Emilia approach. In this approach, there are areas where children's works are exhibited on the school and classroom walls. A triangular roof-shaped structure at the school entrance, the interior surfaces of which are covered with mirrors, aims to allow children to sit inside and see themselves from different perspectives. There are reflective surfaces in different areas of the school. Its purpose is closely related to the philosophy of seeing oneself and creating one's own identity. In these schools, classrooms are separated by wall-sized windows, and natural and artificial light sources are used. In schools, particular importance is given to the easy access of the materials in the classroom and the structuring of knowledge by using the materials effectively. In addition, every area and corner in the classroom is used for different purposes and allows children to interact with other children (Gandini, 1998; Nutbrown and Abbot, 2001; Strong-Wilson and Ellis, 2007; Thornton and Brunton, 2009).

As mentioned in the approaches above, the design of educational environments in early childhood needs to have an atmosphere different from institutional buildings, with aesthetic features that will attract the child's attention in this period, and children needs to feel comfortable and safe like at home. Thus, it is ensured that children develop positive attitudes towards school, lessons, teachers, and friends (Demiriz et al., 2003; Güven, 2004; Kartal, 2005; Uysal, 2006; Baran et al., 2007; Dönmez, 2008; Holfester, 2008; Schilling, 2011).

While experiencing their environment, children use their senses, try to satisfy their curiosity, investigate, think, understand, and express. Children's development is a dynamic process, so learning environments that will meet the changing and differentiating needs of the child and support their multi-faceted development with various stimulants that are designed. Therefore, the child is in the center of the spatial designs for children (Bika, 1996). While these designs are being shaped, it is necessary to cooperate with development experts, psychologists, pediatricians, architects, economists, and, if necessary, other experts (Henniger, 2005).

2.2.1 Physical Effects of Preschool Environments

It is necessary to know the physical (motor) development as well as the psychological development to understand the development of the child as a whole. Because physical (motor) development, directly and indirectly, affects the child's behavior (Karabekir, 2009). Physical development; occurs in the child moves his arms and legs (large motor skills) and uses the small muscles (fine motor skills) in his fingers and hands. Playing outside and taking physical activity breaks during the day helps children develop healthy bones and muscles, focus better, and feel less stressed. For example, making puzzles, writing, drawing, and working with clay are some activities that develop children's finger and hand control (NAEYC, 2020).

Children use their muscles to transport the blocks, meticulously lining them up to design and build a tower from the blocks. They use their muscles to move blocks with their hands and stack small blocks. As children move large blocks, their large muscles are strengthened, and their hand-eye coordination is also supported. (Altay, 2018; AÇEV, 2015). The preschool child, who is in the most active period of his life, is constantly on the move to make his bodily functions functional and to meet his learning and questioning needs. During this period, materials such as blocks in the classroom, climbing tools and slides in the garden, balance boards, etc. tools will contribute to the child's motor development (Arnas Aktaş, 2019).

Children aged 0-6 are referred to as children in the preschool education period. Children's educational environment in this period is the environment where children will spend the most time outside of their families. The qualities of the educational environment will have a significant effect on the interaction and harmony of children with other elements such as school, teachers, and friends. Therefore, the physical equipment of schools is critical in terms of the quality of the educational environment.

The schools' land is better to be suitable for climate, calm, dust-free, away from railway facilities, roads with heavy traffic, and airports, and they are expected to be directly related to parks and sports facilities if possible. A good connection to the entry-exit roads and public vehicles, without danger is necessarry and these need to be correctly positioned concerning the areas where the children who come to school live. Children's living and play spaces (south) need to be separated from

service areas (north) from carers' homes, with their separate entrance door (east) and main entrance (Emer,1983). Points to be emphasized in planning; easy access to toilets from play, art, and sleeping rooms, designing group rooms with the flexibility of using smaller or larger sizes, including semi-closed playgrounds, avoiding solutions with stairs, away from heavy and fast traffic and factors causing air pollution, in natural environments as much as possible attention to their inclusion. In preschool designs, it is necessary to avoid solutions with narrow, long, and intricate corridors where children can stay out of control, installing floors in the basement, gardens with high-level differences, and direct contact with roads with traffic (Gür, 2002).

In addition, preschool buildings generally do not have balconies, and windows need to be planned in such a way that children cannot climb up and hang out. All electrical cables preferably be hidden, and the sockets are be at the height of 1,5 m (27 m) out of the reach of children. In addition to all these, wet floors in the institution are be made of non-slip material to prevent children from slipping and falling. The items in the institution must be in a way that does not harm the children's health. Sharp pointed, or curved corners pose a danger to children. The edges and corners of the furniture need to be softened. If there is a ladder, the steps should be covered with a non-slip and soft material, and there should be handles on the sides (Demiriz et al., 2003).

In the preschool period, classroom and educational spaces are places where children explore, talk, ask questions, construct knowledge, and engage in creative activities individually or as a group (Mills, 1998). The physical environment affects both human behavior and development. The interior and exterior physical environment is essential for the child's research and learning development and growth. While the quality of the physical space and materials allows the child to be involved in activities at different levels, it also affects the quality of the adult-child relationship. Therefore, the interiors and exteriors become safe, clean, and attractive (Regional Educational Laboratory, 1991). While designing the educational environment, the physical and emotional climate should be created safely—the needs of children individually and as a group have changed. Adults should share the design of this educational environment with new materials, taking into account the needs of

children when designing classrooms. However, the role of teachers is still important to manage and decide (Richard, 1998).

The preschool classroom preferred to have various materials that children can play with and research. Purposeful and productive games are preferably included in the classroom area. A well-organized environment should be (Dodge, 2002):

- Trusting and relating to others,
- Choosing independence and tidying up
- Dealing with their practice, continuing their studies,
- Gain skills as you select and use materials,
- In the corner where the blocks are located, there should be information (Signs) in different sizes and shapes and on which shelf each one is located,
- Different forms of materials in the house corner or drama corner should allow students to act out different roles,
- The art corner should have paint, package, pastel, chalk, glue, scissors, play dough, and cleaning materials,
- Puzzles and different games in board games should be such that children can make shapes and know how to match,
- In the sand and water corner, children should be able to do different activities to learn why some objects sink and others do not,
- In the library corner, children should be able to examine books, listen to music, or listen to stories from tapes,
- In the music and movement corner, musical activities such as musical instruments, CDs, or cassettes should enable the child to listen to music and make different movements,

Children have learned that they have to show different behaviors in different places before they come to preschool. Therefore, preschool teachers equip children's classrooms and educational environments with materials, and they see children's behaviors and their expectations about the educational environment (Mills, 1998). The educational environment gives a message to every child with this aspect. Below is the table of what the physical environment means to children seen (Kıldan, 2007):

Table 1. Showing the Message-Environment Relationship (Source: Kıldan, 2007, p. 507).

Positive Message	**How Do Environmental Messages Delivered?**
It's safe and it is a comfortable space.	The room is neatly partitioned ,and the shelves are suitable for viewing angles. There is a child-friendly table, chair, and relaxing rug. There is a clean, comfortable space to move around inside and outside the classroom. There is a space for every child where they can feel personally safe. Children can always see their teachers, and teachers can always see their children. The classroom looks clean and tidy.

Table 1 (continued)

Positive Message	**How Do Environmental Messages Delivered?**
I belong here and I am valuable.	Pictures and other materials show children's families, languages, reflect their culture and society. Sections, where children's work can be stored has. Children can see their work in some parts of the classroom, and you can also find their names here.
I can share with my friends.	A classroom where children can work together in small groups is designed in such a way. Materials are shared and used as a group. There is also enough material. Sections separated outside the classroom cooperate with children designed to play.
I can find what I need.	Everything is within easy reach of children, clean and it is orderly. Accessing the materials is quite easy.
It may be interesting to work here.	The classroom and the materials in the classroom are attractive and interesting. Other materials such as toys, books, objects, and collectibles are designed in such a way that

	children can explore and explore. Writing instruments, blocks, art, and structural materials, children encourages writing, painting, and building.
I can find my needs.	The materials are organized logically. With thumbnails (containing words, pictures, and symbols) games are named. The locations of the materials are shown and removed to the shelves.
I am trying to do new things.	Children and adults can interact with each other individually or as a group. The environment is suitable for influencing. Different learning experiences with similar materials and tools provide ways. Books and pictures reveal new people, places, and events.

Piaget states that a child will always want to see and hear new things. It emphasizes that the mental development of children will also be affected by these environmental opportunities and situations. John Dewey and later educators state that the best learning path is based on experience. Maria Montessori states that a high level of learning will occur when an environment equipped with concrete experiences and well-designed materials is prepared for children (Sueck and Lawrence, 1991).

In recent years, educators, architects, and researchers have revealed that the design of classrooms greatly influences children's behavior. James Banning, Professor of Psychology at the University of Colorado; by saying "We shape the buildings and they give us to shape" revealed how stimulating the physical environment is forming the behaviors of individuals (Hebert, 1998). According to the operant theory of Sameroff and Chandler (1975), the child's development does not depend solely on the child's biological characteristics or environment. The child and the physical space affect each other at some points in time (Chung, 2000). For example, a well-designed physical space is attractive to the child, and the child can reflect his positive feelings about the physical space to his school, teachers, and friends.

The physical space needed to be arranged so that the child can be alone safely, and the desire of children of the same age to do the same activity is better not to be hindered. This is achieved with proper use of space. The older ones can be taken out at different times with younger groups of children. Whether there is enough space or not can be understood by observing children's relationships with each other and their participation in activities. In addition, the environment is preferably attractive and colorful. Children's work need to be able to be displayed (for example, their pictures). However, besides the children's work, other pictures and paintings can be be hung so that the children can make comparisons. In addition, children are expected to be capable of moving from one activity to another without disturbing others and preferrably not affect others. A well-adjusted space allows children to establish positive relationships and use materials actively (Regional Educational Laboratory, 1991). The ability of children to establish positive relationships among themselves and with other people (teachers, etc.) is also directly related to the safety need that Maslow stated in his hierarchy of needs.

In a school, children want to feel safe. Therefore, areas in schools are very effective in children's learning. If the structure of the buildings meets the individual needs and expectations of the children, children will undoubtedly feel better there (Hebert, 1998). Along with expectations, school areas has to be free from dangers. A child who feels secure will exhibit more positive academic and social behaviors.

The classroom and school environment design also effectively controls children's self-esteem, sense of belonging, and other feelings of indecision in their world (Hebert, 1998). In a school designed with the needs of children in mind, children will display more natural and respectful behaviors, thus contributing to the provision of classroom order (Hebert, 1998). Considering the climatic characteristics, all classrooms or other important educational environments preferrably receive sufficient light, and the classrooms are generally arranged in an east-west axis (Prakash, 2005). In addition, necessary educational technologies should be accessible in schools anytime and anywhere (Prakash, 2005).

Today, some learning approaches such as constructivism suggest that students construct knowledge actively instead of passively receiving information. If some of the materials used in school bear real-life traces, this will further increase students' interest in fields such as mathematics, music, culture, and art. For example, there

may be recognizable lyric or musical melodies on the walls above the window. In the design of floor patterns, geometric shapes can be inspired. The façade of the school may reflect the culture and traditions of the community or the ceiling of the lobby may reflect the mystery of the constellations. Entrances, doors, and windows can provide instructive information about the shapes and forms of objects (Phan, 2005). It is possible to diversify these examples according to the purpose of the schools. For example, for a child who has just started preschool, seeing the picture of a cartoon hero that he always watches with interest in his classroom can positively support his adaptation to school.

2.2.2. Psychological Effects of Preschool Environments

According to Vygotsky, all personal-psychological processes begin with social processes shared among people, often between children and adults. The clearest example of this is "language." Social interactions determine whether we are sad or happy. Our social environment places us in a specific category. For example, intelligent, tall, short, rich, etc. As a result, our psychological processes begin as social processes shaped by our culture. Emotional development, which affects the child's psychology, is shaped according to the learning environment. Emotional development is defined as the child's understanding of his feelings and the feelings of others, while social development is defined as the child's establishing good relations with others. Teachers have a significant role in helping children recognize their emotions, talk about and express their emotions, and show interest in others. At the same time, teachers contribute to the ability of children to self-regulate and manage their emotions and behaviors. Teachers guide children to work together, involve each other in activities, make and maintain friends, and resolve conflicts (NAEYC, 2020). Preschool learning environments such as play and activity areas are one of the tools that enable children to socialize (Demiriz et al., 2011). In learning environments, children develop emotional skills by sharing the materials they want to play with, deciding how to gather the materials together, and putting them on top of each other without breaking them down. Throughout this process, children learn to be patient, share ideas, and respect ideas that differ from their own (AÇEV, 2015).

Another point that affects psychological development is the language development of the child. Psychology is affected by language development. Therefore, we can reach the effect on psychology by looking at the effect of learning

environments on language. Language skills, which significantly contribute to children's effective communication and reading and writing skills, show a significant improvement in Preschool Education Institutions by listening and talking to children, peers and adults (NAEYC, 2020). Classroom arrangements are an essential tool in supporting these skills. Sitting around the teacher in a "0" and "u" shape created with cushions or chairs while doing classroom activities is healthier in terms of classroom layout. Thus, students have the opportunity to see and interact with both their teachers and friends during the activity, as well as increase their communication skills. A well-organized classroom will positively affect educational activities and communication among students (Bilgin, 2013).

2.2.3. Importance of Space in Learning

Space has a direct impact on instructional programs. The arrangement of space has a significant effect on how students behave and move around, as well as how much attention they pay to instruction. A high-quality instructional program needs to use both its time and space efficiently. Therefore, a high-quality teaching plan requires efficient use of time and space (McLeod, Fisher, and Hoover, 2003). There is a reciprocal relationship between space and people. Understanding the effects of the physical environment on behavior is related mainly to the social characteristics of the physical environment. The structured physical environment is also related to the social environment. Studies have shown that the relationship between the child and the environment affects children's behavior. The meanings of space, form, and human spatial events; It is thought that the spatial behaviors of people are at least as effective as the characteristics of the space (Göregenli, 2015)

According to Hasol, the definition of space is a space that separates the person from the environment to a certain extent and is suitable for carrying out various actions in it. For an animal to lead a happy life, it must perceive its place with all its dimensions (Doruk, 1973). The size perceived in the mind changes in proportion to age. Children's perception of the environment is thanks to some structures in their physical and mental development processes. Children and adults' physical and mental activities differ in the perception and evaluation of the environment. The child primarily uses the sense of sight to perceive his environment and his place. He tries to perceive both the space and the object by walking around the elements (such as a table, chair, coffee table) that may be a physical obstacle

around him. Factors such as color, light, and texture are essential for children's perception. Children, who are more active and mobile than adults, usually try to touch all objects while recognizing their surroundings. In this case, we can conclude that the child uses the sense of touch after the sense of sight in perceiving the space (Buluklu, 2015).

Perception of space; is directly related to the social and physical environment. As shown in Figure 1, sense can be determined by environmental conditions. In this case, the spaces to be designed for children to meet and positively support all children's educational and developmental needs as users. Therefore, attention is given to the qualities such as material, equipment, shape, texture, color, and size in the arrangements that make up the spatial design and needs to be considered in harmony with the children.

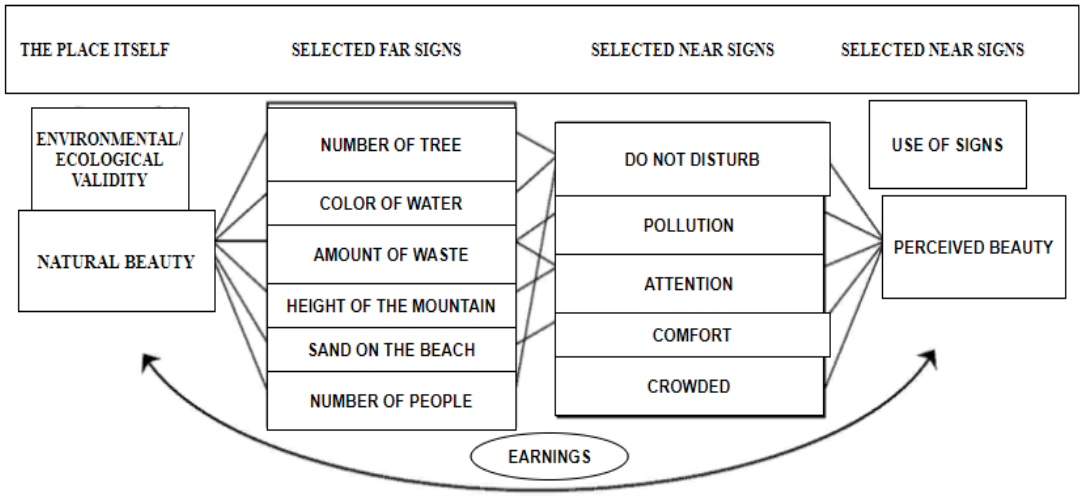


Figure 1. Brunswick's "Lens Model" Based on Environmental Perception (Source: Brunswick, 1950; Rohrmann, 2014).

Perception of space; is directly related to the social and physical environment. As shown in Figure 1, sense can be determined by environmental conditions. In this case, the spaces designed for children meet and positively support all the educational and developmental needs of children as users. Attention is given to the qualities such as material, equipment, shape, texture, color, and size in the arrangements that make up the spatial design and these are expected to be in harmony with the children. In the user's role, a person feels the need to transfer his identity to the space while perceiving the space. For this reason, space design starts in the planning where the sociological and psychological needs of the child as a user are met and their

orientations are analyzed. All arrangements to be made in the space have to consider the child's psychology, age group, hygiene, comfort, health, safety, and comfort. In addition to meeting all the child's psychological, social, and physical needs, the place is needed to be precautionary against the risks of encountering a negative health situation. All objects and equipment items in the space; Children's height, weight, age, and criteria ought be appropriate. (Gislason, 2010).

According to Piaget, the mental development stage of people is parallel to the mental development stage that a child will experience from the moment he comes to life. The child does not directly understand space. However, it becomes structured as a result of experience gains. Symbols, to which a specific meaning is attributed to the space by reconciliation, are formed due to the child's experience. Piaget had important results on the development of spatial concepts for children;

- As with accessing other concepts, the child's actions interact with the environment, start with kinetic movements, turn into internalized actions and finally take their operational form.
- Contrary to general beliefs, spatial concepts do not occur only at the level of perception. Although space seems to be data in life, it is acquired through mental evolution.

Piaget's primary hypothesis about space can be summarized as follows: The concept of space in children is on a path of development within logic, the opposite of historical formation. (Yılmaz, 1994).

2.2.4. Effects Of Learning Environments On Children's Learning Process

When preschool education is considered from the institutional perspective, it is seen that the children of the 0-6 age group (0-72 months) of children of families with different socio-economic and cultural levels are equal, in line with their cultural values, suitable for all development levels and individual differences. We see that it is defined as a systematic and planned education process given in the family or in alternative programs, which enables them to receive education under these conditions, pioneers the awareness of their abilities in all areas of their development, and prepares them for primary education. Therefore, these institutions are the structures that save children from being dependent on their parents, shape the future of society, ensure the safety of children, provide education and care, and internal and

external arrangements are made. Necessary equipment is provided by considering the administrators, teachers, auxiliary personnel, and families (Oktay, 2004).

The importance of a rich learning environment and play in children's learning is an indisputable fact. However, many teachers today see school more as a place to develop academic skills. These teachers do not give enough opportunities for children to play at school (Samuelsson and Carlsson, 2008). In this respect, other learning environments that contain rich stimuli gain importance as an alternative for children's development and learning. At this point, children's museums have an essential place as a learning environment where children can learn spontaneously by playing and exploring and making unique contributions to the development of the child (Samuelsson and Carlsson, 2008).

Everyone tends to notice the environment and "read" their message or meaning based on their thoughts. However, if we observe how easy it is for everyone involved and how everyone uses the space, we can improve our ability to analyze deeper layers of meaning. Later we can learn more about the relationships between children and adults who spend time there. (Edwards et al., 1996; Nicholson, 2005). School can reflect and sustain ideas about how children learn, what they learn, and how they are taught. Beyond purely educational goals, a school can also convey very subtle messages to children about what is important and what deserves respect. Educational environments can make a significant difference not only in education but also in the life experiences of the children who use them (Nicholson, 2005).

Historically, educational environments have influenced what can and cannot be learned. It placed strict restrictions on limited schools with primitive resources other than established activities and is known to hinder the development of curriculum offerings in the creative arts, physical education, vocational training, and other fields with specific field requirements. (Anderson, 1970). This situation also shows the importance of using the school with interior and exterior spaces.

One of the most influential views on children's games was put forward by the famous Russian psychologist and theorist Vygotsky. Vygotsky's basic understanding of the role of play is that play contributes to two critical areas of children's developing abilities. The first is about language development; the second is about children's ability to control their own cognitive and emotional processes through play, that is, to gain self-control. This view of Vygotsky is still accepted as influential on children's learning processes today (Vygotsky, 1978).

Preschool education environments have great importance in terms of their physical and social environment. They enable children to develop their creativity, physical, mental, and social aspects, develop their mother tongue, learn other languages, and socialize through games. All kinds of education given or not given to the child in these years determines his future and, therefore the society and the shape of the society he will be in (Oktay, 2004). Preschool education; aims at the physical, spiritual, and emotional development of children. This direction prepares the child for the primary education process by ensuring that the child gains good habits and works in cooperation with a sense of responsibility. For this reason, the most crucial element that stands out is to make unique designs and developments for children in preschool education buildings. Planning of schools enable children to feel at home, trust the educational structure, be happy in the structure, and fulfill their interests and needs. Schools; With their architectural structure and spaces, it might allow children to gain an approach based on research and discovery while experiencing education (Anderson, 1970).

The spatial quality value, which is shaped by the function and character of the space is the age, gender, social status, etc. of the color, texture, material, light equipment, and equipment depending on the function of the space formed by the influence of factors. Using these factors appropriately and correctly will ensure the quality of the space and user satisfaction (Tavşan, 1995).

If evaluated as a term, designing educational structures; can be explained as making the environment, space, or physical equipment where the education is carried out as an activity most robustly and beneficially within the scope of the planned purposes. The design of educational buildings consists of the physical environment and a social environment that includes all stakeholders, such as educators, teachers, experts, parents, students, and other authorities. Planning the social environment with this broad scope requires the cooperation of disciplines such as psychology, life sciences, ecology, economics, architecture, and engineering (Oktay, 2004). The early learning period is crucial. There are only 2000 days between when a child is born and when he starts preschool. As research shows, the emergence of his most significant developments during this time lays a solid foundation for the years to follow. Our brains are built around the environment we grow up in, and quality learning experiences that begin at birth are vital to a child's success later in life. Therefore, a well-designed physical environment is considered critical in realizing all

the benefits of early learning programming. Factors such as the strategic placement of windows and fixtures at a child's level, interactive sensory furniture that promotes cognitive-social development, or the integration of the classroom with the open playground that arouses curiosity about nature are of great importance for educational structures (Kara, 2018).

In addition, the features that the equipment that plays an active role in the design of children's spaces should have can be briefly listed as follows:

- The equipment should be strong and durable, useful and replaceable, waterproof and paint colorless, produced from healthy materials, expand their imagination, and be unique to the child.
- It should be optional and addable.
- It should have many colors.
- It should be safe against accidents.
- It should be varied and modular.
- It should be functional.
- It should be easy to clean.
- It should be affordable.

It is important to install functional multi-purpose equipment that can meet all vital needs of children in indoor spaces (Tavşan, 1995).

As time passes, the importance of technology increases with the advancement of age. This also applies to educational structures. Innovative computer applications and other innovations might also help your child develop while preparing them for the modern technology-driven world. These modern preschool structures can help the child understand and develop the technologies they need to master for future success. Preschools are not a place to seek excellence in the academic curriculum but a place where children engage in and teach in a tailored way whatever activity appeals to them. The design of preschool education structures preferably have qualities that will help the child's emotional, social, and personal development and development. By combining the basics learned at home with what they learned in educational structures, a child helps them to develop their communication and different skills by being in constant interaction with children of the same or different age groups and through the activities they share (Korkmaz, 2015). The child, who is not limited to the house he lived in as of his birth, continues his interaction in different areas, gaining new experiences. In this context, the living area in the house, especially the

children's room, educational units such as nurseries and preschools, and the spatial designs of cultural activity areas such as children's museums, science, and game centers are places that are specially addressed (Babaoğlu, 2007)

Stimulants that are functional in preschool education structures to attract students' attention are of great importance. These stimuli ensure that mental images are translated into the language of communication, thus transforming thoughts and images into information. These transformations provide a solid foundation for the child's future life. Interior and exterior spaces are essential, especially to strengthen children's communication with the areas where they spend intense time. All designs and arrangements need to be designed for the mental development of children strongly and positively (Özdemir and Bacanlı, 2007).

While designing the structure that will provide services for preschool children, the developmental characteristics and qualities of the children who receive education in this period should be considered in the first place. Preschool children are in a position of action with the desire to acquire and learn about things in the environment. While all activities and studies can be in the same place in the planning of the educational structure, it requires children to be able to benefit easily by changing places according to the activity characteristics in different places.

2.2.5. Design Elements Within Learning Environments

The connection between classroom design and learning outcomes is more than a simple assumption, and scientific researches support this.

A study published in Building and Environment in 2015 found that changing some key elements of classroom design can improve students' learning outcomes by 16 percent. According to the study, factors such as lighting, air quality, and students' sense of ownership of their classroom affected the students' learning ability. (Connecting elements, 2016)

2.2.5.1. Lighting: The brightness of the learning environment is one of the influential factors in learning. Therefore, preschool children should benefit from daylight as much as possible (Aktaş Arnas, 2018). Lighting to be done in the space; differs according to the action to be performed in the space and the purpose of use between parts of the space (Cin, 1989). Lighting suitable for activities and avoids monotony are preferred in educational environments. For example, it would be more

appropriate to place the book corner in a location that receives sunlight. The parts of the classroom that have less light can be arranged as house and block corners and can be made more attractive with artificial lighting elements (Demiriz et al., 2011).

Moreover, a study has found that the way classroom lighting is set can significantly impact student behavior. A four-month study by John Ott found that students in regular "standard cool white" fluorescent tube-lit rooms were more active than students in rooms with "improved" fluorescent tubes that contain not just the visible light spectrum. (Knirk, 1979)

2.2.5.2. Ventilation: Ventilation is one of the most basic needs in any place where people live. Children's learning environments in preschool education institutions should be ventilated regularly. Regular ventilation is also crucial for the health and productivity of every individual in the institution (Demiriz et al., 2011). Therefore, natural ventilation should be preferred as much as possible in the ventilation of spaces in pre-school educational institutions. When operating ventilation devices such as air conditioners in environments where natural ventilation is not possible, care should be taken so that there are no children in the environment. While natural ventilation reduces the risk of students getting sick, using unnatural ventilation devices increases the likelihood of children getting sick (Aktaş Arnas, 2018; Aktaş Arnas, 2019).

2.2.5.3. Heating: Classroom temperature should be at average room temperature, as the extremely hot or cold classroom environment affects children negatively (Aktaş Arnas, 2018). The best heating system for the preschool education institution is the heaters. The environment can be efficiently heated with honeycombs from the floor or the wall. Underfloor heating is healthier and more efficient for preschool education institutions in cold regions. In heating with central heating cores, some precautions should be taken against accidents in the environment such as impact (Bilgin, 2013; Demiriz et al., 2011).

2.2.5.4. Window-Door Frames and Wings: The number and size of windows in learning environments should be determined according to the activity performed in the environment. The windows are arranged so that children can see outside whenever possible and are exposed to natural light from outside. In addition, it is still necessary to consider the heat loss of the environment and the noise factors that may

come from outside. The glass in the door and window in the environment should be selected from the glass with insulation against heat and noise. Care should be taken to ensure that the window sashes in the learning environment are ergonomic (Demiriz et al., 2011).

2.2.5.5. Wall Paints and Color Properties: Colors have an essential effect on learning because they affect children's physiological states and behaviors (Aktaş Arnas, 2018). Interior wall paints should be odorless, moisture-proof, air-permeable and easily cleaned, and ceilings should be painted with lime for health reasons. The classroom walls can be differentiated with paints of similar or different characteristics according to the work of the children (Demiriz, et al., 2011).

2.2.5.6. Flooring: Care should be taken to ensure those floor coverings are made of wipeable and non-slip materials suitable for cleaning and health conditions (Bilgin, 2013). Floor coverings can be determined according to the intended use of the learning environment. Except for environments where water is constantly in contact such as the kitchen, dining room, laundry, and toilet other environments should be furnished with parquet as much as possible. Parquet can be preferred due to its ergonomic features such as reflecting the light in the environment, increasing the temperature, being easy to clean, and looking nice (Demiriz et al., 2011).

As well as the arrangement of the educational environment, some features should be considered in the selection of materials to be used in the environment (Oğuzkan and Oral, 2012; Perry, 1997; Kalemci, 1998; Tok, 2015). These:

- The materials are not to be pointed, not to harm themselves or others. Paints are not prefered to contain chemicals that will endanger the child's health.
- The materials are preferred interesting and easy to learn for preschool children.
- Furniture is preferred ergonomic.
- It is preferred made of durable materials.
- It is preferred similar to the materials used in the home environment.
- It is preferred carried easily.
- It is preferred easy to clean.

- It is not preferred contain accessories that would be harmful to children.
- It is prefered colors that are compatible with the interior of the classroom.

CHAPTER 3: MONTESSORI PHILOSOPHY

The interior architecture researcher intends to come up with some spatial analysis through the re-evaluation for better Montessori school interiors. There are important elements that make Montessori philosophy worth studying.

The Montessori education system, which was shaped by the second world war, is going through a similar difficult process called the 'pandemic' process today.

Maria Montessori experienced three tragedies during her lifetime: World War I, the totalitarianism of the 1920s and 1930s, and World War II. Despite the darkness, she saw that the world could be made beautiful. After years of observing children, she came to believe that they could be the key to transforming mankind and bringing about lasting peace if they were educated through the practice of peace.

"*We must lay the foundation for peace ourselves by constructing a social environment, a new world for the child and adolescent, so that their individual conscience may develop*," said Montessori.

She designed the Montessori curriculum to emphasize education for peace as its primary focus. (Dunning, 2022)

While this situation was a result of the war, similarly, the effects and consequences of the pandemic on Montessori philosophy have emerged today.

Young children learn by exploring their environments through movement and using all their senses, so distanced learning that is developmentally appropriate has been a challenge. At this point, the strong relationship of the Montessori education method with nature allowed children to continue their education in outdoor spaces instead of distance education. Thus Montessori education method was re-shaped in the pandemic. (Poyntz, 2021)

The Covid 19 pandemic has rapidly affected the whole world since March 2020. Moreover, it forces people to change the relationships they have built with the physical spaces they have long been accustomed to and where they carry out their daily activities. Education is one of the most affected areas by the coronavirus pandemic (Künyeli and Baydoğan, 2020).

Social distancing is applied in more than 109 countries because of the COVID-19 pandemic. The implementation of social distancing has led to the temporal closure of schools in all these countries, both regionally and locally (Mahaye, 2020).

As part of the social distancing policy, schools in many countries are closed during the COVID-19 pandemic (Lancker and Parolin, 2020). Studies have shown that COVID-19 is highly contagious and being in crowded and dense environments can increase the incidence of this disease. Schools are among the most dangerous places because they are densely populated with children. Moreover, children with this condition can transfer it to family members and friends. This is why education continued as distanced after schools closed. However, the continuation of the corona pandemic creates the need for face-to-face teaching and the need for students to go to school (Soltaninejad et al., 2021).

A global pandemic could further increase the leaning of being outdoors. Stanford University researchers examined 119 peer-reviewed studies and found that such education has a measurable, positive impact.

According to research, children who spend more time in nature score higher on cognitive measures such as critical thinking and problem-solving. Moreover, they engage in more creative play, get along better with others, have greater self-discipline; have better self-esteem; are healthier, less stressed, and more physically active. In terms of health, they even have lower rates of nearsightedness.

Nature has also been found to improve focus and help those who have attention deficit disorder.

With the impact of the pandemic, in recent years, many traditional schools have established gardens where children can spend part of their day._Some schools set up tents outside to benefit from the fresh air and continued their education there.

Public schools are trying to adapt to nature, while private schools have more resources and flexibility to move to learn outdoors (Dalphonse, 2021).

3.1. Montessori Educational Approach And Quality Of Space

In this section, first of all, information is given about the emergence and development of the Montessori educational method. In addition, the principles of the Montessori method are mentioned. Finally, the spatial criteria of Montessori schools are explained in detail and summarized in the given table.

The Montessori Method is an educational approach introduced by Italy's first female medical doctor, pedagogue, and professor of anthropology, Maria Montessori (1870-1952). Maria Montessori was born on August 1, 1870, in Chiaravalle, Italy, and attended primary school in Rome. Subsequently, she started the Regia Scuola Tecnica Michelangelo Buonarroti Technical School in Rome in 1883, but due to his interest in biology, she decided to study medicine and entered the University of Rome. She completed the pre-medical program here and graduated with high honors in psychiatry in 1896. Thus, she received the title of Montessori Italy's first female doctor.

Montessori acted as the principal of a private school in Rome in 1900, under the name of "Ortophrentic School" for children with developmental problems, where education was given not only to students but also to teachers, and in this process, by developing new materials for special problems, children were prepared in advance and it has been observed that they are more successful with experiments and exercises. She also conducted studies on the education of children with mental retardation in Rome and revealed that mental retardation is not a medical problem but a pedagogical problem, that they cannot be cured with the treatment methods applied in hospitals, that these children with mental retardation can be helped with special education systems and that these children should be educated in schools. She created her own education method based on his argument (Wilbrandt, 2013).

Montessori proved this assumption when she was able to teach some of these children to read and write as a result of his studies and methods with mentally retarded children between 1898-1900, and the children achieved the same success as normal-minded students in the exam administered in a public school. The success of Montessori's education method on mentally handicapped children made him think that this education method could also be applied on children with normal intelligence, and she revealed today's Montessori method with the necessary changes and additions (Montessori, 2016).

In 1907, news of the school's success spread when Maria Montessori opened the first "Casa de Bambini-Children's House" in Rome's poor neighborhoods, aged between 2 and 6, mostly illiterate and children from poor families. Visitors came from various countries of the world. 88 Despite the lack of sufficient materials and equipment due to financial impossibilities, the second "Children's House" was opened by further development. In this second school opened, Montessori materials started to be used, the construction of which was undertaken by an association, and subsequently, orphanages and children's homes in Switzerland, where the education method of Froebel was used, began to be transformed into Children's Home, where the Montessori method and materials were adopted as of January 1909 (Güleş and Erişen, 2009). Montessori, who opposed the traditional understanding of education based on the violence of her period, emphasized that the teacher should be a guide that facilitates the work of the child, and argued that an environment in which the child can gain freedom in education is necessary. The Montessori Method aimed to develop the child's abilities such as knowing and applying what he wants, concentration, self-confidence, independence, entrepreneurship, respect for others, cooperation, and orderliness. For these purposes Montessori; firstly, by enabling the child to experience the pleasure of learning by himself without any coercion; secondly, it aimed to reach the child in two ways by helping to perfect the learning mechanism (Lopata et al., 2005).

The widely used education method has been changed to apply the Montessori method. The first duty of the teacher is to stop interfering with him (Montessori, 2016). According to Maria Montessori's theory of child development based on three-year periods, these children, who were allowed to divide the classes into three different age groups and study with the same teacher for three years, by observing

and helping each other, have an idea about what will happen when the little ones grow up and reach their age. and older children are provided with the opportunity to reinforce their knowledge by helping younger children. Thus, the child also helps their social development by learning to establish social relations with different people (Doğru, 2009).

This school philosophy and education method, developed by Maria Montessori, can be applied to all children with or without disabilities, as well as for children with autism and other disabilities. It is an approach method that aims to find the easiest way to learn (Korkmaz, 2015)

Montessori has prepared several educational materials that support self-education, train the child's senses, help the development of independence, self-confidence, concentration, obedience, coordination, and order. These materials are used in early childhood and are divided into five groups as daily life materials, sensory materials, mathematics materials, language materials, and universal education materials (Montessori, 2016).

The child is central to the planning of Maria Montessori's educational spaces. Place; it is based on design criteria that prioritize the needs, interests, and personality development of the child. In the planning of Montessori education spaces; The design criteria that support the personal freedom of all children and allow them to explore and observe are targeted. The planning of Montessori education spaces is realized in line with the following objectives (Korkmaz, 2015):

- Individualization
- Freedom of choice
- Concentration
- Independence Problem-solving skills
- Social interaction

Competence in basic skills Montessori education system has been found to contribute positively to the educational development of the child as a result of many researches. A study conducted by Lopata and Wallace revealed that children who received the Montessori education method had higher academic achievement than children who received education according to the traditional method (Lopata et al., 2005). As a result of the research carried out by Güleş and Erişen; It has been stated

that Montessori education practices play an important role in enabling preschool children to acquire real information about the world they live in (Güleş and Erişen, 2009).

From an environmental perspective; the Montessori approach tries to create a school environment that is very different from traditional teacher-centered classrooms. It has removed the environments where adults are responsible, with environments that have prepared the classrooms in a way that helps children develop their sense of freedom and self-control due to its focus on the whole of the child.

In the Montessori approach, it is completely based on the child's desire to learn, education is a natural process, the child acts from within himself, thus providing both self-control and learning opportunities, and the opportunity to research, try, make mistakes and correct their mistakes on their own. By providing a free environment for children, it is ensured that they discover the unknown properties of materials, shapes and colors with their sense organs, and experience the pleasure of understanding, learning, and knowing mutually as a result of their experiences with their peers and adults. Thus, children who use game observations and emotions to acquire knowledge gain experience as a result of interacting with the environment by arranging their knowledge and learning (Doğru, 2009). However, there are certain rules regarding the use of materials in the classroom. In the small cabinets that children can reach, the materials listed in a certain order from simple to complex must be put in place by children after they are used (Lillard, 1973; Topbaş, 2004).

Montessori schools, where the educational environment is prepared for children, are basically designed by taking into account all elements such as the safety of the environment, light and sound, where the child can move freely. Classroom environments that support social interaction, areas for individual, small group and all class activities, light, proportional and easily moved by the child, chairs, furniture, cabinets, hangers on the walls, easy to use locks, drawers, and doors that can be opened and closed easily, brushes that he can grasp with his fingers, brooms with short-straight handles, soaps that fit in his hand, clothes that can be put on and taken off by himself, again compatible with children's sizes, etc. goods and materials are designed as a pleasant aesthetic environment and a safe environment for physical activities (Korkmaz, 2015).

According to Hainstock, children in Montessori schools learn through their physical environment. According to this idea, education need not be imposed on the child; When the necessary learning environment is prepared for the child, the child will be free to act and develop according to his inner orientation. In such an environment, the role of the educator is limited to helping the child when he/she needs it and preparing the necessary environment for the child. In this context, according to the method, the strongest relationship in education is not between the teacher and the student, but between the child and the environment (Durakoğlu, 2010).

Educational materials are arranged in such a way as to enable the child to understand concepts such as shape, size, color, texture, taste and the relationships between them. While there are educational and instructional materials that will benefit all kinds of development of mentally handicapped children in the classrooms, there are toys for playing games and a wide variety of educational materials for normal children without intellectual disabilities. Children who are free to walk around the classroom as they wish and go from school to the open area are taught to do this quietly and without disturbing their other friends 91, which creates a sense of respect for the environment in which the child lives. Due to this freedom of movement, education is not divided into study, rest or playtimes as in traditional schools, and the child is allowed to choose the activity they want. Thus, it has been revealed that children in these schools are extremely eager to learn and can learn on their own when appropriate environments are offered to them (Doğru, 2009).

In Montessori classrooms, children are provided with the opportunity to do self-education by using educational materials in order to meet their mental development needs, individual work freedom, meet the need to adapt to the social environment and gain self-sufficiency skills. There are corners such as individual education, daily life activities, educational materials, prepared environment, language materials, general culture materials, sensory materials, fine arts materials, mathematics, and geometric materials. In the classrooms where these materials are located, the materials are exhibited by being arranged according to their sections. Although the materials are multi-colored, the baskets, containers and trays they are in have a natural appearance to keep the attention on the material. Glass jars and bottles are also used because they are plain and recyclable. Mentioning the importance of

being in touch with nature, Montessori drew attention to the fact that it has an important place in the development of the child (Wilbrandt, 2013).

Another important part of the Montessori method is nature (Montessori, 2016). The child needs not only to know nature but also to live in nature. For this reason, Montessori states that children need to be a little isolated from city life to the open air, to walks, to the sun, to get wet in the rain, to deal with the soil, and nature has a great place in education. Since the laws of nature form the basis of science and branches of art, nature-related activity environments are also offered to children so that they can understand the order, harmony, and beauty of nature. On this occasion, the school garden is an important educational environment in these schools, where exterior spaces are also given importance. Children's area cleaning in the garden, flower-tree growing and irrigation, animal feeding, etc. they also carry out the works related to environmental care where activities are carried out (Korkmaz, 2015).

In the Montessori method, the child, who is intertwined with nature, discovers by contacting, learns by observing the natural life cycle, comprehends his place in nature, takes responsibility when caring for plants and animals, and in patience and trust, which is a way of belief and philosophy of life. De Jesus stated what it means to wait and that he learned to respect nature. Thus, it is ensured that children discover the diversity and beauty of other beings in the world and develop their feelings of love and trust towards nature (Büyüktaşkapu, 2012).

Maria Montessori says 'Children did not have any land that could be tilled, so flower pots were set out all-around a large terrace. The children never forgot to water the plants with a little watering can. One morning I found them all seated in a circle on the floor around a magnificent red rose that had opened up during the night.' (Montessori, 1988). Actually, this is a good example of how Montessori education can integrate daily life. This is an important issue for these days because of the pandemic reasons.

In Montessori classrooms, it is ensured that the child can move freely and educate themselves by making applications on his own. In Montessori's schools, children have a methodical and calculated freedom and are built on three basic elements of Child-Environment-Teacher. Here, the child is not as an adult wants, but by observing and understanding him as he is, to find the best and easiest way to learn

by himself. It provides a learning motivation that will continue throughout his life with the experiences he has gained due to the work he has done in line with the child's desire to learn (Wilbrandt, 2013).

While arranging the space and landscaping in Montessori schools, it is considered that the children can move freely by feeling safe, that the items prepared in suitable sizes for the child are suitable for the strength and dimensions of the child, and the suitability of the child's "culture" in which he lives. In this context, there is no gratuitous material in any classroom and every material has a fundamental and hidden purpose. In addition, while the rules in the society are applied in the classes where the freedom of movement and choice is applied, the phenomena of the outside world are brought into the classroom environment. The teacher, who is both the architect and a part of the environment in these schools, must have a good command of the materials, be absolutely clear in his movements and always be fully prepared. The materials on the shelves are placed from left to right, paying attention to the introductory characteristics of colors, from simple to difficult, and only one of each material is kept so that all children learn to be patient, wait, share and make the right decision (Wilbrandt, 2013).

Montessori preschool includes children's education spaces, learning spaces, outdoor play, library, a staff room, and storage areas. Environments should be prepared in such a way as to include manipulative, language, cultural, mathematical, and emotional issues reminiscent of practical life. The Montessori learning environment is based on the interests and experiences of preschool children and teachers. Personally created regular environments for pre-school children include practical life, arithmetic, cultural, linguistic, and sensory issues (Şener, 2001)

According to the spatial design principles of the Montessori educational approach, the physical environment design and the use of the space reflect the communication of preschool children with the "wide community values" (world, city, nation) located in the immediate vicinity of the preschool space. As the basic element of the approach, space is “inviting, systematic, aesthetically pleasing, gathering and peaceful”. The materials themselves and their organization reflect careful selection, as order and beauty cause aesthetic satisfaction and respect for the preschooler. The principle that briefly conveys this understanding of education is the "prepared environment". With this environment, the child takes part in practical life

experiences. The experiences gained are designed to stimulate children's senses (Şener, 2001).

Definitions made for Montessori educational environments whose spatial characteristics are examined and spatial concepts developed in line with these definitions are among the distinguishing features that form the basis of Montessori education. Spatial concepts in Montessori education in the context of definitions made for Montessori educational environments are given in Table 2.

Table 2. Concepts Expressing the Spatial Feature of Montessori Education (Source: Sakarya, 2022)

Spatial definitions with Montessori Education	**Concepts**
Perceptual stimulating space	**OPENNESS**
An aesthetic, orderly and understandable space	
Educational materials and space to explore	
Barrier-free, plain and convenient place for observation	
Venue with options for personal preferences	**VARIATION**
Space suitable for group or individual work	
Space with different defined areas	
Space open to the formation of different spatial gains in childhood	
Space that creates freedom of choice for every child	**FLEXIBILITY**
Venue providing an individual hands-on learning experience	
Space design that provides freedom of movement	
Flexible space suitable for adaptation for every child	
Space for the child's height, age, and culture	**RELEVANCE**
A place that the child can adopt and trust	
Space where personal needs can be met	
A place that makes every child feel valued	
Real-life space that develops sense of responsibility	**NATURALITY**
The place where environmental experiences are encountered	
Space built with natural materials and materials	

Place in contact with nature	

Figure 2. Montessori Training Space / Eucalyptus Montessori Child Care Centre Canberra -CCJ Architects (Source: Soyupak and Proto, 2018)

Since Montessori has a holistic approach, it has developed an education system that supports child development in this direction, and educational environments that allow this education to take place. In Montessori spaces, children are designed to act as individual, responsible and free individuals (Soyupak and Proto, 2018). The child, whose defined areas are located in places with an environment that is suitable for education, carries out the education with preferences for his own wishes. Light colors were used throughout the classroom space in Figure 3.1, and natural wood was preferred for materials. There is a certain order throughout the classroom. The fittings are compatible with children's sizes, and natural light is highly utilized with large windows. According to Montessori, children are extremely sensitive to order. The concept of order for Montessori children; Memorizing the location of every object and where it should be, recognizing the environment, dominating it down to the smallest detail, and being able to move comfortably enough to move blindfolded in it.

3.2. Montessori Educational Environments

In this section, Montessori educational environments; their relationship with the educational approach, exterior and interior spatial features will be discussed in detail.

3.2.1. Exterior features of preschool Montessori educational environments

The order in a space is also related to aesthetics. According to Montessori, not only the educational materials, but the entire educational environment should be attractive, inviting, and aesthetic. Such an environment encourages children to use the furniture and space carefully by helping them form the thought of "I must use it carefully".The spaces must have an order that can support the development of the child in every aspect. Montessori education venues; It is designed for the child to gain a sense of identity, to be able to achieve anything on his own, to be free, to use it for his spatial needs (Firlik, 1996).

The architectural qualities found in educational buildings that adopt the Montessori educational approach are as follows (De Jesus, 1987):

- Single storey school building
- Having an atmosphere that includes aesthetics and order in general
- Opening the doors of education classes to the garden
- The equipment in the school is suitable for the physiological structures of the children
- Designing classroom spaces suitable for mixed-age groups

In Montessori educational buildings, the design is organized to make children feel at home and to attract their attention to school. Children's senses are taken into account when planning educational spaces in Montessori schools. It is based on the idea of what children want to see, hear, touch, smell, and taste. In order for Montessori children to observe real life, there are real objects in real life and large garden areas in educational buildings. According to the Montessori understanding of education, the child; nutrition, and a well-planned environment are kept away from physical negativities (Demiriz et al., 2011)

After the work of Montessori, studies on the scientific education of children in nature went further. Arguing that animal and plant shapes prepare children for further physiological studies, Montessori suggested that there should be wetlands for growing plants and vegetables in garden areas and that they should be in a respectful manner towards nature by taking responsibility while feeding plants and animals.

Montessori education; focuses on the development of the child's emotional, cognitive, social, and physical selves. All children have a sense of independence

towards their interests in order to discover and develop their potential talents. It advocates lifelong learning.

The spatial layout in Montessori educational buildings is planned to provide independence and privacy to the child. Activity areas and circulation areas in buildings are designed with an open plan method suitable for children to observe what is happening in the building and with each other. Educational buildings have various areas of appropriate size, from which children can choose according to their interests (De Jesus, 1987).

The setting up of central space in the design of Montessori educational buildings; serves the order that allows children to wander, rest, socialize as well as work (Hertzberger, 2008). With its common areas and special setup, Montessori enables children with different structural characteristics to be together and socialize.

Montessori education enhances the exteriors by integrating every child's learning experience with the environment surrounding the school building. Montessori offers children the opportunity to participate in a variety of outdoor activities, helping them experience the real world with natural areas.

Figure 3. Terra Nova Adventure Park (Source: Peyzax Magazine, 2020)

As in Figure 3, the Montessori outdoor area has a variety of outdoor play and activity areas. In the middle of the playground, climbing equipment and wooden study materials for children provided a fun function for children. Observation cabins, wooden steps, slides, sand, and water areas increased the creativity of children and gave them the opportunity to experience real-life in nature.

Montessori outdoor designs meet education and play in a harmonic way. It also offers the opportunity to discover animals and plants with the existing garden arrangements. In field designs; There are opportunities to develop children's cognitive and motor skills by observing the soil, the environment, and the characteristics of plants.

3.2.2. Interior features of preschool Montessori educational environments

Montessori spaces are organized simply and aesthetically. Classrooms are considered bright, airy, and safe. Light colors are used throughout the interior. There are pictures and paintings on the walls at a level that children can see. There is an order in Montessori education spaces. The location of materials and materials is clear. Children can work freely using the materials they want. In accordance with the children's 103 sizes, the furniture is also light and light in color to provide ease of transport for the children. Chairs, tables, shelves, and all the tools and equipment in the space are thought to be suitable for children's sizes. Cabinets have open shelf systems, sink sizes, door handles, toilets and hangers are designed according to children's heights. In this way, children can move freely as they want and have physical independence. This method supports children in learning by doing and experiencing. The child, who is associated with objects specific to daily life, learns by doing real-life tasks. This method has a significant impact on the child's self-confidence gain (Korkmaz, 2006). There are many different areas in Montessori education spaces. These are practical life exercises, sensory exercises, mathematics corners, book corners, and cultural activity areas (Demiriz et al., 2011).

The current curriculum in Montessori early childhood classrooms includes the following qualities (Korkmaz, 2015)

- Mixed-age group
- At least three hours of non-stop working time, five days a week
- Personal and group teaching

- Adult child ratio meeting local requests
- Child's observation record
- Regularly scheduled family conferences
- Open observation policy

The current curriculum topics in Montessori early childhood classrooms are as follows (Korkmaz, 2015)

- Encourage self-activity, self-directed learning, and self-motivation
- Providing sensory training for mental development
- Developing competencies and confidence through concrete repeated experience and practice
- Promoting collaborative learning through peer education and social interaction
- Providing opportunities for physical activities and outdoor activities
- Providing instructional work that promotes creative expression

All developmental needs of children are met in Montessori education venues. Each child has the opportunity to observe each other while performing a study or activity in places where they have the freedom to work independently according to their wishes (Korkmaz, 2015). According to Montessori, each child exhibits different behavior patterns at different ages and since each of these age groups will be considered as a stage, each age group has unique needs. In order to develop social skills in children, Montessori classes were mixed in terms of age, gender, culture, physical disability, and success.

Figure 4. Prepared Environment in Montessori Education (Source: Montessori Dünyası, 2022)

As in the education structure in the example in Figure 4, interior planning; it is open-plan. The place is designed completely in accordance with the sizes of the children. The interior design can create a sense of peace in the child with its style reminiscent of a simple house. The spatial arrangement is designed to integrate with children's physical freedom, away from complexity and suitable for movement activities. Light colors and natural materials are used throughout the space.

Montessori interiors inspire and engage children by encouraging them to education and training. The spaces have natural, attractive and aesthetically appealing features for the child. The spaces have a certain order in accordance with all the works.

Montessori spaces aim to enable all children to independently develop their social skills and learn happily. Montessori spaces have natural lighting, soft neutral colors, and regular spaces that make all children and individuals feel a sense of belonging to the space. There are natural wooden educational materials, wooden tables, and woven carpets in the venue. All spatial spaces have 106 remarkable arrangements suitable for children to work individually or together as a group. While children take an active position in education, there is a design that supports their concentration and is far from confusion. Learning, by gaining experience in the

educational structure of the child with spatial arrangements; it enables them to develop socially, spiritually, emotionally, physically, and intellectually. Montessori education prepares children for life by bringing them together with real life. Thanks to Montessori education, the child gets acquainted with the real world and gains a careful, independent, and autonomous structure (Soundy, 2009).

Montessori spaces have an open space arrangement so that children can move freely and comfortably, as well as make observations. The space is free from the distractions of children. It includes suitable areas to make children's talents visible. There are open shelving systems suitable for the height of children that do not block their field of vision. The space appeals to the senses; living plants, variety of textures, soft colors, and hygienic quality. They are places where the personal needs of all children are met. Montessori spaces use real materials, as children need to learn to think about reality; The images displayed must show real-life life, objects or events. Well-designed spaces have a child-centered structure; it has a sensory environment that reflects beauty, order, and simplicity (Kara, 2018).

3.3. Montessori Class And Montessori Materials

The Montessori class has mixed-age groups.When young children first start using the materials, they have the opportunity to learn from older and more experienced children, and as time passes, children gain experience by using these materials (Köksal Akyol, 2005). Montessori classes are organized as standard and every material used is the same in all Montessori classes. In Montessori classrooms, children can do the activities they want, and they can use other areas in the school whenever they want (Kaylı and Arı, 2011). The necessary environment is kept ready for the child to choose the activity they want.

In Montessori classrooms, materials are designed in accordance with the physical characteristics of the child. There are light-weight, proportionate, movable furniture suitable for children's height, cabinets that they can reach when they reach out, locks that they can easily use, drawers and doors that can be easily opened and closed, clothes hangers that they can easily reach on the wall, brushes that they can grasp with their fingers, and short-straight-handled brooms. Children can choose and use materials as they wish (Sobe, 2004), and this environment develops personal discipline in the child. Since there is only one of each material, very important social

skills such as waiting for their turn, producing an appropriate solution, and postponing their request for later are supported, as well as indirect learning such as learning by watching. When the child wants to use a material, he has to wait for his friends to work. In this way, the child learns to respect the rights of others (Köksal Akyol and Oğuz, 2006).

Montessori materials provide opportunities for children to explore the world. The materials are designed in sizes and safe for the child to use, have realistic features and are effective in supporting creativity. These materials include error control and this self-control leads to education (Erişen and Güleş, 2007). In Montessori education, specially designed materials including error control are used (Korkmaz, 2006). Every piece of Montessori materials has been carefully designed and follows a system from simple to complex. Three-stage presentation is used in the presentation of Montessori materials to the child. Three-stage presentation is a basic technique used to guide children in the process of introducing, comprehending and using the material (Korkmaz, 2006).

In the Montessori approach, the child can find all the necessary pieces of material, work without interrupting the activity, and put the materials back into place because he/she chooses the material himself. Thus, the child becomes a part of the order in the classroom. In this order, each material has an unchangeable place. All materials have a clean, complete and aesthetic appearance. This enables children to work carefully and diligently and to complete the work without any problems. The material to be used in beautiful, elegant and attractive colors encourages them to practice. In particular, the color compatibility and sameness of the pieces used in a set allows children to easily find all the pieces belonging to that work (Köksal Akyol, 2005).

In addition to being a guide in Montessori classrooms, the teacher is a very good observer. It leads children to explore, to know their environment, work individually, work in groups with their friends, and act freely (Köksal Akyol and Oğuz, 2006).

3.4. The Role of the Teacher in Montessori Education

The role of Montessori teachers in the classroom is to prepare learning materials in line with the needs and interests of the children in their classrooms. The

main thing is not to teach children something, but to make them focus on learning. The teacher focuses on the child instead of focusing on the daily lesson plan. Although the 4 Montessori teacher plans daily lessons for each child, she must be sensitive and open to changes in the child's interest, progress, mood and behavior. Maria Montessori states,

"The teacher needs to guide the child without letting him feel his presence too much so that he can always be ready to provide the requested assistance, but there may be no barriers between the child and his experience." (Oğuz and Akyol, 2013)

In the Montessori approach, the teacher prepares the environment and guides the children to interact with the environment. Teachers provide children with the opportunity to use their potential for their own development and are in the position of enabling children to move freely in the pre-prepared environment, having sufficient knowledge about human development and growth, having observational skills to meet children's developmental needs with materials and activities, and encouraging children for learning. The teacher also has the characteristics of supporting learning physically and psychologically and using leadership skills in the classroom. In addition to being a very good observer, a Montessori teacher is a person who can provide individual guidance to the child and show the child how to benefit from each material. The task of the teacher is not to impose their own knowledge and experience, but to give children the opportunity to use their potential for their development; To motivate and prepare the child for social and cultural activities in the environment prepared for the child.

In this way, Montessori teachers develop children's social skills. The child adopts the appropriate methods he/she has observed for effective learning, facilitation, direction and guidance. The Montessori teacher should know the individual development level of each child very well. They should be able to decide which material is better for which child, provide individual guidance to each child, and show the child how to make the most of each material. The teacher should then leave the child alone with the material and return to his observation. The teacher should only intervene when necessary. He should be flexible and open to new ideas while helping each child. The child should be able to see the teacher as a helper and guide, who is there when needed (Oğuz and Akyol, 2013)

3.5. Montessori Education Activities

There are five main areas of activity in Montessori education: daily life skills activities, sensory education activities, mathematics activities, language-enhancing activities, and cosmic education activities (universal learning activities).

3.5.1. Daily Living Skills Activities

In practical life practices, Montessori refers to the imitation of daily housework. Movement practices such as picking up the carpet and wiping the floors fill their place with style practices, gymnastics, and rhythmic practices, and walking on a straight line (Arslan, 2008).

The activities of the children in the Montessori environment are not limited to just using the teaching tools. Children who are also busy with objects related to daily life learn practical life tasks. These include interesting household chores such as dusting, drying the spill, removing stains, lifting and rolling carpets, laying them down. These exercises are not only done to improve the child's self-care skills, but rather to meet their touch needs. Because by touching and feeling the materials, the child can notice various tactile features in the materials, which supports cognitive development. Hand gestures used while doing business are closely related to human intelligence. Therefore, the numerous household chores that the child does provide important opportunities to realize their cognitive development (Durakoğlu, 2011).

Daily living skills support children's self-care skills and motor skills. Daily life skills activities allow children to achieve their own work and become independent. In addition, while supporting the motor development of children, it enables children to prepare their own work environment, improves the child's sense of self-confidence, supports visual perception skills, raises awareness of their own cleaning and hygiene, and enables the child to take responsibility. Considering these, it can be said that daily life skills activities make positive contributions to children's self-care and motor development. Montessori emphasizes that activities that are necessary for education that support motor development are effective in gaining self-discipline, attention and good study habits, and in developing sensory movement skills necessary for academic learning in the later period (Tuğluk et al., 2006). A study by Gleen (2003) evaluated the effects of Montessori education in adulthood. According to the results of the research, it has been revealed that Montessori

education has positive effects on the academic and social development of children. In the study conducted by Lillard and Else-Quest (2006), it was concluded that children who received Montessori education had more active social and academic skills.

3.5.2. Sensory Education Activities

Sensory education has an important place in the Montessori approach. The education of the senses begins at the age of zero-six. The acquisition of knowledge, skills and concepts is achieved by using materials. With sensory education, the child has the opportunity to explore dimensions, weights, geometric objects, sounds, smells, tastes and different surfaces by actively using his five senses.

Sensory education activities arouse children's desire to act and meet their basic needs. Self-study, the free choice of material, the way of working at his own pace require and develop the organizational ability of the child. With these studies, the child learns to plan, share, get ideas, compromise, be compatible, and work with others. While sensory training activities enable the child to focus his attention on one point, it also helps him to gain the habit of working diligently. In addition, sensory training activities include many mental activities and provide learning of concepts through materials.

Through the materials included in the sensory education activities, children are taught five levels such as large-small, long-short, deep-shallow, thick-thin, heavy-medium-light, color, shape, smooth-rough, hot-cold, sweet-bitter-sour. They learn and reinforce many concepts that appeal to the senses. Öngören (2008), in his study, concluded that children who received Montessori education gained the concept of geometric shape faster. Yiğit (2008) found that children aged four to five who used the Montessori teaching method were more successful in gaining number of concepts than children aged four to five who used the traditional teaching method.

In the exercises carried out within the framework of the education of the senses; The ability to touch flat or rough surfaces lightly, to put and remove solid objects from their sockets, and to hold geometric objects with two fingers is gained. Thus, the hands reach such a high level of maturity that they can make a significant part of the movements they will use in writing (Montessori, 1975). However, such exercises alone are not enough for children to hold pencils properly. For this reason, different materials are also used (Durakoğlu, 2008).

3.5.3. Math Activities

Mathematics materials; It supports the cognitive domain as it teaches quantities, symbols, counting and four operations, and the social-emotional domain as it enables children to work together.

Mathematics activities accelerate the child's creative thinking, mental estimation, and learning by embodying abstract concepts. Mathematics materials help children develop their concept of numbers. With these materials, children can recognize numbers visually, can grasp the spelling of numbers tactilely, and children can sense addition-subtraction, and multiplication-division operations. At the same time, children learn odd and even numbers thanks to math materials.

It has been determined that children aged four and five who receive Montessori education are more successful in gaining the concept of number than children aged four and five who use the traditional teaching method (Yiğit, 2008). During the studies, two or more studies also support the social skills of the children. Researches support this view.

Drenckhahn (1961) examined the effect of Montessori materials on mathematics teaching. According to the results of the research, it has been concluded that the mathematics materials used in Montessori education have positive effects in terms of evaluating time as well as supporting children's concrete and logical thinking. Again, in a study conducted by Lillard (2008), it was concluded that children who received Montessori education exhibited better social skills than children who received traditional education.

3.5.4. Language Development Activities

Language development activities are very important for improving hand-eye coordination and pencil holding skills. Thanks to the phenotic (phonological) approach applied to children, children understand how to encode spoken language into words through symbolic letters of the alphabet. Likewise, they learn the letters represented by each sound (Seldin, 2007). Prendergast (1969), in his research, examined the effect of the Montessori method on children's school readiness levels.

As a result of the research, it has been revealed that there is a significant difference in the receptive language scores of preschool children who are educated with the Montessori method and those who are educated according to the normal

program. Erben (2005), in their studies, concluded that Montessori materials affect children's receptive language development positively. In another study, researchers found that children aged five-six who received Montessori education had higher receptive language skills than children who did not benefit from this education. (Kayılı et al., 2010)

While language-enhancing activities help the child gain speed in reading by understanding written symbols, it also contributes to the child's verbal expression and easy communication, and the development of vocabulary. It gives the habit of holding a correct pencil, the child's awareness of the place of sounds in the word, the child's perception of the spelling of sounds by touch and visual, children's formation of words by combining moving letters and sounds, capital letters are just a different way of writing sounds. it makes you realize what it is.

With Montessori education, it is ensured that the child's ability to express herself freely is developed with the help of structured exercises (Köksal Akyol and Oğuz, 2006).

3.5.5. Cosmic Education (Universal Learning Activities)

Cosmic education studies aim to make the child aware of the world and environment in which he lives by first teaching the history, traditions, music, dances and foods of the country he lives in, in the next step, by introducing other countries in line with the principle of from concrete to abstract, from near to far (Çakıroğlu Wilbrandt, 2009).

As a result of their research, Güleş and Erişen (2009) concluded that the cosmic education studies within the scope of Montessori education practices play an important role in preschool children's acquiring real information about the world they live in.

Cosmic education studies begin by introducing the continent and water forms to the child with a relief globe. Then the continents and oceans are named and their locations are introduced. At the same time, puzzle maps that show many geographical facts such as lakes, gulfs and bays and enable them to learn by touch are studied with children (Çakıroğlu Wilbrandt, 2009).

Within the scope of Montessori education, corners with local tools such as wooden spoons, fabrics of different textures belonging to local clothes can also be

included (Temel, 1994). Children can learn about the regional differences of their own country, as well as learn about the world by discovering the traditions, music, food, climate, language and animals of the cultural structures of other countries. This enables children to be conscious, understanding and tolerant towards other people (Poyraz and Dere, 2003; Köksal Akyol and Oğuz, 2006).

Montessori suggests that the understanding of history should be given within the scope of Cosmic education using time zones. Time slots are made from long rolled sheets of paper and are laid on the floor in the classroom. Specific events in history are marked by indication. Introducing the concept of history to children begins with children specifying the time periods related to their own lives, and the infancy picture of the children is put at the beginning (Köksal Akyol and Oğuz, 2006).

According to Montessori, children need to understand the order, harmony and beauty of nature and be happy with them (Montessori, 1975).

In the field of cosmic education, there may be seeds to grow flowers, rabbits, animals such as snails and silkworms. In Montessori education, an empty area can be given in an aquarium, park or garden where animals or plants can be grown. According to Montessori, keeping children close to nature helps their spiritual development (Poyraz and Dere, 2003).

With the studies carried out, the innate sense of curiosity and discovery in the child is supported and developed by projects and experiments. Plant and animal groups are studied regularly, creating a sense of love and appreciation for them (Köksal Akyol and Oğuz, 2006).

3.6. World Examples from Montessori Educational Environments

Schools that have training or training within the scope of working on the vehicle on this applicable system will be included. In this study, it can be designed to have structures that can be evaluated in different ways so that design schools can be sunbathing and evaluated from their point of view.

Table 3. Berkeley Montessori School (Source: Trachtenbergach, 2003)

BERKELEY MONTESSORİ SCHOOL		
Location of the	**Year of construction**	**Architect of the**

Building California-USA	2004	Building Pfau Architecture
IMAGES		
		
Floor plan	Front view	View From Inner Garden

The Berkeley Montessori school was created by converting the Santa Fe railroad depot, built by Charles Whittlesey, which served as a stop from 1904 to 1950, years later. school building plan; Apart from the two buildings containing classroom spaces, the library, cafeteria, and administrative units were built on an area of 16.000 square meters. Due to the number and diversity of students, it is designed as a city campus that is compatible with the nature of urban design, similar to the urban area.

Built in 1904, the railroad depot was used for passenger service until the 1950s. The historic warehouse building was preserved by being converted into a Montessori School. The project includes two school buildings, library, cafeteria, preschool, and administrative units. Creating a sustainable project was the main aim of the project. For this reason, photovoltaic panels and sustainable surfaces such as bamboo flooring are included in the project.

Table 4. Berkeley Montessori School Spatial Analysis (Sakarya and Çahantimur, 2019).

SPATIAL ANALYSIS	
Sample Images	
Outdoor	Courtyards and gardens shared by all

	students, classroom organizations where children can find a place for individual or group work give children freedom of choice and movement to take the actions they want. Covered semi-open corridors provide a functional connection between the spaces. Classroom organization is also such that individual and group study areas can be easily perceived.
Class 	The building has a design that allows all children to do activities in groups or individually. With the help of the connections with the exterior, the atmosphere provided in the interior space and a whole organizational unity with the building in general has been provided. The interior design of the building supports social development.
Outdoor 	With the courtyard in the middle of the settlement of the buildings, it has ensured that all buildings benefit from daylight and visual continuity is ensured between the buildings. Children are intertwined with nature through the courtyard and can spend time in a natural environment with the wooden material used on the facade and floor of the building. The small sitting areas in the courtyard and the corners by the window in the classroom allow children to work individually.

Table 4 (continued)

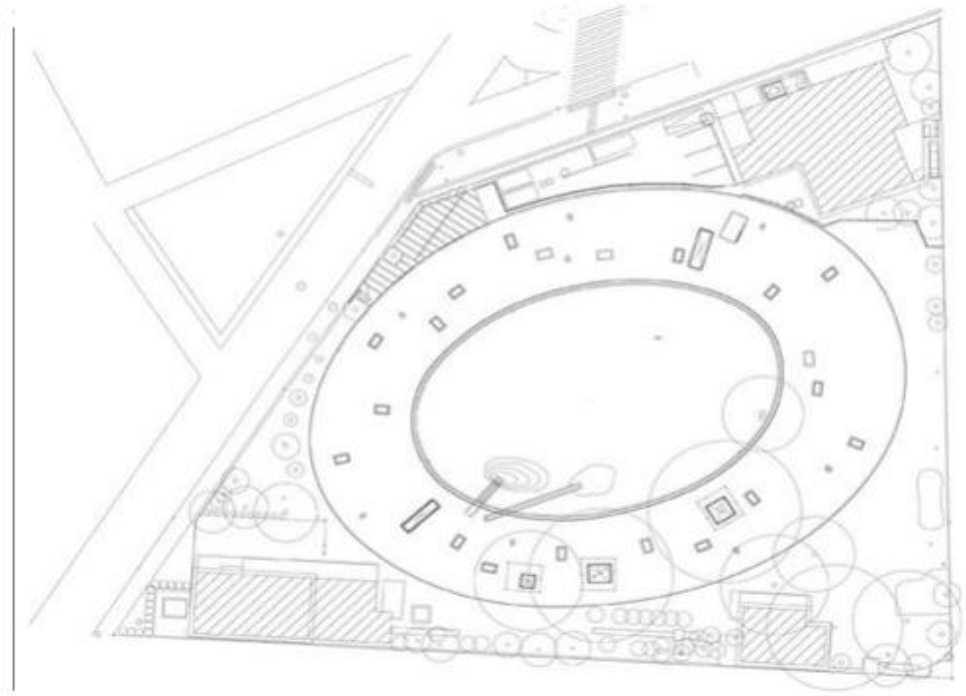
SPATIAL ANALYSIS
Sample Images

Outdoor 	"Berkeley Montessori" educational structure, wide landscape while creating harmony for natural life with its design equipment and materials used in the building recycled and natural materials are preferred. Courtyards and gardens, where children can spend their energy and move actively, make children's time at school more productive. In addition, the interior, the character of the building facade and the flooring add a more dynamic feature to both the building and indirectly to the children

Table 5. Fuji Montessori School (Source: Tezuka Architects, 2007)

FUJİ MONTESSORI SCHOOL		
Location of the Building **Tokyo- Japan**	**Year of construction** **2007**	**Architect of the Building** **Page Architecture** **Tezuka Architects**
IMAGES		
 TOP VİEW		

Table 5 (continued)



LAYOUT PLAN

Fuji Preschool in Tokyo has the most perfect design ever conceived to allow children to move freely. The playground of the school is designed in a circle so that children can run as much as they want. Thus, children can move freely in this endless cycle without the need for anyone's intervention and without the possibility of getting lost. The designers deliberately made an earthen bump at the starting point of the stairs to reduce the steps. But the children started to take these lands and turn them into game balls, and when 600 children made balls on the lands, the mound started to disappear. Eventually, the school administration had to ask the construction company for reinforcements. When the soil hardened and the children stopped making balls, they started to slide down from there. Architect Tezuka expressed this situation as follows:

"Actually, I was not a fan of making slides. Kids love to skate, but we shouldn't tell them what to do. Without dictated materials, children have to use their creativity to think and play. But we finally decided to keep it because we needed a fire escape."

They designed the roof of the school without damaging the trees in the area. One of the children's favorite games is climbing a tree. In Fuji Preschool, this is perfectly safe, because even if they fall from the tree, the children jump into another

playground, the hammocks. Also, there are no walls between the classrooms and all sounds can be heard. The school has communal washrooms, specially positioned to create an environment for children to communicate not only with computers but with each other.

Table 6. Fuji Montessori School Spatial Analysis

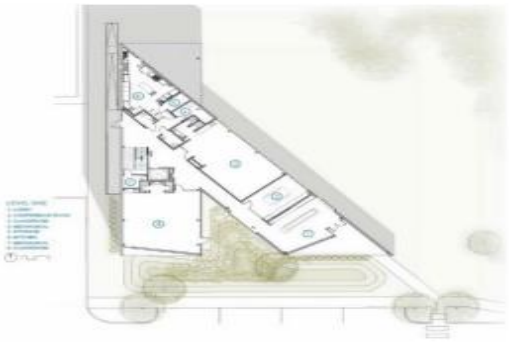
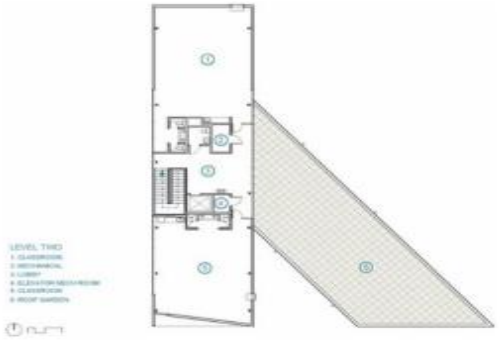
SPATIAL ANALYSIS	
Sample Images	
CLASS 	The use of the roof of the building, the absence of any partition walls in the interior, and the arrangement of the study areas in the classroom allow children to move freely in a free form. The dimensions and heights of the reinforcement are also designed in such a way that the child can reach freely.
OUTDOOR 	Thanks to the tree included in the design and passing through the classroom, children were able to make concrete observations, and with the taps in the courtyard, it was aimed to develop children's senses by touching water and mud.
OUTDOOR 	The tree, which was protected during the construction of the school and passing through the middle of the classroom, teaches children to respect nature. While the equipment in the classrooms is made of wood, children learn in a natural environment, while the taps in the courtyard help children take responsibilities such as watering the plants. With the transparency of the façade, the perception of all natural phenomena and the environment outside has been increased to a higher level.
CLASS 	In addition to the single table and chair arrangement in the classroom, the children were allowed to do individual studies through the inner courtyard. The presence of glass walls instead of dividing walls between the classrooms ensured that every corner of the school could be easily observed by the teachers, and the inward-looking design of the building and the walkable roof surrounded by railings ensured that the children were in a safe

	environment.

Table 7. Fayetteville Montessori School

FAYETEVILLE MONTESSORI SCHOOL		
Location of the Building **Arkansas, USA**	**Year of construction** **2012**	**Architect of the Building** **Marlon Blackwell Architect**
IMAGES		
		
Layout Plan	Entrance Facade	Front View
The triangular form of the building was formed by the floodplain bordering the building. This restriction caused the southwest corner of the building to take the form of a triangle. The building consists of 4 square classrooms, a conference hall, and a kitchen. The rectangular arm that continues along the flood bed was designed as a single storey and a green roof garden was formed on it.		

Table 8. Fayetteville Montessori School (Source: Archdaily, 2015)

FAYETEVILLE MONTESSORI SCHOOL
IMAGES
 Ground Floor Plan
 1. Floor Plan
 Sectional View South Facade
 Sectional View West Facade

"Fayetteville Montessori School" was designed by "Marlon Blackwell Architect" in 2012. The building sits on a triangular area, which is thought to be suitable, in the southwest of a land that has a tendency to flood. The structural form consists of this area, which is bounded by the floodplain line. The school structure has been solved by placing two steel-framed units on top of each other, naturally in harmony with the terrain. The area on the ground, created by the elevation difference created by the upper floor, has also gained the function of a sun-protected playground for children. The building is covered with light wood and dark bronze

metal on the exterior. The contrast created by these light and dark materials created a balanced combination in design with the warmth of wood and the coldness of metal.

According to the ground floor plan of the school building, in the direction of the south facade entrance area; The hall, which started with a lobby area that meets the entrance in the interior layout, created a guiding line separating the spaces. Depending on this hall line, separately and sequentially; a conference hall, two separate large classroom areas, two separate mechanical units, warehouse, and kitchen are located in the arrangement suitable for viewing the garden. In the first floor plan, there is a distribution from the lobby area to the spaces. There is an elevator machine room and a mechanical room. According to the floor layout plan, there are two classroom spaces, one on the north façade and one on the south façade. There is a large terrace garden area formed by the roof of the ground floor on this floor. While the garden is fun for children, it also creates a functional feature to provide a natural environment where the ground floor is easily accessible. The relationship of the space with the natural environment has been expanded. The experience of being in nature is adapted to the floor plan. This functional area is one of the most effective structural features of the school form.

Table 9. Fayetteville Montessori School Spatial Analysis (Source: Sakarya and Çahantimur, 2019; Architectural Record, 2016).

SPATIAL ANALYSIS	
Sample Images	
Class 	You will also be in freedom of movement with the course and alignment of your childhood of small heights and donation items in the eyes of a group of children who have the opportunity to have any one person's choice in their classroom. The items hung on the walls in the circulation areas of the building are in a remarkable position for children. The absence of dividing and limiting equipment in the design of the space reflects the principle of openness throughout the space.

Table 9 (continued)

SPATIAL ANALYSIS	
Sample Images	
Class 	The space design is open to socialization, allowing the coexistence of children with different structural characteristics. A flexible space setup, which provides observable areas, is positive for the development of social relations and value judgments. The objects displayed on the walls of the entrance lobby and meeting room are real and natural materials, enabling the child to observe real-life objects. The furniture in the classroom is not fixed to the floor and it is aimed that the child can realize his mistake when he makes a mistake, by including objects that can fall and break in the classroom.
Outdoor 	There are no dividers in the classrooms in the building, thus creating the opportunity for free movement. In addition to the interior space, there is also a garden and playground suitable for exploration outdoors. Design arrangements that offer the opportunity to observe nature also allow children to gain free experience in real life.
Reinforcement 	The fact that the dimensions of the furniture and materials in the space are proportional to the age of the children also increases the sense of belonging to the space in the children. The principle of being related to real life in the educational structure, a buffalo skin is exhibited on the stair landing, which will contribute positively to the examination of the development of living things, and there is also a fossil collection in the building.
Circulation	While the long and openable windows in the classroom help natural light and air enter, the wide and large windows in the corridor on the second floor are positioned so that the child can see the green roof. The green garden created in the triangular garden of the building is also an area where the child can

	observe. Thus, it is aimed to gain ecology awareness in children from an early age.

CHAPTER 4: METHODOLOGY

4.1. Hypothesis

H1: The impact of interior design on the learning environment depends on the spatial adequacy of Montessori preschools.

4.2. Description of the Study

The existing Montessori preschools that provide education in Turkey are divided into 3 groups: they are part-time, full-time and mixed (MEB and part-time Montessori) education programs. More than 80 private preschools apply part-time and full-time Montessori programs. In addition to the MEB program in public preschools, the Montessori education system began to be applied in 2013-2014. In this context, the interior features of 3 groups of schools were examined. The study aims to evaluate the schools implementing the existing programs in Turkey in the context of spatial competence.

Within the scope of the study, data about the current situation of 3 different school groups applying the Montessori education program were collected and the results were compared.

In the research 'What is the effect of preschool indoor environments on learning in the context of Montessori?' Based on the question, the basic Montessori internal criteria have been determined.

The concepts determined in accordance with the spatial criteria were tested through a Likert scale questionnaire. The survey was conducted online with 60 volunteer teachers. Data on 3 different school types applying the Montessori education program were obtained. The survey consists of three parts. The first part includes basic questions such as the age, gender, and educational status of the participants. In the second part, the spatial setup of Montessori structures has been

gathered under 9 main titles determined as a result of research and examinations; Freedom, Embodying, Natural Environment, Socialization, Individualization, Feeling of Confidence, Place Attachment, Dynamism, and Perceptibility. These concepts were evaluated with a Likert scale. The third part consists of open-ended questions. In this section, it is aimed to collect information about the design expectations and needs, as well as the observations and future expectations of the participants.

4.3. Data Collection and Analysis

The obtained data collection as applied by the individuals included in the sample. The data obtained from this study, which was conducted to determine the effects of preschool indoor environments on learning in the context of Montessori, were analyzed using SPSS 22.0. Frequency (N) and percentages (%) were calculated in order to determine the distributions according to demographic variables. The item totals and averages of the scales and their sub-dimensions were found. Means and standard deviations were calculated.

4.4. Findings

In this section, the results obtained from the survey conducted within the scope of the study are evaluated. The survey was prepared via Google Forms and the survey link was shared with schools in Turkey. The study was carried out in December 2021 and was applied online due to pandemic conditions. Instructors from different Montessori preschools were asked to rate the level of suitability of the classroom's physical indoor environment, using a scale of 1 to 5, where 1 = Strongly disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, and 5 = Strongly agree. In accordance with the data obtained, the values of the 3 school groups were compared.

4.4.1. Results of Individuals' Socio-Demographic Information

Table 10. Distribution of Branches of Individuals

	Frequency	**Percent**	**Valid Percent**	**Cumulative Percent**
Class Teacher	51	85,0	85,0	85,0
Assistant Teacher	6	10,0	10,0	95,0
Intern teacher	3	5,0	5,0	100,0
Total	60	100,0	100,0	

As shown in Table 10, 51 (85.0%) of the individuals included in the study are classroom teachers, 6 (10.0%) assistant teachers, and 3 (5.0%) intern teachers. Most of the research has classroom teachers.

Table 11. Distribution of Ages of Individuals

	Frequency	Percent	Valid Percent	Cumulative Percent
20-30	36	60,0	60,0	60,0
31-40	17	28,3	28,3	88,3
41-50	5	8,3	8,3	96,7
51 and above	2	3,3	3,3	100,0
Total	60	100,0	100,0	

As shown in Table 11, 36 (60.0%) of the individuals were between the ages of 20-30, 17 (28.3%) were between the ages of 31-40, and 5 (8.3%) were between the ages of 41-50 among, 2 (3.3%) were 51 years old and over. The majority of the research consists of individuals between the ages of 20-30.

Table 12. Distribution of the Gender of the Individuals

	Frequency	Percent	Valid Percent	Cumulative Percent
Woman	45	75,0	75,0	75,0
Male	11	18,3	18,3	93,3
I do not want to specify	4	6,7	6,7	100,0
Total	60	100,0	100,0	

As stated in Table 12, 45 (75.0%) of the individuals are female, 11 (18.3%) are male, and 4 (6.7%) do not want to specify their gender. The majority of the study included female individuals.

Table 13. Distribution of Educational Status of Individuals

	Frequency	Percent	Valid Percent	Cumulative Percent

Vocational High School	3	5,0	5,0	5,0
Associate Degree	12	20,0	20,0	25,0
License	30	50,0	50,0	75,0
Degree	15	25,0	25,0	100,0
Total	60	100,0	100,0	

As shown in Table 13, the educational status of individuals is 3 (5.0%) vocational high school, 12 (20.0%) associate degree, 30 (50.0%) bachelor's degree, 15 (25.0%) master's degree. The majority of the research consists of individuals with a bachelor's degree.

Table 14. Distribution of Departments from which Individuals Graduated from University

	Frequency	**Percent**	**Valid Percent**	**Cumulative Percent**
Department of Preschool Education Teaching	39	65,0	65,0	65,0
Department of Child Development	21	35,0	35,0	100,0
Total	60	100,0	100,0	

As indicated in Table 14, 39 (65.0%) of the individuals participating in the study graduated from the department of preschool education and 21 (35.0%) from the department of child development.

Table 15. Distribution of Professional Seniority of Individuals

	Frequency	**Percent**	**Valid Percent**	**Cumulative Percent**
1-5 years	34	56,7	56,7	56,7
6-10 years	17	28,3	28,3	85,0
11-15 years	3	5,0	5,0	90,0
16-20 years	2	3,3	3,3	93,3
21-25 years	3	5,0	5,0	98,3
26 years and above	1	1,7	1,7	100,0
Total	60	100,0	100,0	

As stated in Table 15, the professional seniority of 34 (56.7%) of the individuals is between 1-5 years, 17 (28.3%) of them are between 6-10 years, 3 (5.0%) of them are 11- between 15 years, 2 (3.3%) between 16-20 years, 3 (5.0%)

between 21-25 years, 1 (1.7%) between 26 years and above. In the majority of the research, there are participants whose professional seniority is between 1-5 years.

Table 16. Distribution of When Individuals Received Montessori Education

	Frequency	Percent	Valid Percent	Cumulative Percent
1 year ago	15	25,0	25,0	25,0
2 year ago	12	20,0	20,0	45,0
3 year ago	13	21,7	21,7	66,7
Other	20	33,3	33,3	100,0

As shown in Table 16, 15 (25.0%) of the individuals received Montessori education 1 year ago, 12 (20.0%) received Montessori education 2 years ago, 13 (21.7%) received Montessori education 3 years ago, and 20 (33.3%) received Montessori education at other times.

Table 17. Distribution of How Long Individuals Have Taught with the Montessori Method

	Frequency	Percent	Valid Percent	Cumulative Percent
1 year	17	28,3	28,3	28,3
2 year	15	25,0	25,0	53,3
3 year	12	20,0	20,0	73,3
Other	16	26,7	26,7	100,0
Total	60	100,0	100,0	

As shown in Table 17, 17 (28.3%) of the individuals have been teaching with the Montessori method for 1 year, 15 (25.0%) 2 years, 12 (20.0%) 3 years, 16 ' (26.7%) teach Montessori at other times.

Table 18. Distributions of How Individuals Decided to Take a Montessori Education

	Frequency	Percent	Valid Percent	Cumulative Percent
Voluntarily	51	85,0	85,0	85,0
Because the institution I work for switched to the Montessori system	3	5,0	5,0	90,0
Other	6	10,0	10,0	100,0
Total	60	100,0	100,0	

As stated in Table 18, 51 (85.0%) of the individuals participated in the study voluntarily, 3 (5.0%) because their institution switched to the Montessori system and 6 (10.0%) due to other reasons. They decided to take a Montessori education.

Table 19. Attitudes of teachers from 3 different school types towards 9 concepts

		Freedom	**Reality**	**Natural Environment**	**Socialization**	**Individualization**	**Security**	**Place Attachment**	**Movement**	**Perceptibility**
		Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean
Which Education System Does Your School Apply?	Full-day Montessori	4,35	4,71	4,21	4,43	4,28	4,25	4,34	4,56	4,32
	Half-day Montessori	4,39	4,54	4,34	4,40	4,27	4,46	4,69	4,36	4,44
	Half-day Montessori half-day national education program	3,73	4,38	3,60	4,11	3,65	4,06	4,31	4,09	4,08

As stated in Table 19, the reality, socialization, individualization, and movement total scores of the individuals who applied half-day Montessori education were higher than the individuals who applied for the other education. The total scores of freedom, natural environment, security, place attachment, and perceptibility of individuals who practice Montessori full-time were higher than those who applied to other education. Looking at the table, individuals who apply half-day Montessori and national education programs have lower scores compared to individuals who apply full and half-time Montessori education.

4.3.2. Discussion

With the effect of the Second World War, the Montessori education program aimed to prepare individuals for life at a young age (Eichelberger, n.d.). As

mentioned in detail in the previous sections, the teacher is only an observer. Children learn by 'experiencing'. As mentioned in the theoretical framework, one of the early foundations of child's development supports children's learning, socialization, interests and needs while providing the right conditions to improve student learning. It is the construction of the learning environment whether mentally, physically or cognitively. Therefore, the learning environment can be seen as a flexible and dynamic scenario that addresses both time and student needs. Schools also need to create spaces that contribute to student learning, a supportive tool that addresses and represents learning. However, Covid-19, which entered our lives in 2019, reverses this situation. With the Covid 19 pandemic, the act of gathering and contact has decreased. Training continued online (Murray, Brown and Barton, 2021). In the new world order, participation with remote access using technology has become one of the most preferred methods. The new system, which came into our lives with Covid, has also brought innovations to the Montessori education program. The Montessori education method has continued until today with traditional methods away from technology. However, the pandemic has also created new needs like war. In this case, if we consider how the program can be adapted to the new system, it can be updated as the groups that come together in the classrooms now come together online. For example, students can feel that they are in contact even with remote access by using VR glasses through an online character that represents them. The teacher can also continue as an observer in the online system. (Johnson-Glenberg et al., 2014a)

CHAPTER 5: CONCLUSION

Preschool children explore their environment with their peers and learn actively with the help of their environment. In order for pre-school education to achieve its goals; the school environment should be carefully designed by considering the emotional, social, mental, and physical development of the children. Both the interiors and the exterior of the educational environments should provide spatial support for education. (Miller and Cunningham, 2003).

In our modern time, preschool education has become compulsory for all children. Moreover, the transition to distance learning in the spring of 2020 caused by COVID-19 was particularly challenging for Montessori educators and students because key elements of the method were not directly transferable to this new format. When children learned from home, they were unable to recreate hands-on learning using Montessori materials, learning in a community, and educator's observation. (Murray, Brown and Barton, 2021)

Many different types of technology are available to help people learn and have fun together, but some barriers still prevent families from using these tools effectively. Online learning is not a suitable replacement for in-person instruction when it comes to classrooms that rely on sensorial and manipulative learning methods, such as the Montessori method. (Holbrook, 2022)

The formation of learning spaces in the spatial setup of the Montessori education system, one of the alternative pre-school education approaches, has a flexible feature. Design in Montessori educational environments is planned with unobstructed and convenient arrangements for observation. Montessori education spaces are designed in an order that allows the coexistence of areas suitable for different studies, aiming to bring different value judgments and a sense of

responsibility to children. Moreover, Montessori spaces have qualities that make the child feel valuable and develop the child's use of senses.

Montessori education is a program-oriented education method that will realize the child's inherent desire to learn instead of imposing knowledge on the child. Montessori education and educational materials make a great contribution to the development and learning of the child. If the materials used are presented in a way that attracts the attention of the child, it is important in terms of supporting the classroom developmental areas. Montessori education offers new experiences and experiences not only to children but also to educators. The teacher work as a guide. It provides benefits in terms of doing research, transferring what they learn to daily life and adapting it to children.

In recent years, the number of Montessori schools in the world has been increasing. Some of the researchers interested in preschool development suggest that Montessori method is limited to children's imaginative activities and is based on ready-made materials in a way that does not allow for creative and diverse learning styles. On the other hand, many pedagogues and educators emphasized that activities sensitive to socio-emotional development such as drama and games are more effective in learning during these periods. The reasons stated above in the examination of sharing behaviors also prove that the Montessori method is a method that supports children to be active learners.

The situation is different in Montessori method that leave many preschool institutions where sharing behaviors are seen as a necessity. The Montessori method gives children more freedom in what they do. Students, who have more freedom in their behaviors, also have more opportunities for sharing behaviors. It has been observed that children who take their meals individually, perform food sharing behaviors with the helping factor, and do not perform food sharing behaviors with the threat and peer bullying factors. It has been determined that Montessori children, who have the freedom to play with whom and with which toy, perform the toy sharing behavior with the factors of listening and physical proximity, but do not share the toys with the negative discipline factor. It has been observed that Montessori students, who are free to choose the material and the time to complete it, share materials with encouragement and positive facial expressions, and they do not share materials with the intervention factor. It has been observed that Montessori

students, who are educated in the same class of different age groups, and who are provided with information transfer, share information with encouragement and hint factors. (Güler, 2021). As a result, it is seen that development and learning are affected by many social contexts and are related to all developmental elements. The skills acquired by children in the preschool period are structured on the acquired knowledge and follow a sequential order. At this point, the Montessori method provides great opportunities for children to feel safe and to establish socio-emotional development with teachers and peers who respond to them. In this context, it is predicted that the acquisition of sharing behaviors, which are included in the behaviors of preschool students, will lead the students to continue their lives as individuals with active participation and a healthy development course, with this method, which stands against developmentally inappropriate approaches, which lead them to individually appropriate qualifications for the period they live in and in the future.

Study evaluates the interaction between education philosophy and physical space through an alternative education method. Montessori method, which is one of the alternative education methods, differs from traditional education methods with its acceptance of the child as an individual, its understanding of freedom and the place it accepts as a second teacher. It has been seen that Montessori schools have lively, interesting and inviting spaces, where the needs of children are taken into consideration, and every corner of the school is used for educational purposes, unlike traditional schools where only classrooms are used for education. The basic features that define the method are conceptualised and the effects of these concepts on the space are evaluated from an interior architectural point of view. The spatial characteristics of Montessori schools are gathered under 9 concepts as; Freedom, Embodying, Natural Environment, Socialization, Individualization, Feeling of Confidence, Place Attachment, Dynamism, and Perceptibility.

The method's understanding of freedom; flexible classroom/space in an open plan layout, which allows different activities at the same time with various action areas on the corridor or in the classrooms, which frees children to the person, method or place they want to work with. It has been seen that it is reflected in the space with their organisations and the relations established between indoor and outdoor spaces.

The Montessori method reflects the dynamism concept both interior and exterior spaces. Montessori's emphasis on the child's movement and mobility, with semi-open corridors that invite children to different activities, open and flexible planning of classes, sliding doors that provide freedom of movement to children by establishing a classroom-corridor relationship, and trees, swings, slides, sand in the garden. It is mirrored by various playgrounds such as a swimming pool or a courtyard.

Classroom doors that aim to bring different ages together and open to each other, flexible classroom planning and equipment arrangement that allows working together in the classroom, classrooms that provide direct access to the garden, and areas such as garden, amphitheatre, sandbox or roof that are used as a common area allow socialisation.

Hangers suitable for children's sizes, kitchen counters, cabinets, display areas, bookcases, sinks, tables, chairs, seats and some materials emphasize the reality principle of the method by enabling children to experience real-life with objects suitable for their own size.

The importance that the method attaches to nature is large, wide and transparent, facilitating the observation of the outside, with light chimneys on roofs of school buildings, which are positioned intertwined with pieces of nature such as water and green elements or where nature is included in the design, natural materials used as materials or included in the design. It is revealed by the classroom facades, the classroom organizations located on the same floor as the garden, and the classroom doors opening to the garden.

The flexible interior plan, corridor space and furniture, allowing children to work individually, emphasize the principle of individuality.

The implementation of an open plan indoors, the design of the space equipment in accordance with the anthropometric measurements of the children, and the fact that the learning areas in the corridors are not separated from the classroom with large glass doors enable the students to work safely under the supervision of the teacher. All these features support the concept of feeling of confidence.

The building's volume is not too big and the warm-toned colors used in combination with natural materials such as wood and stone create a feeling of home.

Having individual areas for children (the areas where they exhibit their works and personal closets) increases the sense of belonging and emphasis the place attachment.

Placing a kitchen counter and dining area in a corner together with the areas reserved for individual and group work in the interior, emphasizing the areas with different functions with the color, material and texture differences used bring the principle of perceptibility to the fore.

In this study, 60 individuals, including 51 classroom teachers, 6 assistant teachers, and 3 intern teachers working places are evaluated and the reflection of the Montessori method on educational spaces and the findings regarding the responses of the individuals were examined.

The evaluation of the participant teachers who are from three different types of Montessori schools through the nine concepts is tested through a Likert scale. The results show that full-time and half-time Montessori schools are evaluated highly in all of the nine concepts in comparison with the mixed system schools. In addition, when the mixed system and others are compared, it is seen that the data of freedom, natural environment and individualization are evaluated at the lowest level.

The biggest difference between full-time and part-time Montessori schools and mixed schools is their compliance with spatial design criteria. The difference between schools emerges when schools that provide education with the MEB program are later included in the Montessori education program. It is seen that the interior design criteria and requirements are ignored in the transformation process of mixed schools.

The scope of the research questions support that the interior architecture of preschool environments is crucial and directly affects the institution's educational character. In addition, the findings of the research approved the hypothesis. At this point, it is seen how important interior architecture is to get maximum efficiency from education. Interior architecture practice is the biggest supporter of educators in meeting the requirements of Montessori spatial design. The study examines the interior architecture of Montessori schools and reveals the relationship between design and learning from an interior architectural perspective and provides a concrete guideline to the interior architects in the intersection of educational activity and space configuration.

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APPENDICES

Appendix A - Research Survey

QUESTIONNAIRE FORM

Dear participant;

This survey study is carried out for the study titled **"Analysis of the Effect of Preschool Interior Design in the Context of Montessori"** at the Department of

Design, Graduate School of Economics, Izmir University of Economics. The information obtained during the application phase will form the basis of a scientific study. The contents will not be shared with third parties and will be kept confidential.

Participation is on a voluntary basis. Answer the following survey questions and mark the appropriate option **(x)** for you. Thank you for your contribution to our work.

I declare that I have read and understood the above information and that I have voluntarily participated in the survey.

Name

Surname :

Date :

PART 1:

Your Major:

1. ( ) Prechool Teacher
2. ( ) Assistant Teacher
3. ( ) Intern Teacher

Your Age:

1. ( ) 20-30
2. ( ) 31-40
3. ( ) 41-50
4. 51 +

Your Gender:

1. ( ) Female
2. ( ) Male
3. ( ) Prefer not to say

Your Education Level:

1. ( ) Vocational School
2. ( ) Associate Degree
3. ( ) Undergraduate
4. ( ) Postgraduate
5. ( ) Ph.D.

The Department You Graduated From:

1. ( ) Early Childhood Education
2. ( ) Child Development and Education
3. ( ) Other (Please explain)…….

How many years of relevant work experience do you have?

1. ( ) 1-5 years
2. ( ) 6-10 years
3. ( ) 11-15 years
4. ( ) 16-20 years
5. ( ) 21-25 years
6. ( ) 26+ years

When did you study Montessori?

1. ( ) Never
2. ( ) 1 year ago
3. ( ) 2 years ago
4. ( ) 3 years ago
5. ( ) Other (Please explain)…….

How many years are you teaching with Montessori method?

1. ( ) 1 year
2. ( ) 2 years
3. ( ) 3 years
4. ( ) Other (Please explain)…….

How did you decide to study Montessori?

1. ( ) Voluntarily
2. ( ) The organization where I work started to use Montessori
3. ( ) Other (Please explain)…….

What teaching method does your organization use?

1. ( ) Half-day Montessori
2. ( ) Full-day Montessori
3. ( ) Half-day Montessori and the program of Ministry of National Education
4. ( ) Other (Please explain)…….

Explanation: Statements regarding the 9 main conceptual areas determined for Montessori education are given below. You are kindly supposed to answer each statement as “Strongly disagree”, “Disagree”, “Neutral”, “Agree” and “Strongly Agree”. Please indicate the most appropriate option with (x) and answer all the items.		**Strongly disagree**	**Disagree**	**Neutral**	**Agree**	**Strongly agree**
Freedom	Between the classroom and the corridor there are areas that can be included both in the classroom and in the corridor.					
	There are library, exhibition areas, sitting and playground areas created with height differences on the ground, located on wide corridors.					
	There are glass walls or folding glass doors between the classroom and the corridor.					
	Stairs and amphitheaters used in the corridors are independent study areas for children.					
	With the thought that learning can also take place outside of closed spaces at school, the garden is also provided to serve as a learning garden.					
	The spaces and space elements in the school are planned considering the anthropometric measurements of the children.					
Reality / Embodying	The objects exhibited in the corridors and classrooms of the school consist of real materials and equipment and consist of visual objects that benefit the development of the children.					
	The school has its own garden with living things like animals and plants.					
	The garden of the school has the quality to allow children to make concrete observations.					
	The equipment in the kitchen located in the classrooms or in a corner of the school is designed in accordance with the anthropometric dimensions of the children, and real tools and equipment are included in the kitchen and classroom.					
	Tables and chairs in the classrooms are generally made of wood and not fixed to the floor.					
Natural Environment	The garden of the school enables children to be intertwined with nature, to experience the diversity and beauty of nature directly, and to discover natural materials through concrete observation.					
	The direct relationship of the classrooms with the garden, the presence of semi-open terraces and the school garden allow children to be in contact with nature and to explore using their senses.					
	Including place for animals and plants in the garden of the school, information about natural life can be given, and it is ensured that children gain a sense of responsibility by taking care of these creatures.					
	The school garden, including skylights, wide windows and extending from floor to ceiling provide visual continuity and help maximum natural light enter the interior.					
	By using natural materials in the furnishings and facades of the schools, it was ensured that the children gain awareness of nature at an early age.					
Socialization	The garden and interior spaces of the school are organized in such a way as to help children interact with different age groups together.					
	Sports halls, multi-purpose halls, terrace roofs, galleries, stairs					

	in corridors, lecture halls, reduced areas under the stairs, and various learning and action areas lined up along the corridor or designed in the form of special niches allow children to interact and socialize with each other.					
	The use of shelves, tables and chairs that are compatible with the size of the children instead of the wall as a divider in the classrooms helps to increase the interaction in the classroom.					
	The open-plan design of the interiors helps children to come together randomly in their daily lives and interact with each other.					
Individualization	With single-person study areas located in the school's corridors, windows or corridors, children are allowed to do individual studies.					
	With the open-plan design and flexible configuration of the classrooms, special and individual spaces can be offered for children.					
	Single desks for individual work in hallways and classrooms are usually positioned towards the wall or window.					
Security / Feeling of Confidence	The safe and sheltered environment of the school garden allows children to play with confidence.					
	The learning areas in the corridors were not separated from the classroom through wide glass doors and allow the teacher to observe the student and the student to observe the teacher easily.					
	Designing all interior equipment such as stairs and corridors in accordance with the anthropometric measurements of children both provides a safe environment and allows children to move freely.					
	The L shape of the classrooms, low tables, chairs, and shelves enable the teacher to follow the student easily and the student to work safely under the supervision of the teacher.					
Place Attachment	Tables, chairs, shelves, stair handles, hangers, railings, handrails, kitchen counters and utensils are designed according to children's sizes.					
	Special corners for children used only by children, cupboards reserved for children to put their personal belongings, and areas where children's works are exhibited allow children to own the space, they are in.					
	Warm-toned colors used with natural materials such as interior and exterior landscaping applications, plants and animals in open areas, wood and natural stone add a soft atmosphere to the space and create a feeling of home environment.					
	The fact that the school buildings are not very large, and each space is arranged according to the needs of the child increases the sense of belonging.					
Dynamism	Large and sheltered open spaces create opportunities for children to discharge their energies by getting fresh air.					
	Other than the main areas, other service and activity areas add movement to the daily process at the school and contribute to the children's being active by making a free choice.					
	Classrooms are designed flexibly to allow children to move freely and create space for different activities in the classroom, so that children can choose from a variety of activities.					

	Arrangements such as the façade of schools, the colors used in the interior, flooring, galleries, and light chimneys add dynamism to the building and indirectly allow children to be more active.					
Perceptibility	The school is designed in such a way that it can be easily perceived by those who experience the building for the first time and the children.					
	The use of different colors and materials in certain corners of the school shows that the spaces are functionally differentiated.					
	Different corners of the classrooms are reserved for individual and group work, and a kitchen counter and dining area are placed in one corner.					
	All of the educational materials in the classrooms are organized according to a certain order in the relevant shelves or cabinets.					
	Attention has been paid to the fact that the colors used in the spaces, the exhibited objects and the equipment elements used attract the attention of the children and create a visually aesthetic appearance.					
	The use of glass doors in the classrooms and low dividing elements in the corridors allowed the creation of permeable and easily perceptible spaces.					
	The buildings in the school differ from the other buildings in the environment in terms of form and texture, color and material used on the facade.					

In which areas has the Montessori method had the greatest impact on students' learning? Please explain.

_____

What would you like to see different in the future in terms of design in schools that provide education with the Montessori method?

_____

Thank you for your close interest in our research.