INVESTIGATION OF STREETS AS 'LEARNING LANDSCAPES' FOR CHILDREN: THE CASES OF ANKARA

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submitted by **DUYGU KALKANLI** in partial fulfillment of the requirements for the degree of **Master of Science in Urban Design in City and Region Planning Department, Middle East Technical University** by,

Prof. Dr. Halil Kalıpçılar
Dean, Graduate School of **Natural and Applied Sciences** _____

Prof. Dr. Çağatay Keskinok
Head of Department, **City and Regional Planning** _____

Assist. Prof. Dr. Yücel Can Severcan
Supervisor, **City and Regional Planning, METU** _____

Prof. Dr. Adnan Barlas
Co-Supervisor, **City and Regional Planning, METU** _____

Examining Committee Members:

Prof. Dr. Serap Kayasü
City and Regional Planning, METU _____

Assist. Prof. Dr. Yücel Can Severcan
City and Regional Planning, METU _____

Prof. Dr. Adnan Barlas
City and Regional Planning, METU _____

Assist. Prof. Dr. Meltem Şenol Balaban
City and Regional Planning, METU _____

Assist. Prof. Dr. Cansu Canaran
City and Regional Planning, TEDU _____

Date: 15.01.2019

I hereby declare that all information in this document has been obtained and presented in accordance with academic rules and ethical conduct. I also declare that, as required by these rules and conduct, I have fully cited and referenced all material and results that are not original to this work.

Name, Surname: Duygu Kalkanlı

Signature:

ABSTRACT

INVESTIGATION OF STREETS AS 'LEARNING LANDSCAPES' FOR CHILDREN: THE CASES OF ANKARA

Kalkanlı, Duygu
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Co-Supervisor: Prof. Dr. Adnan Barlas

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Environmental impact on the physical and social development of children is significant enough to be underestimated. At the same time, children represent a large group within the urban population. However, especially in the cities of developing countries such as Turkey, physical space is designed by primarily considering the interests of adults. Besides, unhealthy and insecure conditions in the cities severely restrict the children's freedom of individual movement in the open space and even the use of the street in front of their homes. However, from the time the child communicates with the outside world and the perception of space begins to emerge, especially the streets can be considered as an area that affects the development of children; and where children can practice social and cognitive learning. This study aims to investigate the effects of streets on the development and learning of children and to investigate which characteristics of the street contribute to the learning activity of the children. In this study, streetscapes from different areas of Ankara were examined. Details of the streetscapes were investigated which may relate to the children's learning behaviors. The results were analyzed with respect to existing studies in the literature. After a literature review process, an evaluation tool was tested in various streetscapes. The example areas were taken from different neighborhoods

of Ankara; A street from a historical neighborhood, a street from a traditional neighborhood, a street from a mass housing estate, and a street from a neighborhood with the new trends in urbanism in Turkey which also has 'play street' qualification. The study discusses the physical qualities of these streets regarding their contribution to the learning of children

Keywords: Children's Geographies, Child and Space, Learning Landscapes, Environmental Psychology, Urban Streetscapes

ÖZ

SOKAKLARIN ÇOCUKLAR İÇİN 'ÖĞRENME ALANI' OLARAK ELE ALINMASI: ANKARA ÖRNEKLERİ

Kalkanlı, Duygu
Yüksek Lisans, Kentsel Tasarım
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Çocukların fiziksel ve sosyal gelişiminde çevrenin etkisi azımsanamayacak ölçüde büyüktür. Aynı zamanda, çocuklar kentte yaşayan nüfus içerisinde kalabalık bir grubu temsil etmektedir. Buna karşın özellikle Türkiye gibi gelişmekte olan ülkelerin kentlerinde, fiziksel mekan öncelikli olarak erişkin bireylerin çıkarlarına yönelik biçimlendirilmektedir. Bununla birlikte, kentlerdeki sağlıksız ve güvensiz koşullar, çocukların açık alandaki bireysel hareket özgürlüğünü, ve hatta evlerinin önündeki sokağın kullanımını büyük ölçüde kısıtlamaktadır. Ancak çocuğun dış dünya ile iletişiminin sağlandığı ve mekan algısının oluşmaya başladığı dönemden itibaren özellikle sokaklar, çocuğun gelişimini etkileyen, sosyal ve bilişsel öğrenmeyi gerçekleştirebildikleri bir alan olarak değerlendirilebilir. Bu araştırmanın amacı, bir kamusal alan olarak sokakların çocukların gelişimi ve öğrenmesi üzerindeki etkilerini incelemek ve sokağın fiziksel hangi özelliklerinin çocuğun hangi öğrenme aktivitesine katkı sağladığını araştırmaktır. Bu çalışmada Ankara'nın farklı bölgelerinden sokak kesitleri alınarak çocukların öğrenme davranışları ile ilişkili olabilecek detayları incelenmiş, sonuçlar dünya literatüründeki benzer çalışmalar ile ilişkilendirilmiş, ve kapsamlı bir analiz çalışması yapılmıştır. Literatür araştırması sonucunda elde edilen bulgular ile yöntem oluşturulmuş ve fiziksel çevreyi değerlendirme aracı

geliştirilmiştir. Ankara'nın farklı mahalle dokularından örnek alınan alanlarda bu değerlendirme aracı test edilmiştir. Bu alanlar sırasıyla şu şekildedir; tarihi yerleşim yerine ait bir sokak, geleneksel mahalle dokusuna ait bir sokak, toplu konut alanına ait bir sokak ve Türkiye'deki yeni şehircilik uygulamaları ile şekillenmiş bir mahallededen alınan, aynı zamanda 'oyun sokağı' niteliğine sahip olan bir sokak. Çalışmanın bu alanlardaki sonuçlarına göre yapılan değerlendirmede, bir sokağın çocukların öğrenmesine katkıda bulunabilmesi için, tasarımcılar tarafından öngörülecek uygulamalarda dikkat edilmesi gereken fiziksel nitelikler tartışılmıştır.

Anahtar Kelimeler: Çocuk ve Mekan, Çevresel Psikoloji, Öğrenme Alanları, Kentsel Sokaklar

To the child inside of us,
who follows the white rabbit

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INTRODUCTION

1.1. Problem Context

Starting from the second half of the nineteenth-century adults have realized that their childhoods were so different from their children's everyday experiences (Schildt & Siegfried, 2005; Sennett, 1977). A growing number of studies argue that there was a time in history where children used to have access to the world at large, whether it was streets, squares, public spaces, vacant spaces, or the fields and forests (Wridt, 2004). This same literature notes that today's children are increasingly trapped in indoors, hindering them from learning from the outdoor environment (Burton, 2011). In urban neighborhoods, spontaneously developed games or various types of collective or individual street play are increasingly disappearing. Due to a number of reasons, such as the loss natural areas, parental fears about bullying, traffic accidents, and strangers, the loss of neighborhood tradition, impact of technology, children have gradually lost access to the traditional game types played in the street and the natural environment (Ward, 1978; Frost & Reifel, 2001; Wridt, 2004; Goodman, 2011; Shaw et al., 2013; Tranter, 2016). One can see these trends across the globe from East to West (e.g., Jordan, Turkey, Canada, UK, USA, Australia, New Zealand; see also, Appleyard, 1980; Abu-Ghazzeh, 1998; Allin et al., 2014; Tranter, 2016.) Children are trapped into indoor play areas or commercial play facilities, or at best, designated neighborhood playgrounds, mostly for security. However, playgrounds intended to compensate for the daily limitations faced by children experiencing urbanization consequences, are made according to the building bylaws, which try to achieve a standard in terms of quantity, but they are insufficient in terms of qualifications because none of these adult-controlled environments is public in real terms (Ward, 1978). These spaces do not include opportunities for children to experience the social

differences or to manipulate the space. Therefore, it cannot offer the educational potential to a child as good as of public space. However, the child should be easily able to play everywhere in the urban environment and should not be forced to stick in a 'playground' or 'designated areas.' According to Ward (1978, p.73), "the failure of an urban environment can be measured in direct proportion to the number of playgrounds".

Although parents prefer the designated and protectionist environments, like playgrounds, for their children to eliminate the states of distress, such settings may limit the children's social and emotional development in long-term. When the neighborhoods are not qualified enough to fulfill the developmental needs of children, their capacity to experience and discover the surrounding environment, as well as their cognitive development, is limited (Malone & Tranter, 2003). On the other hand, the importance of the relationship between children's learning and play in the outdoor environment is strongly emphasized in the literature (see, e.g., Carr & Lynch, 1968; Ward, 1978; Loebach, 2004; Bilton, 2010; Maynard, Waters & Clement, 2013; Karsten & van Vliet, 2006)

Evidence shows that the physical environment in which the child interacts with others is of great importance in the socialization and development of the society (Björklid, 1982; Moore, 1986). To create child-friendly environments which contribute to the child's development and learning, urban planners and designers should accept the child as an individual in the city. They should protect children's right to grow up in a playful and healthy environment and should ensure that the globalizing and ever-growing adult environment do not usurp the rights of the children in the city.

Today, it is possible to observe such findings almost everywhere in the world, where children are separated from the urban or natural environment and directed by their parents to the indoor or designated play environments to provide security against possible external threats. (Malone, 2001). Though, Hart (2002) suggests that

designated play environments were invented as a device to remove children from the street, in order to provide the requirements of rapid urbanization strategies such as motorization; and streets are regarded from both families and children as an inappropriate space for play due to the applied implementations accordingly.

But street has particular importance for younger children, or in some cultures for a specific gender group; i.e., especially in eastern countries where girls' home range is usually more restricted than boys' (Tranter & Doyle, 1996). It is because they're unable to go to a playground or an indoor sports facility or a shopping mall on their own. The street is the only place nearest their home where they can spend time alone without family supervision. Therefore, it is assumed that under the appropriate conditions for their play, children will spend more time in the street; In fact, it is believed that through experiences, children will gain achievements on creativity, self-expression, problem-solving skills, self-confidence, cognitive and social abilities, and so on (Björklid, 1982; Moore, 1986; Leventhal & Brooks-Gunn, 2000; Loebach, 2004; Goodyear, 2012). In other words, children will 'learn from' or 'learn through' streets.

1.2. Aim of the Research and Main Research Questions

The main question is *"To what extent do the urban streets promote children's learning?"* Sub-questions are*; (1) What is a learning landscape? What is the relationship between the physical environment and children's learning? (2) What are the developmental stages in children? What factors affect children's learning in public spaces? More specifically, how can we measure children's outdoor learning? (3) Types of activities in public spaces?* How do these activities relate to learning? What can be the learning outcomes of the different kind of activities? *(4) How can we assess the learning environment of children's geographies?*

The research will be tested in different streetscapes of Ankara. A typical block with different street layouts having different physical characteristics will be selected from different neighborhood environments of the city; in order to understand whether some

street settings promote children's learning more than the others. Both qualitative and quantitative methods (mixed research method) will be used to provide a complete understanding of a research problem, involving both collected data with observation and assumptions and theoretical frameworks. Independent variables are the physical (environmental) features of Ankara's selected different neighborhoods, which will be added as inputs in the assessment tool. Assessment tool categories and each neighborhood's inputs will be determined according to the literature review. A structured observation technique will be used for this research study.

1.3. Purpose of the Study

In the literature on children's environment and behavior, many studies are focusing on the interaction between children and the environment or children's play. Most studies have addressed the following topics: physical and spatial environment on child behavior and learning; the physical environment and its influences on mobility, psychological development of children; neighborhood design and outdoor play relationship; indoor design standards for children's cognitive development; and how the perfect playground design should be. On the other hand, there is not enough scientific research on the relationship between physical affordances of the environment and their impact on children's learning capacity. No spatial assessment tool can measure this impact or, no study has ever investigated to what extent public spaces promote children's learning.

In this thesis, it is aimed to discuss these topics which are underemphasized in the literature and to propose a premise assessment tool to clarify the correlation between environmental attributes and children's learning. It also aims to use the proposed tool in a number of selected sites to understand how much these selected areas are educational.

1.4. Configurations of the Study

This thesis has three important outputs. First, it suggests a conceptual model for the measurement of learning landscapes. Second, by using the model, the thesis answers the following research question: "to what extent does the urban streetscapes in Ankara affect children's learning?" With the synthesis to be made by the findings of the study, this thesis questions to what extent can children's learning be increased in urban streetscapes. The second chapter builds the theoretical framework on the literature about children and their learning process. Developmental stages of children and the factors affecting children's learning process will be profoundly discussed in this part. In the third chapter, based on the existing theories explaining the role of the physical environment in children's learning and behavior setting will be discussed. According to the discussions about the role of the outdoor spaces in children's behavior and learning process, a conceptual model for assessing the learning environment of children's geographies will be generated. In the fourth chapter, sample fields in different neighborhoods of Ankara, selected for the evaluation of the model, will be examined. These fields will firstly be discussed according to their general characteristics and layouts, then categorized according to the created assessment tool criteria. Observation method will be utilized. In the fifth chapter, findings from the implementation of the assessment tool will be discussed. In the final chapter, the main findings will be argued. A discussion will be made about which kind of the street layout provides successfully the criteria that are specified in the assessment tool. The last part aimed to make contributions to literature by suggesting a model, which can apply to all types of streetscapes to understand their effect on children's learning.

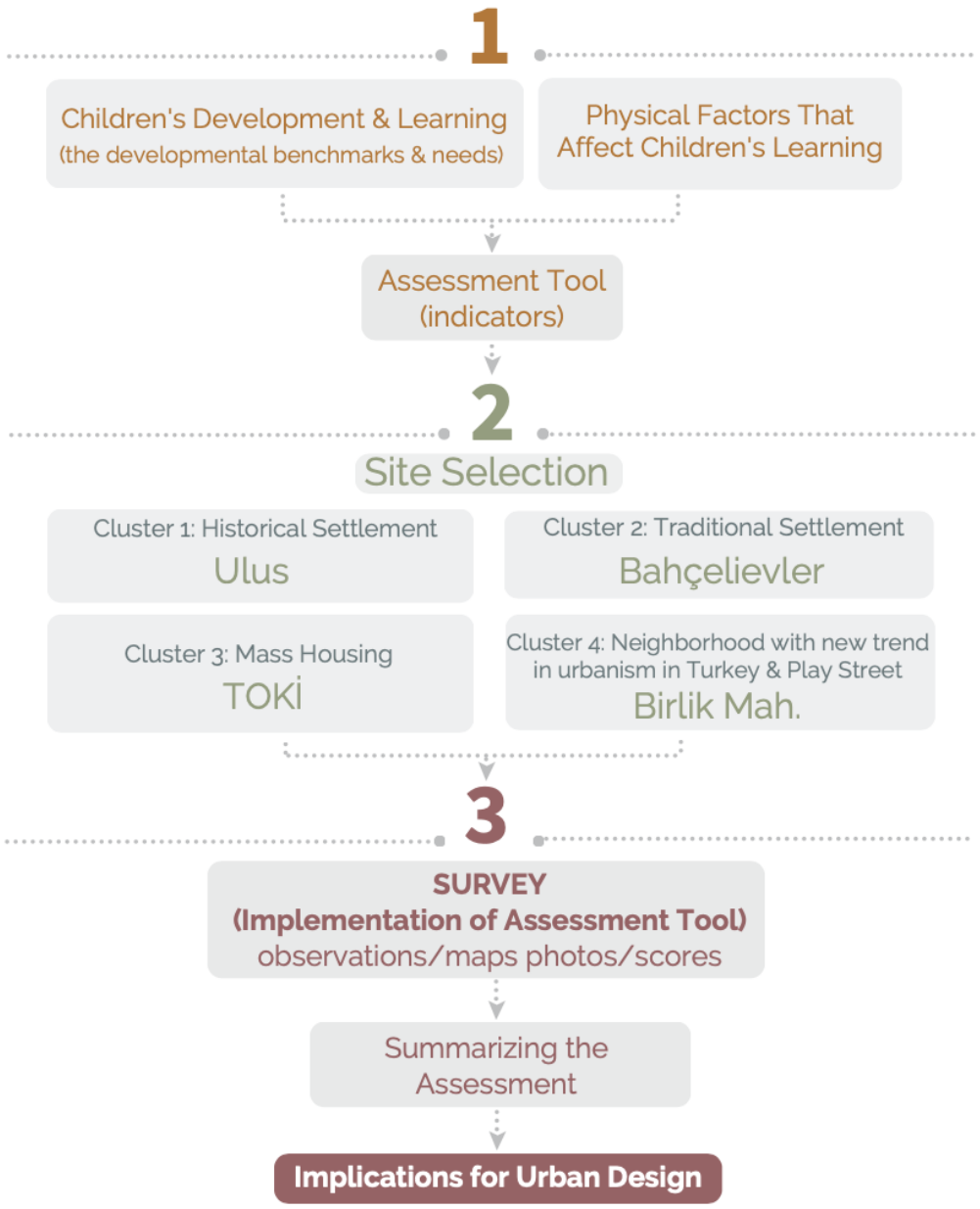


Figure 1-1. Research Design of the Study

CHAPTER 2

THEORITICAL FRAMEWORK

The child's toys and the old man's reasons
are the fruits of the two seasons.

William Blake

2.1. Children's Development and Learning Process

Children development is contextualized through the three key interacting components: physical (biological), cognitive, and socio-emotional. These developmental periods blended with the process of learning. Learning is progressing through the competence of conditioned responses, the acquisition of the range of habits and behavioral tendencies, which are in accordance with the developmental periods and categories (James, 1958). Nature (biology) and nurture (experiences) of the child are in connection and influencing each other (Wachs, 1999). According to The Institute of Medicine (IOM) and National Research Council's (NRC) 2015 report, it is assumed that the children's experiences can influence their genes during their developmental period and affect their brain development and behaviors. Report claims that "There are some periods in development where the brain is more susceptible to change than others. In early childhood, brain development is strongly influenced by children's environment and experiences."

Physical (Biological) forms create changes in an individual' body. Genetic codes acquired from parents, the advancement of the cerebrum, tallness and weight gains, improvement of motor skills, and the hormonal changes of adolescence demonstrate the function of physical (biological) procedures being developed (Yussen & Santrock,

1982). Learning capacity has a direct and proportional relationship with physical development of children. As physical development progress, the children's capability of doing (motor skills) increases and this improves cyclically their learning capacity; as children learn, they can involve in new activities that will accelerate their physical development. Physical development is especially accelerated in infancy, slows down during early childhood, and rapids again over the adolescence time. Physical development indicates height and weight as well as advancement of muscle, fat, and bones (Kail, 2007). Physical development in children establishes from direct involvement in nature through play and investigation. Youngsters are physically active when playing outside by contrast with playing inside.

Cognitive development indicates to change in one's attention, intelligence and language, which affect children's learning abilities. Cognitive development comprises mental thinking, problem solving, concentration and attention (Yussen & Santrock, 1982). According to Piaget (1964), fundamental cognitive structures are comprised of organized behavior patterns. Development in different areas such as physical growth, cognition, language, personality, social relations and learning capacity has always been intertwined. Cognitive and social development are not independent of each other; Advances in one field affect progress in others (Kail, 2007). On the other hand, the learning perspective assumes that the degree of connectedness between social and cognitive development depends on the nature of the environmental impacts. Similar environmental impacts in different areas of child life produce many connections; Different environmental effects will produce less connection. (Kail, 2007).

Socioemotional development includes changes in one's associations with other individuals, changes in feelings, and changes in identity. Physical, cognitive and socioemotional forms are integrated (Yussen & Santrock, 1982). It includes feelings, expressions, social skills comprised of child's language and communication skills in based on interaction with fellows and parents. The development of different emotions

depends on the brain maturation, cognitive development and advancement of self-awareness (Papalia, Old & Feldman, 1993). The relationship between socio-emotional development and learning is important because, the development of social skills strengthens the interaction of children with their peers and adults. Adequate socio-emotional development and socialization skills provides an opportunity for child to share his/her individual acquisitions and learn from other. Children learn by sharing their experiences with friends and taking role model of their adults (Kail, 2007).

2.1.1. The Developmental Stages of Children

Developmental needs, required in each childhood period, differ according to the developmental stages of children. In some period, cognitive development of children is faster than others, whilst physical or social development is accelerated in other periods. In each developmental period, the subjects of interest of children, the concentration of the children and the motivation to learn is changing. Therefore, the relationship between space and learning has different levels of interaction in each developmental period of childhood. To understand the dimensions of this interaction, children's developmental periods and the components of these periods are examined in detail.

The development of a child is typically characterized regarding the periods of approximate age ranges. The most common grouping figuration of developmental stages describes the development of children as following; the prenatal stage, infancy, early childhood, middle childhood and adolescence. The prenatal period lasts from birth to approximately a nine-month duration. Over this period, a single cell develops into a life form with intelligence and behavioral capacities (Yussen & Santrock, 1982).

Infancy is the formative stage that continues from birth to around 18 months-2 years of age. In that period, child is extraordinarily dependent on parents. Numerous mental activities simply begin such as communication skills, coordinating sensations and

physical activities, thinking with symbols, imitating and learning from others (Yussen & Santrock, 1982).

Early Childhood is the developmental stage that starts at the end of infancy and lasts to about 5-6 years old. During this developmental period, children figure out how to enhance their self-sufficiency. Also, they improve learning skills (to follow-up instructions, to recognize letters), and they spend numerous hours in play and with associates. Children spend plenty of time in play with their fellows. First grade generally denotes the end of this period (Yussen & Santrock, 1982).

Middle childhood is the developmental stage that reaches out between around 6 and 11 years old. Children specialize their basic skills of reading, writing, and computing. In this stage of life, they come across with the bigger world. Achievement motive takes an important place in child's world. The child's self-control abilities improve (Yussen & Santrock, 1982).

Adolescence is the period of development that begins at the ages of 12 and ends at about the ages of 18-19. Adolescence starts with physical changes like alteration in height and weight, changes in body form and the advancement of sexual attributes. The search for independence and the effort to create identity are the prominent characteristics of this developmental period. Adolescents spend more time outside the family during this period. The thinking system becomes more abstract, idealistic and logical (Yussen & Santrock, 1982).

Furthermore, It is argued that children's development does not ended by adolesence period (Depp, Vahia & Jeste, 2010). Learning is a lifelong process. All the periods of development are comprised because of the interaction of physical (biological), cognitive and socioemotional growth (Yussen & Santrock, 1982).

2.2. Theories of Child Development

This chapter summarizes the basic theories to understand child development; some of the classical theories such as **psychoanalytic**, **behaviorism** (learning theory, social learning), **cognitive-developmental** and some of the contemporary theories such as

ecological perspective. Each makes a significant contribution to the understanding of the development of children. Although the theories suggest different aspects of development, most of their ideas are complementary rather than contradictory (Yussen & Santrock, 1982).

Development is a self-built and aggregate action. In order to comprehend the one, it should be looked at prior periods (Baltes, Lindenberger & Staudinger, 2006). The value of the infant's relationships at home affects their further relationships with schoolmates, sincere friendships or lovers. Development takes place during life. Almost all theoreticians accept that development takes place in a multilayered context where it includes continuous interaction between biology and environment, is cumulative, and proceeds during the whole of life. (Steinberg, Vandell & Bornstein, 2010).

Psychoanalytic theories define the development as unconscious. Psychoanalytic scholars assert that behavior is superficial feature, and that a true understanding of development requires the analysis of the symbolic meanings of behavior and the deep internal functioning of the mind (Yussen & Santrock, 1982).

As indicated by Freud (1910), the healthy development is provided by the emergence of the ego - the rational, adaptable part of the self in middle childhood. In his theory of psychosexual development, Freud argues that many aspects of the individual's personality stem from an early and large childhood sexuality. For Freud, it is a series of biological instincts that direct the human behavior. According to him, the basic personality of man takes shape in the first five years of his life.

On the other hand, Erikson (1950) did not agree with the idea that personality is constant in early childhood. On the contrary, he states that this development continued throughout human's life from infancy to old age (Erikson, 1950). Erikson believed that adults also went through certain stages, just as the children had done. The

emotional tendency of an individual is not fixed at any stage but is always subject to revision. In Erikson's theory, the development appears in eight stages throughout life. At each stage, individuals confront with a crisis, a unique development task that needs to be solved. According to Erikson (1950), these crises are not a disaster, but a milestone pointed out by both an increased vulnerability and increased potential. Furthermore, an individual's successful breakdown of the crisis leads to a healthier development (Erikson, 1968).

In psychoanalytic theory, emotions are fundamental for development. In the learning theory, on the contrary, the role of external influences on behavior is emphasized. According to learning theorists it is not essential to consider what is going on in the child's mind in order to explain children's development. Moreover, it is not so important to think about the children's wider social and cultural environment. The behavior of individuals is the result of their experiences in the immediate environment. The basic principles of learning are the same for everyone. Additionally, all behaviors such as love, fear, laugh, generosity, confidence alongside knowledge and abilities are learned (Steinberg, Vandell & Bornstein, 2010).

Social Learning Theory is a more up-to-date version of the learning theory which is filling the gaps of the theory of behaviorism. The problem with behaviorism is that it does not explain the sudden appearance of complex behaviors (Steinberg, Vandell & Bornstein, 2010). In other respects, according to social learning theory, children also learn by observing and imitating the behavior of other people, role models (Bandura, 1978). Learning theory draws attention to how the development of children is taken form by the people around.

The cognitive-developmental perspective focuses on how children think and how their ideas change during their development process. Piaget (1956) believed that children tried to understand their world naturally. In infancy, childhood and adolescence, young people try to understand how the physical and social worlds are working

(Piaget, 1956). Piaget claims that during the development process of children, radical revisions occurred at three times, the first occurred about two years old, the second after the age of seven, and the last one before puberty. These extreme changes mean that children experience four different stages in their cognitive development process. Each phase represents a basic change in how children comprehend and regulate their environment, and each phase is qualified my more complex types of logic. All children are supposed to passed through these four stages, yet some may do it faster than others (Piaget, 1954).

There are two processes in Piaget's theory of four stages of development: organization and adaptation. In addition to organizing observations and experiences to make sense of the world, human beings also adapt and yield to new environmental demands (Byrnes, 1996). Each phase consists of a different way of understanding of the world depending on age and different way of thinking. Thus, the cognition of the child qualitatively differs from each other at each stage (Piaget, 1954). Four stages of Piaget's cognitive development theory are listed as following;

The sensorimotor stage is the primary stage. It endures from birth to around 2 years old. At this stage, infants develop an understanding of the world with sensory experiences (for example, to see and to hear) Infants learn by associating senses with motor action (Piaget & Inhelder, 1956).

The second stage is the preoperational stage, endures from around 2 to 7 years old (Piaget & Inhelder, 1956). Children can go beyond basically combining sensory information in this period with physical activity in addition to reflect the world with words, symbols, and drawings (Yussen & Santrock, 1982).

Children obtain a storage of symbols and images mentally, particularly consists of spoken and written words. Subsequently, they can consider things that are not physically present. On the other hand, they cannot imagine how an object looks from

varied angles. They are inadequate to try different ways to solve a problem, or do other things in their mind (Steinberg, Vandell & Bornstein, 2010).

The third stage, the concrete operational stage, corresponds to roughly 7 to 11 years old. In this stage, children's reasoning becomes focused and logical. They can reason logically if reasoning can be practiced with particular or concrete examples (Piaget & Inhelder, 1967). To exemplify, children in this stage fall short of advanced abstract thinking required for to algebra (Steinberg, Vandell & Bornstein, 2010).

The formal operational stage, corresponds between the ages of 11-15 and proceeds through adulthood, is the final stage (Piaget & Inhelder, 1967). In this stage, individuals are capable of abstract and logical thinking. (Yussen & Santrock, 1982). Children can think speculative, representative, symbolic terms and move beyond space and time (Steinberg, Vandell & Bornstein, 2010).

Ecological perspective indigenizes the perspective of Darwinist theory and Gestalt principles to the understanding of perceptual processes (Jenkins, 2008). The ecological perspective on development shows that human beings can never completely comprehend the development without considering the context in which it happens (Bronfenbrenner, 1979). This implies that it should be considered the children's immediate environments (like the home or school); encountered relationships and experiences as they grow older; the organizations that directly or indirectly impact children (like education system, mass media, etc.); the socio-cultural qualities and economic conditions (Steinberg, Vandell & Bornstein, 2010).

Affordance theory handle the subject of both the interplay between object shapes and spatial relationships and the object possibilities for activity (affordances). Theory claims that perception triggers activity (Gibson, 1979). According to Gibson (1979), environmental perception unavoidably causes certain actions. Affordances are perceived in an immediate, concrete way such as, buttons for pushing, handles for pulling, levers for sliding and so on. Gibson argues that perception is very important

because it allows people to adapt to their environment. He expressed that children figure out how to learn to identify information indicating objects, events and patterns that children use for their daily activities (Miller, 2002). Miller (2002) indicates that, children are information "hunter-seekers", who collects information to survive and navigate the world.

By using Gibson's concept of affordances, Heft (1988) examined children's outdoor activities to come up with a set of functional properties of children's environments. The result of this functional taxonomy provides a mindset about children environments that might be mentally more significant than the standard form-based arrangement of environmental aspects. Affordance is the main idea behind this analysis of children's environments. Gibson (1979) built up the idea to represent the way that our perceptual experience contains awareness of both the configuration of events and objects and their functional importance (meaning). The meaning of events and objects directly perceived by a perceiver is exposed to sensory data by cognitive process. The affordances of the environment are functionally important features that are considered in relation to a person. If the position of a horizontal surface has a height appropriate to the leg length of the individual, it is perceived as the surface can be climbed by the individual, in other words, the surface is affordable for climbing-on (Warren, 1984). If this surface is positioned at approximately knee level of the individual, the surface is perceived to be sit-on-able, that is it affords for sitting (Mark & Vogele, 1984). Environmental characteristics can be defined as that functional way according to the activities they allow or afford people. Remove-able or lift-able objects, walk-on-able surfaces, stand-on-able surfaces, and areas that allow to hide behind, climbing over, or crawling underneath are other examples of affordances (Heft, 1988). These examples outline distinguishing features of affordances; to be more specific, they are relationally specified. Affordance properties are concurrently designated by properties of the environmental aspects being attributed to a specific person.

Individuality should also be considered when assessing the functional possibilities of a particular place. For example, when it is evaluated for a child and an adult, affordances may not overlap for the same place. Implementation of affordance method to consider environmental characteristics will lead to clarify the importance of functional features of environment for an individual. That brings out a definition that might be more psychologically meaningful than the standard form-based approach focusing solely on the form. Furthermore, the immediate experience of the environment may require an awareness of its functional potential and limitation (Heft, 1988).

While form classifications (such as tree, fence, street, building, etc.) are common in our daily conversation about environmental features, these form-based qualifications might be relatively abstract ways of experiencing the environment. Under favor of the environmental experience, children might make progress.

Affordances is more essential and in an experiential sense, in comparison with awareness of form-based classifications. Since the environmental features have several functional meanings, affordances have not entirely independent characteristic differing from form-based classifications. Although the idea of affordance is special to Gibson's hypothesis, Barker and Wright (1955) emphasize the apparent functional character of environmental features as well, not only with regard to the concept of psychological habitat of them but also their analysis of behavior settings. Barker and Wright (1955) indicate that the psychological habitat is situated at the crossing point of the behaving person and the non-psychological environment. In other words, it is jointly determined by the person and the environment. Moreover, these scholars state that the functional necessities of behavior-setting are perceivable features developing out of the relationship between behavior and environment. Behavior-settings compose of continuous patterns of behavior and the environment, in other words, patterns of activity and the environmental features that lead this activity (Barker & Wright, 1954). Some examples to behavior settings include climbing area, sand pit, water play setting, tricycle path, vegetable garden, etc.

Table 2-1 Theories of Child Development

Child Development Theories	Psychoanalytic Theory	Learning Theory (Behaviorism)	Cognitive-Developmental Theory	Ecological Approach
Theorists	Freud, Erikson	Byrnes, Bandura, Skinner, Pavlov	Piaget, Vygotsky	Bronfenbrenner, Gibson
Prominent ideas	-Emotions are fundamental for development. -Development is primarily unconscious and heavily colored by emotion.	-External influences are effective on behavior. -Child learns from his social and cultural environment.	-Development is a result of new levels in the organization or structure of thought, or qualitative changes. -Changes in the way children think about their physical and social world as they move from infancy through adolescence.	-Theory emphasizes both the proximal and distant contexts, in which development occurs. - The information that exists in the world around is directly perceived by individuals. -The approach connects perceptual capabilities to information available in the world of the perceiver. Perception brings people into contact with the environment to interact with and adapt to it.

2.3. Child's Developmental Stages and Categories

2.3.1. Sensimotor Period (Infancy)

Sensimotor period roughly corresponds to the infancy period from birth to 2 years of age. According to Piaget and Inhelder, infants learn about themselves and their world through their own developing sensory and motor activities during the sensorimotor stage. (Piaget & Inhelder, 1967)

Cognitive Development

Infants understand the world in terms of their physical actions. To give an example, while trying to grab a toy, children perceive color and shape of it. In this period, it is very difficult for the child to understand spatial relationships, their brain cannot accurately determine the distance and direction between the object and the hand. The child may understand that the objects move, but cannot comprehend the movement (Miller, 2002).

A child effectively learns the features of the objects and the relationships between them. In the sensorimotor period, children carry out this information by obvious actions, consequently with a 'logic of action' (Piaget & Cook, 1952). Their cognitive structures are organized more tightly (Miller, 2002). Their behavior gradually becomes more deliberate (Kail, 2007). Children analyze and coordinate the order and apply it as a solution to new situations. Hence, they create new tools and apply them to new purposes in new situations (Wigfield & Eccles, 2002). Their individuality gradually separates from the environment. Children discover the boundaries of their own bodies and see their selves as a single object in the world of objects (Miller, 2002).

In that period, infants advance from reflexing responding to effectively exploring the world, like understanding the objects or using symbols. These achievements are striking and constitute the stage of preoperational thinking (Kail, 2007).

The Piagetian approach examines cognitive development with qualitative stages. In the sensorimotor period, the cognitive and behavioral schemes of infants become more detailed (Steinber, Vandell & Bornstein, 2010). Object continuity gradually develops at this stage (Miller, 2002). The information processing approach is about how people perceive the symbols and what they do with the information they acquire.

Information processing researches (see, e.g., Bailey, 2013; Kail, 2007) shows that the ability to create and recall mental representation is almost continues from birth to present. Indicators of information processing efficiency of infants include practice speed, visual recognition memory, visual innovation preference and cross-modal transfer (Papalia, Old & Feldman, 1993). These abilities also tend to express the developing intelligence and predict the later intelligence. Early visual attention is an indicator of the exploratory competence of toddlers. The ability to process information is influenced by the sensitivity of important adults (Papalia, Old & Feldman, 1993).

Physical (Motor) Development

In this period, physical growth has a progressive course in the following way; The central nervous system directs the behavior by processing information. Brain development is shaped by the interaction between biology and experience (Steinber, Vandell & Bornstein, 2010). Motor development is attached to physical maturation (Kail, 2007). The theory of dynamic systems suggests that a change in development affects others. The multimodal comprehension of objects is coordinated through senses (Steinberg, Vandell & Bornstein, 2010).

In this period, children pass from simple reflexes through a series of sensorimotor behaviors (Steinber, Vandell & Bornstein, 2010). The development of motor skills based on both maturation, experiences and perception. A child's body develops most rapidly in the first year of life; development continues at a fast but decreasing rate for the next 2 years (Kail, 2007). Muscle controlling newly begins at the start of the infancy period, and during the first 3 months they begin to gain control over their

movements (Papalia, Old & Feldman, 1993). Moreover, sensory capacities also develop quickly in the preliminary year (Steinber, Vandell & Bornstein, 2010). Tactual sense is the first developed and the most mature sense since the first months after birth; Sense of smell, taste and hearing start to progress in the womb (Papalia, Old & Feldman, 1993). Because vision is the less developed sense, talents like color perception, focal sharpness and ability to follow a moving object develop later on in the first few months, as well as audial awareness and visual preference (Steinberg, Vandell & Bornstein, 2010). Due to the formability of the brain, environmental experiences may affect the brain development either positively or negatively. Envrionmental and cultural factors may influence the motor development (Kail, 2007). Recent studies indicate that environmental features can accelerate the motor development, whilst being excessively deprived of it can decelerate the development. Additionally, learning plays a big role in early motor development. Therefore, it can be said that early education may speed up specific behaviors (Papalia, Old & Feldman, 1993).

Social Development

Infants demonstrate their feelings by crying, laughing and smiling. Until after this period significant physiological and behavioral distinctness between genders do not usually seen (Steinberg, Vandell & Bornstein, 2010). The concept of the self begins to emerge in accordance with respectively physical self-reflection and self-awareness, self-identification and self-assessment, and emotional response to injustice (Kail, 2007). Socialization strikes up with the development of self-regulation; Communication with other children influences cognitive and psychosocial development (Papalia, Old & Feldman, 1993).

2.3.2. Preoperational Period (Early Childhood)

Preoperational period approximately corresponds to the early childhood period between the ages of 2 and 7. Motor development of child comes into prominence at that period (Piaget & Inhelder, 1956).

Cognitive Development

Piaget (1964) defines this period as pre-operational age. This is the period that the child is mentally concentrated on him/her and influences the child's ego-centric perception. According to Piaget and Inhelder (2013), logical thinking has not developed yet in this period. The child cannot distinguish what is subjective or objective because of his ego-centered thinking (Yavuzer, 1988). At this stage, children begin to use objects as if they symbolized alternative things; To illustrate, he/she can use a stick as a horse to ride. In this period, the concepts of number, time and size are very primitive (Wigfield & Eccles, 2002). This period can be considered as a preparation period for concrete operational processes. Children individually create symbols in their brain and may produce some similarities, but they may not be logical (Steinberg, Vandell & Bornstein, 2010). They can even combine the most irrelevant objects and concepts. The way in which they perceive the world is holistic and general, however they cannot grasp the details yet (Papalia, Old & Feldman, 1993). Children also cannot understand yet different perspectives or make intellectual comparisons and express their ideas. As a result, their ideas are very changeable (Yavuzer, 1988).

According to the Piagetian approach, the symbolic function allows children to mentally represent and reflect people, objects and events. Preoperational children can comprehend the notion of identity; start to understand the causal relationships; become competent in the classification and comprehend the elements of counting and quantity (Wigfield & Eccles, 2002). In this period, mental lexicon in children is greatly increased through rapid mapping, additionally grammar and syntax become quite complex. Autobiographical memory starts at around 4 years of age and may be associated with language development (Piaget & Inhelder 2013). On the other hand, children tend to remember the extraordinary activities they actively take part in (Yavuzer, 1988). The communication style of adults about events with children also affects memory formation (Papalia, Old & Feldman, 1993).

Physical (Motor) Development

Children start walking after two years of age. Therefore, there is an intensive motor development in children at that period. Motor development moves backwards between 2 and 3 years of age (Steinberg, Vandell & Bornstein, 2010). A child can stop and run again whilst running, can climb stairs, walk sideways, hit a ball, jump on his two legs. Child starts to have a long-distance jumping ability between 4 and 5 years old; He/she runs well, his/her walking style is comfortable and starts to coordinate with arm swing, he can walk in a balanced way along a drawn line, can take balanced steps up and down without holding anything, and can run and kick a ball. 6 years old child can jump over high obstacles and high distances (Papalia, Old & Feldman, 1993). Child's motor activity is well developed, and he can move the body in free motion (Kail, 2007). By 6-year-old age child can coordinate all his movements (Yavuzer, 1988).

Physical growth is much slowly increasing than at the infancy period (Papalia, Old & Feldman, 1993). Motor development is advancing rapidly; greater motor skills, fine motor skills and eye coordination are gaining momentum and more complex action systems are developing in children (Kail, 2007). Differences in motor abilities of boys and girls may also be reflected in differentiations in their skeletal system; Muscles, skeletal, nervous, respiratory, circulatory and immune systems mature more (Steinberg, Vandell & Bornstein, 2010). Stages of art production reflecting brain development can be listed as deflection stage, shape stage, design stage and pictorial stage (Papalia, Old & Feldman, 1993).

Social Development

Children at this stage often have anti-social tendencies in their behavior (Kail, 2007). However, they are incrementally prepared for the process of socialization (Steinberg, Vandell & Bornstein, 2010). During this period, children want to play with their peers. Around 3-4 years old, rather than playing alone, they start to play in groups of two or three children. The most observed behavior is chatting and watching each other (Papalia, Old & Feldman, 1993). Usually, although they sit together, they play with

their own toys. Approximately from the beginning of the age of four, they start to inquire and try to recognize their surroundings (Steinberg, Vandell & Bornstein, 2010). Children begin to adapt to the environment, they become more curious about the surrounding objects and people (Kail, 2007). Therefore, the opportunity to experience the environment is quite important for children (Yavuzer, 1988).

The development of self-directed feelings gear to socialization and cognitive development. Children establish and figure out simultaneous emotions step by step. Personal distinctions in emotional consciousness start before at the age of 3 (Yavuzer, 1988). Parents and peers are substantial social sources of support of the self-esteem (Papalia, Old & Feldman, 1993).

In preoperational period, identity of gender is also an important manner of the developing self-concept (Yavuzer, 1988). Gender differences are physical, psychological or behavioral differences between male and female. There are few gender differences in early childhood and these differences are usually quite small (Yavuzer, 1988). Gender differences are rarely seen in early childhood period (Steinberg, Vandell & Bornstein, 2010). All societies have conviction about behaviors and attitudes that differing for both genders, and children learn these roles at early ages. However, gender roles may limit both boys' and girls' development. Social learning theory indicates that imitating and observing the role models consolidate the development of gender appropriate behavior; Moreover, researches demonstrate that gender typing is influenced both by environmental and biological facts (Miller, 2002). Difference in play types also affects social and cognitive development of children (Steinberg, Vandell & Bornstein, 2010). Social play is increasing, and the cognitive play types are developing from simple repetitive play to creative, imaginary and ruled ones (Miller, 2002). The variety of games is differentiating among cultures and is affected by the physical environment (Papalia, Old & Feldman, 1993).

2.3.3. Concrete Operational Period (Middle Childhood)

Concrete operational period corresponds to the middle childhood period between the ages of 7 and 11.

Cognitive Development

According to Piaget (1929), children's thinking qualitatively differentiates from that in the preoperational period. Additionally, the concrete operational period comprises of five relating competencies that create resource for logical reasoning; classification, class inclusion, seriation, transitive inference, and reversibility (Inhelder & Piaget, 1964). In concrete operational process, logical thinking and notions of number, time, space, size, volume and distance proceed to settle in the child's mind (Piaget & Inhelder, 1967). Children discover that there are different ways of achieving the same result. With the development of language, the ability to think and express their opinions are also improved. Besides, as Piaget (1964) indicated, they improve their ability to group, classify, limit, and manipulate objects therefore, they can identify an object with many identities, distinguish the similarities and differences of objects. Moreover, logical thinking affects children's sensory lives (Wigfield & Eccles, 2002). By the end of this age, the ability to solve the problem as unaided in children is seen to develop (Yavuzer, 1988).

The capacity of short-term memory steps up and the memory of children becomes well developed in this period (Wigfield & Eccles, 2002). Especially till the age of 9 years, the central manager who controls the flow of information between working memory and long-term memory matures (Papalia, Old & Feldman, 1993). Selective attention and concentration capabilities are increasing during that period in the child (Piaget & Inhelder, 1967). Children can comprehend the complex syntax as well as developing their communication skills (Yavuzer, 1988). Additionally, peer-to-peer interaction also helps to improve literacy (Papalia, Old & Feldman, 1993). On the other hand, the temperament characteristics of children affect school performance (Wigfield & Eccles, 2002). However, environmental and cultural differences are as effective as not

to be underestimated in the development of the IQ of children (Papalia, Old & Feldman, 1993). Piaget (1964) thinks that concrete operational thought is the result of children's manipulation of materials and objects and the acquisition of new experiences with these materials. He does not think that logical operations need to be educated accurately (Piaget, 1964). Various researches including Steinberg, Vandell and Bornstein (2010) support Piaget's idea by suggesting that concrete operational thinking can be strengthened by certain experiences. Although formal education supports concrete operational thinking, it is not necessary. For example, child street sellers with very few formal educations have been found to have a classification understanding when the questions asked in the language of their occupation, although they are poor on doing Piaget's classical classification problems (Miller, 2002). The purpose of Piaget was to define the thought structure or organization of children in different periods of thinking rather than in detail how the development occurred. However, recent researches focus on how children operate information (Steinberg, Vandel & Bornstein, 2010).

Physical (Motor) Development

Children complete this period with development of their body, motor and language skills (Kail, 2007). Hand and arm abilities are well developed; However, the muscular system need to be reinforced with exercises (Steinberg, Vandell & Bornstein, 2010)). In addition, speaking and language skills also develop (Kail, 2007). The cognitive and social development of children is very important in this period (Yavuzer, 1988). Physical development slowed down compared to early and middle childhood; At the beginning of middle childhood period, boys seem bigger than girls (Papalia, Old & Feldman, 1993). However, girls are more developed than boys at the end of this period because they enter adolescence at a prior age (Steinberg, Vandell & Bornstein, 2010). The differences in motor skills of boys and girls are prominently increased as they approach the age of puberty; boys start to differentiate themselves from girls, especially because of their muscular system development and expectations of gender roles (Yavuzer, 1988). Large differentiations in height and weight can be observed

among children in this age group. (Papalia, Old & Feldman, 1993). Thanks to advanced motor development, boys and girls during this period can participate in a great variety of motor activities than that in early childhood (Steinberg, Vandell & Bornstein, 2010). In studies conducted both in European & eastern countries, and USA, it is observed that, most of the games of children of this age are passed with rough-and-tumble (Papalia, Old & Feldman, 1993). Moreover, especially during this period, life-long sports habits can be acquired by directing children, and their skills can be encouraged to be improved (Steinberg, Vandell & Bornstein, 2010). This can reduce cardiovascular risks by controlling blood pressure and cholesterol in the coming years. Children's consciousness of health and disease is also closely related to their cognitive levels. (Papalia, Old & Feldman, 1993).

Social Development

This period is the stage at which children are most affected by the events around them (Papalia, Old & Feldman, 1993). They have a very close relationship with their peers and agree with their peers while they resist to ideas of adults (Steinberg, Vandell & Bornstein, 2010). In addition, peer-to-peer competition is also an important social fact in concrete operational period. Especially boys are prone to team games and they are mostly in racing (Yavuzer, 1988). In this period, the emotional identity becomes apparent (Papalia, Old & Feldman, 1993). Children's ability to differentiate between good and bad, right and wrong, in other words, "superego" develops (Miller, 2002). The play environment is starting to become the street and its surroundings that allows for active games. Street and its surroundings are the contexts where children determine the extent of their mobility (see Sancar & Severcan, 2010; Severcan, 2018; Karsten & van Vliet, 2006). During this period, children constantly keen on to learn and try new things (Steinberg, Vandell & Bornstein, 2010). Children are less dependent on their parents and their home, but then friendships become so important that lack of friendship can cause psychological problems (Yavuzer, 1988). Children who have a lot of control over them become passive in their social relations and cannot make friends easily (Papalia, Old & Feldman, 1993). However, favourable relations also

supports social cohesion, which is possible only with the independence of the children in outdoor spaces (see, e.g., Yörükoğlu, 2002). In this period, acceptance among friends is more important than being accepted by adults (Steinberg, Vandell & Bornstein, 2010). Through friendships, children acquire the skills necessary for social life, such as harmonious relationships and cooperation, leadership, responsibility, teamwork, and the ability to compete without overbearing or being overbeared (Papalia, Old & Feldman, 1993). Most importantly, friendships give children the ability to evaluate themselves. The child compares himself / herself with others, and finds similarities and differences, that reduces egoism and improves self-abnegation (Yörükoğlu, 2002).

2.3.4. Formal Operational Period (Adolescence)

Formal operational period corresponds to the adolescence period between the ages of 11-15.

Cognitive Development

From this period, mental operations are not limited to concrete objects anymore. Children can systematically solve complex problems presented in both concrete and abstract ways (Kiper, 1999). They can also make assumptions and make rational conclusions. They better understand the relationships between objects and events that are not in relation to each other. They can benefit from abstract rules in problem solving (Yavuzer, 1988). They can develop a hypothesis about an existing or potential case and examine it against reality (Miller, 2002). On the other hand, in the last two terms of Piaget, individuals gain autonomy and independence and their thinking abilities become stronger compared to the first two periods (Yavuzer, 1988). Factors affecting individual performance may include ability, belief, and motivation, but context is also very important (Eccles & Roeser, 2009). The distinctness in achievement observed in adolescents are mostly caused by differences in the classes in which their skills, thoughts and aims are expressed, and the home and neighborhood environments in which these factors develop. Thus, environmental influences on

achievements are also important as not to be underestimated. (Steinberg, Vandell & Bornstein, 2010)

Physical (Motor) Development

According Falkner and Tunner, adolescence has five basic physical components (Falkner & Tanner, 1978). First one is a rapid acceleration in growth both at height and weight. The development of primary and secondary sex characteristics is following components. Fourth one is the alteration in body form, specifically, in the quantity and distribution of fat and muscle in the body. Circulatory and respiratory systems are the last one that increase strength and endurance of the body (Falkner & Tanner, 1978). In adolescence period, hormonal changes are seen that affecting young people's moods and behaviors (Kail, 2007). Adolescence starts earlier in girls compared to boys (Papalia, Old & Feldman, 1993). In this period, adolescents are healthy compared to their previous childhood periods because individuals are more enduring and robust. On the other hand, depressive moods are very common among adolescents (Kail, 2007). The cause of depression is usually associated with anxiety about their appearance (Steinberg, Vandell & Bornstein, 2010). Sustaining close relationships with parents and teachers and high expectations for success is a protection way against physical and mental health risks (Papalia, Old & Feldman, 1993).

Social Development

In the focus of adolescence, there is a search for identity consisting of occupational, sexual and eigenvalue components (Steinberg, Vandell & Bornstein, 2010). Erik Erikson (1994) defines the psychosocial crisis in puberty as a conflict of identity against identity confusion. Relations with parents play an important role in this period for development (Papalia, Old & Feldman, 1993). On the other side, in a study conducted in USA, it is observed that adolescents spend most of their time with their peers usually in settings away from home-range (Steinberg, Vandell & Bornstein, 2010); The peer group may have both positive and negative effects on adolescences;

Rejection by peers may cause social adaptation problems in young people (Papalia, Old & Feldman, 1993). Especially among girls, friendships become more intimate and supportive during adolescence (Steinberg, Vandell & Bornstein, 2010)

2.4. Children's Space Perception

The perception of space plays an important role in establishing the relations between human behavior and its environment. Rapoport (1997, p. 27) reinforced this assumption by stating that "environmental perception is important because it introduces variability (cultural and personal) and modifies the notion of a single environment with invariant properties. It is accepted that the user's perceived environment and its positive and negative qualities may be different to the planner's or designer's, and that different groups of users may have different perceived environments. "

Interpretation of the stimuli from the environment and reacting to these stimuli constitute the process of perception. Sensory organs and mental processes mediate to comprehend the surrounding stimulant. Perception, in other words, is the direct sensory experience of the environment. "Perception deals with how information is gathered and obtained, cognition with how it is organized, and preference deals with how it is ranked and evaluated"(Rapoport, 1977, p.31). People's understanding, reconstruction and learning of the environment is achieved through environmental cognition, which is a noesis through mental maps (Rapoport, 1977). According to Ittelson et al. (1974), environments have symbolic meanings and are defined and experienced by actions.

The relationship between human experience and the built environment is an issue highlighted by environmental psychology. The interaction of human-environment relationship has been tried to be explained with many different approaches. According to the transactional theory, the relationship between human and environment is the leading element for understanding the environment (Rapoport, 1977). According to

Ittelson et al. (1974), although human is not a passive product of his environment, he is in a position to act according to the environment and be influenced by the environment. Ecological theory accepts sensory organs, such as smell, taste, vision, hearing, touch, as part of the perceptual system. According to Gibson, personal senses only operates when it is stimulated through the stimuli in the environment (Gibson, 1966). Maslow (1987) emphasizes the importance of cognitive structure for perception. According to him, people's expectations and needs guide their perceptions. (Maslow, 1987).

The main features of the perception can be listed as following; Perception is individual and differs from person to person; Actions and experiences play an important role in perception; and the person receives the information he/she needs from the environment. Ittelson claimed, "perceiving in these senses is carried on by an individual from his own position in space and time and in terms of his own combination of past experiences and needs." (Ittelson et al., 1974, p.105). Perception process in children differs in comparison to adults. This is because the experiences of child are new and rare in the environment. On the other hand, children interpret their environment with a complex imagination and, compare to an adult their expectations from environment and needs are differentiate. In addition to that, the wide capacity of perception and an unlimited curiosity constitutes the unique perception of the child (Ittelson et al., 1974). Also, the relationship of children and space differs from that of adults. Children's perceptual sense and imagination are more spatial. The ability of children to recognize the environment, to be able to walk around and to be able to participate in social communication strengthens their relations with the environment. The scale of this relationship should be consistent with the child's nature and the child's developmental needs. For this reason, for children, factors like scale, security, action and social opportunities are important to perceive and use space.

"Children learn their environment in two ways. One of these is simply orientational. The individual learns to get around, first by relating himself to certain objects or fixed

reference points, then by relating objects to each other, and finally by conceptualizing space as a coordinated system of reference in which the town or city is seen as a kind of geometric abstraction. Secondly, the child learns his environment socially, in terms of what spaces are accessible to him and what kinds of activities are permitted in them" (Ittelson et al., 1974, p.194). Yi-Fu Tuan (1990) says that as human beings grow, he puts appreciation instead of direct sensory experience to realization. The most important factor of appreciation is remembering. But there are very few things in the world that a child should remember, on the other hand the child's world is filled with wonders (Ward, 1978). Moreover, a child lacks social awareness, and therefore the perception of the environment is not stained by social concerns. Yi-Fu Tuan emphasizes in Topophilia that a child lives in this vivid world from the age of around seven or eight to the early adolescence (Tuan, 1990). Since children's cognitive capacity is not influenced by social coding, the imagination is very wide and alterable. Another reason why the child's environmental experience differentiates from the adults is the scale. Furthermore, the smaller the child is, the closer the eye level is to the ground, and this emphasizes the importance of the ground texture, and pavement as well as curves and step levels for children (small enough for an adult to step on, big enough for a child to sit) (Williams, 1995). As children grow, they begin to realize the concepts of dimensions, perspective and proportion. Through these concepts, they realize that the world they see also exists for others as well as for them. Thereby, space becomes an abstract concept or idea for them, apart from the experiences. However, until adolescence or beyond, the child is unable to fully comprehend this formal operational concept (Ittelson et al., 1974).

Tuan (1979) indicates that the scale allows the child to feel safe. Large objects mean less to a younger child than small ones (Tuan, 1979). It can be asserted similarly for the space perception. Small children, for example, are less enthusiastic about public places than older children. Because public spaces are not generally suitable for children scale, and therefore young children do not feel themselves comfortable and in a place that fits their size (Tuan, 1979). As the children grow, they are more

concerned with the geographic notion of the place and look for a suitable space for their own scale. For this reason, they prefer to play on the nook of the garden or under the stairs, on the balcony or on the narrow streets. They try to create special places for their own, belonging to themselves and their friends, because most of the world around them are 'spaces of adults'. Certain studies claim that, older children can define the geographical context of the space (Williams, 1995). They not only explain people's actions, but also tries to explain the function of the space. On the other hand, younger children can say little about the social and economic importance of the place; they interested in the people in the environment rather than the physical environment itself (Ittelson et al., 1974). The child's geographic horizon expands step by step as the child grows. The child's interest and knowledge first focus on small spaces, then he begins to grasp the neighborhood, the city, and later the foreign places and regions. Children at the age of five to six years are more curious about distant geographies (Tuan, 1979). However, in highly urbanized context, their mobility is often restricted by their parents (see, e.g.; Wooley & Sanders, 2005). Because they perceive people as more meaningful, for children, social content is very important in perceiving physical space. As well as physical and psychological comfort, children's requirements and goals also influence their perception of space. "Objects or places in the environment take on a different meaning for a child compared to those espoused by an adult, partly because of the different scale at which they are viewed, but partly because they derive a significance through use in play. For example, adults typically view urban trees and vegetation as part of landscaping and visual amenity. The child at play, however may view a tree as a resource -something that is to be climbed, or employed as a surrogate set of cricket stumps, or as a reference point etc. Sometimes the most nondescript of objects in the adult world become empowered with a significance as landmarks in the child's environment." (Williams, 1995, p.133).

For children's environmental perception, street use and the demand of the child is crucial. According to Piaget, the child's activity is the investigation of the world. Piaget claims that the individual has formed and give meaning the outer world by his

own activity. However, the child should explore to understand the outside world. Piaget suggests that if the child is given the chance to explore and actively manipulate his environment, he/she will better understand the functions of the outside world. And thus, environmental experience plays an important role in the development of motor and cognitive skills (Bjorklid, 1982).

As children's cognitive systems develop, their knowledge of the world also changes. Miller (2002) illustrates the knowledge of spatial information as an example. While infants grasp their close environment with practical information such as far, close, down and up, an older child with more advanced cognitive development can produce a more abstract cognitive map of relations between objects around his environment. While infants recognize the place by crawling, older children can comprehend the environment by manipulating mental symbols.

In both cases, there is a continuous interplay between the individual and the outside world. Piaget (1929), on the other hand, asserts that spatial experience is constantly filtered by the child's comprehension, and that the child acquires experience closer to reality as his cognitive abilities develops (Miller, 2002).

The perception of space, that has been experienced or arranged, in the first two years of the child has not yet reached the stage of envisaging. The concept of representational space in the child starts at about two years of age (the preoperational period) and become competent form only in the ages at around twelve (the concrete operational period). Re-envisioning is not only a recall of spatial action but also an internalized action embodying symbolism. At the end of the preoperational period, the child gains the ability of mapping, and in the formal operational period, the reference system in the child develops. In this period, children are capable to do mappings and topographic presentations describing roads, routes, places and objects, and to re-envision the space in the mind (Akarsu, 1984).

Piaget (1929) says that according to the child a space consists of separate layers, each with different characteristics. He defined the three main features of space as the topological, projective and Euclidian space relations.

The topological space relations in third dimension include the relationships of proximity, separation, order, enclosure and continuity. Before the child develops Projective and Euclidean space relations, he begins to develop basic relations such as closeness, separation and order. These topological relations are the basis for the concept of space. Proximity is the most basic space relationship that can be grasped by perception. Perspective, reference system, size or distance protection is not seen in topological space relations (Piaget and Inhelder, 1956,).

Whilst topological relationships are concerned with the properties of objects, projective spatial characteristics are concerned with the wide-ranging relationships of objects from different perspectives. There is more than one reference system in projective space relations. **Projective space relations** also include the shapes of objects, their position in relation to each other, the distance between them and the perspective (Piaget and Inhelder, 1956).

Euclidean space relations based on a reference system and are formed by the development of complex perspectives. When children can make connections between the different objects and places, the development of this system is completed (Piaget and Inhelder, 1956). The child understands that the representation of objects may vary with the different reference situations. In this way, the child begins to comprehend the relations between objects with perspective rules.

To put it simply, Piaget has gained three important contributions to literature about the development of spatial concepts in children. First one is that, the child's actions interfere with the environment and are first transformed into dynamic movements, then into internalized action, and eventually to operational action. Second one is that,

contrary to the common belief, spatial concepts do not only occur at the level of perception but are also acquired through the mental evolution. Lastly, when the concept of space develops in the child, first the topological space relations are reconstructed and then the projective and Euclidian space relations follow it.

Another approach defining children's space perception, Moore and Hart (1973), are influenced by Freeman and Piaget, and describe the following three reference systems: Egocentric, Fixed and Coordinated orientation systems of references.

Hart described **Egocentric Reference System** as geographical orientation which is activity oriented, is also egocentric. This reference system depends on the sensation of localization through physical motions. Children at 4-5 years of age develop understanding in the immediate district of the direction of buildings or streets. Children can associate objects and actions they imagined. Piaget argues that the child can sense the spatial relationship only between himself and another point of reference, but he cannot successfully apply three or more objects to this system (Hart, 1979).

Fixed Reference System, on the other hand, a child attains for orientation in large-scale environments, but ought to exceed the limitations of the previous egocentric orientation system. In order to learn and define the space, the child places him/herself in a position of a different reference from the fixed objects he determines in the space. These reference points are generally the child's home, school and places where he usually spent time. Fixed points are special spaces for the child and the social relationships are the predictive factor for determining these places. The reference points can be varied however; the environmental representation started to coordinate with the commence of the concrete operations (Hart, 1979)

In **Coordinated Reference System**, a child can create a completely coordinated geographical representation. Children can assemble the components of plan, select more than one starting point and create various routes between them.

The development of these reference systems based on the socio-economic structure. Piaget connects the development of the concept of space to the developmental stages of the child. Similar features can be observed among the same peers, but this generalization cannot not apply to every child. The child should be evaluated according to his period, not by his age. Moore and Young (1978) and Hart (1979), on the other hand, criticize Piaget's theory at some point. Accordingly, the theory of Piaget ignores the differentiations in children's environmental experiences. In addition, the spatial perception process of children can be affected by the socio-economic structure of the family and the society they belong, and spatial cognitions may also differ according to gender.

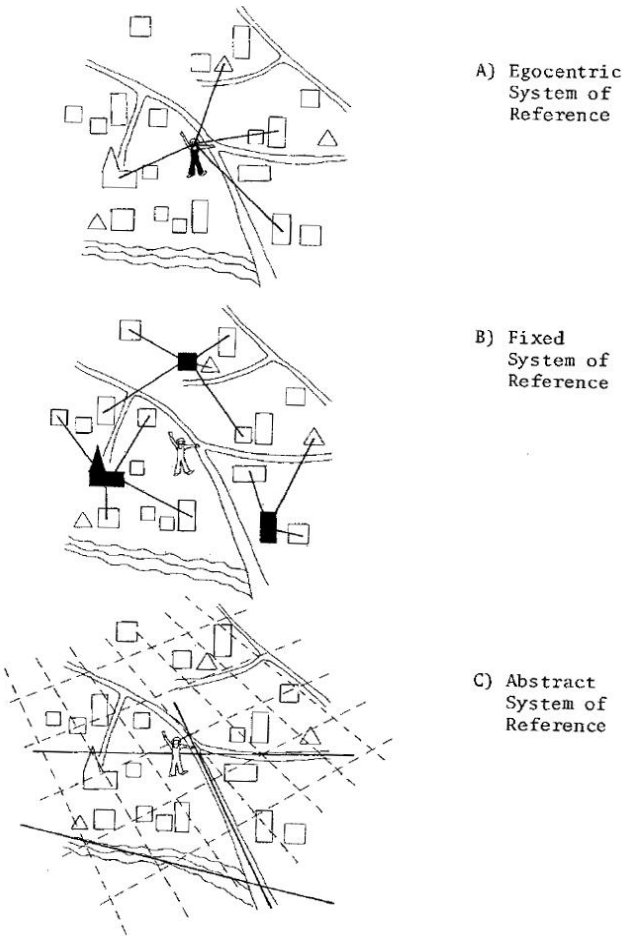


Figure 2-1 Children's Orientation in the Landscape (Hart, 1979, p.394)

2.5. Children's Learning

Illeris (2004) claims that learning consists of three different dimensions; It extends between three poles; cognitive, social and emotional dimensions. He indicates the first pole that, learning has a context of skill, and acquiring this context begins with a cognitive process (cognitive term includes knowledge and motor learning, both of which are controlled by the central nervous system).

Secondly, "learning is simultaneously an emotional process, in other words psychodynamic process, i.e. a process involving psychological energy, transmitted by feelings, emotions, attitudes, and motivations which both mobilize and are conditions that may be influenced and developed through learning" (Illeris, 2004, p.18).

Moreover, learning is also a social process that takes place in the interaction between the individual and his / her environment, and hence is a process that depends on historical and social conditions in the final analysis. Therefore, it is important to understand that this dimension has two interconnected levels: a basic social level that directly or indirectly affect interpersonal interaction, and the underlying social context that influences the character of interaction as well as contributing to the development of individuals. At the level of interaction, the social dimension is addressed to some extent within the group and social psychology and at the social level in socialization theory.

The basic understanding of learning shows that learning always consists of two integrated processes of interaction and internalization (Illeris, 2007).

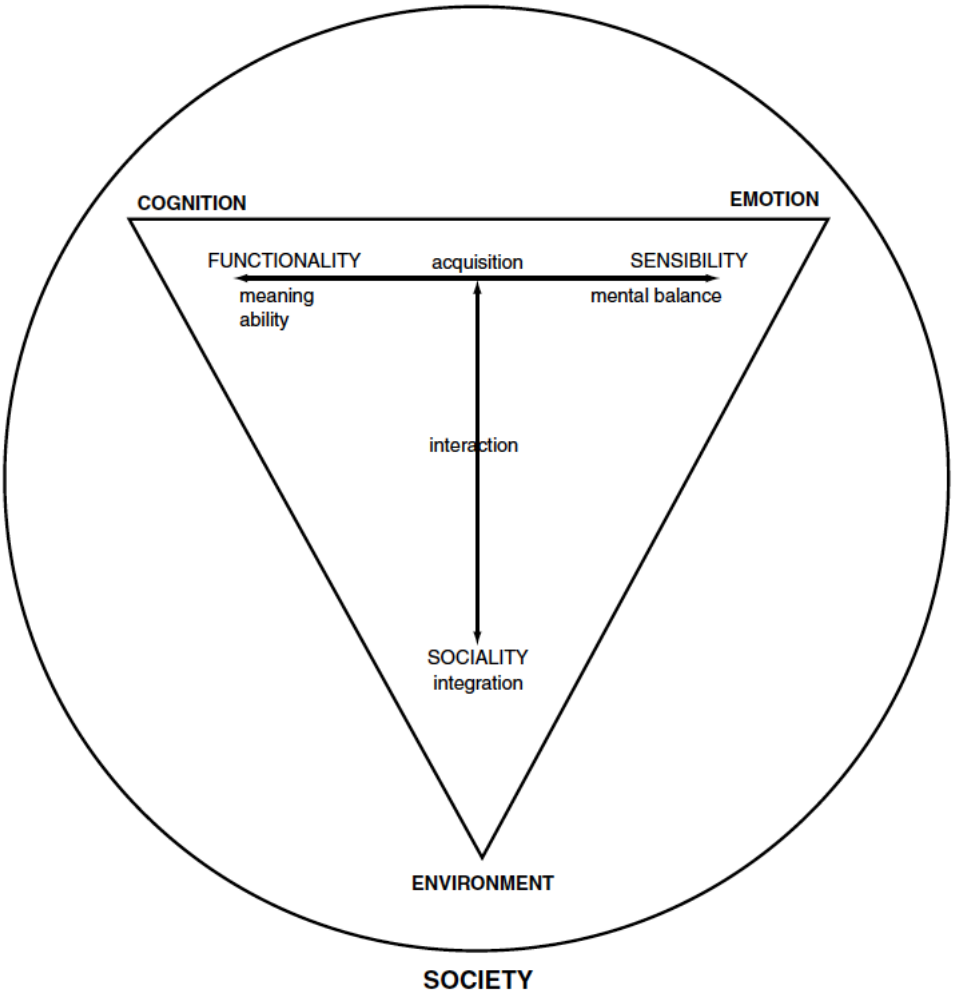


Figure 2-2 Learning process and Dimensions (Illeris, 2004)

2.6. Factors Affecting Children's Learning Process

2.6.1. Individual Factors and Experience

As previously discussed in this chapter there is a direct relationship between age (the developmental periods) and learning process. Besides, as mentioned by Steinberg, Vandell & Bornstein (2010), from the beginning of the early childhood period, it is possible to observe effects of gender on spatial cognition and socio-emotional development, can be seen in the motivation of learning. Although the learning capacity is mostly associated with child's intelligence, personal motivations, past experiences, activities also engaged in daily life have influence on motivation of learning new

things or academic achievement; children learn through adventure & risk-taking, exploration, role-modelling, in short they learn through their individual experiences (Derr, 2002)

2.6.2. Social & Parental Factors

The child's social environment and the promotion of their family are also important factors in learning. As previously mentioned in this chapter, children take their families, teachers or friends as role model in their developmental periods. In this respect, it can be predicted that a child whose family reads a lot will be eager to read books, because the child learns by imitating his or her family members. Besides, children who are appreciated or encouraged by their family or social environment, become more self-confident and willing to achieve more difficult tasks and are more enthusiastic to learn new things (Stipek & Gralinski, 1996).

2.6.3. Physical Environmental Factors

The physical environment has an impact on the child's developmental process (see, e.g., Parke, 1978; White, Kaban, Shapiro & Attonucci, 1976). This is especially valid in early childhood period, in which children have limited control over their environment and spend much of their time engaged in interaction with the physical, rather than the social, environment. For children in the early childhood period, who are trying to enhance their motor skills and movement, the immediate environment is the major mediator of learning. According to David & Weinstein (1987), environmental experiences of early childhood continue to be effective in late childhood, adolescence and even adulthood. Besides, Ittelson et al. (1974) notes that, a stable environment that allows children to relate certain physical qualities of the world to particular behavioral expectations greatly facilitates role learning.

It is obvious that there is a direct role of physical environment on children’s learning. The author discusses these details more in chapter 3.4.4.

2.6.4. Summary of the Factors Affecting Children's Learning Processes

Based on previous theoretical discussions, factors affecting children's learning processes can be listed as: i. Individual factors (perception skills, age, gender) and experience of the child (touch/hear/see, trial and error, play/movement), ii. Social and parental factors, iii. Physical environmental factors (both design of the environment and nature/outdoor environment). In this context, this thesis focuses mainly on physical environmental factors and their impacts on children's cognitive and social learning skills.

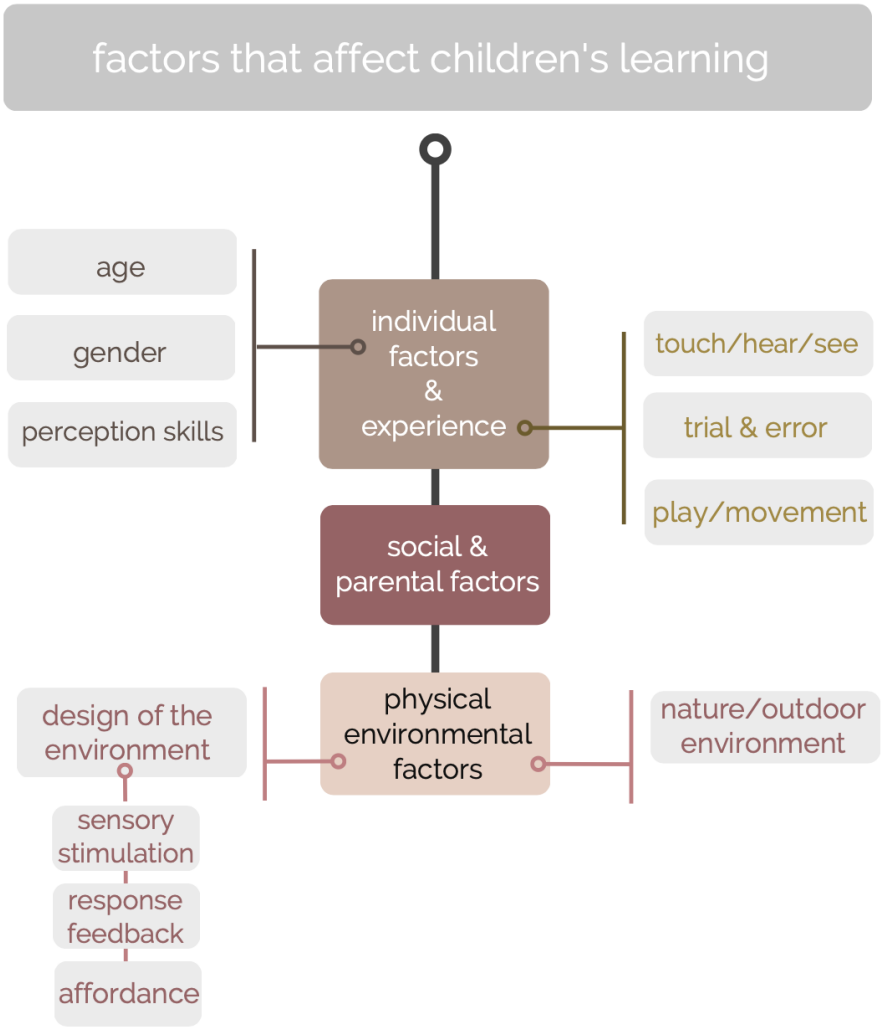


Figure 2-3 Factors that Affect Children's Learning

2.7. The Role of Urban Public Spaces in Children's Behavior and Learning

As it will be discussed in the following parts of this thesis, it is known that play is the fostering factor for children's learning and development. Both indoor and outdoor play environments, accordingly, is very important to shape children's behavior and learning abilities. On the other hand, outdoor spaces are considered the best play environments for children's learning. Because, these areas have opportunities that are not included in the interior spaces and contribute to the children's learning with the affordances that the outdoor physical environment contains. It is not only just because of the environmental affordances but also the social interaction and observation opportunities that outdoor spaces provide. For this reason, it is important to think about outdoor spaces for children. More particularly, these open spaces will be more meaningful and useful when they contribute to children's learning (Acar, 2014). On the other hand, children learn their environment through physical movements (walking, running, climbing, jumping, seeing, etc.). Therefore, the importance of spatial diversity should be considered in order to increase the experience for children's spatial learning.

2.7.1. Children's Behavior in Urban Public Spaces and The Importance of These Settings for Children's Learning

The environment consists of two main components: physical environment and social environment. Since 1950, developmental psychologists have emphasized the environment as an important factor on human behavior. Lewin (1944), the first psychologist who emphasized the ecological approach, described the environment as the whole of the fields governing human behavior. He describes the living space as "a function of the interaction between the human and his environment". Surrounding environment of children plays a vital role on their development and learning (Deutsch et al. 1967). Particularly in the early childhood period, environment and place experience significantly affect children's learning capacity and development (Bloom, 1964). Marcus & Francis (1997) claims that "children are more deeply affected by the environment than other age groups". From birth, the stimuli that infants receive from

the outside world affect their physical, cognitive, social and emotional development and learning, hence it is not a chance to think separately the human being from his environment (Marcus & Francis, 1997). An individual is the focal point of his environment as well as an element of it. In other words, the individual is both affected by his / her environment and at the same time affects the environment; which shows that the environment and behavior have relations with each other, and the physical environment influences the children's behavior and learning with the affordances it possesses (Loebach, 2005). According to Piaget (1964), children are active participants of the learning process. As Loebach (2005) indicates, childhood is a period of active and continuous learning, which is initiated and managed by children whilst influenced by various environmental factors. Therefore, it can be said that in childhood period the environment's role is very important in child's learning. Children conduct outdoor activities in accordance with their objectives and the environmental affordances, and so learning is carried out as a result of these activities (Acar, 2014). Children socialize in consequence of their experiences in the physical environment (Stine, 1997). Therefore, the importance of open public spaces for children should be taken into account and it is necessary to design these environments with non-standard equipment suitable for different activities and providing learning opportunities.

Acar (2009) clarifies that the experiences between children and environment consist of three different types of use; "These are direct, indirect and symbolic or imaginary. The formation of personality and character in childhood is connected with these three levels of experience and the three modes of learning in childhood (cognitive, emotional, moral). Cognitive development refers to thinking and problem solving skills; emotional maturity focuses on the emergence of feelings and emotions; moral development emphasizes the appearance of values, benefits and moral aspects. The three types of experience contribute to the cognitive, emotional and moral learning modes of children". According to Acar (2014), only direct experience offers the most opportunities, because it allows learning by touching, seeing, hearing and experimenting. Children require actively use and explore the environment in order to

learn it, which reveals the relationship between the movement and learning (Stine, 1997). According to Stine, movement is crucial both for learning through perception of the environment and the child's physical development; however currently, children mostly spend their out of school time at home. He emphasized that even the access type to the school has changed by comparison to one in the past, which shifted from on foot to school buses or private vehicles; and gives a reason for this as protective behavior of families, the distance between home and school, security and comfort issues. On the other hand, it is crucial to compensate the interaction of children and environment that is lost during the new ways of transportation. In order to ensure this, children need areas that they can use directly in their out of school times.

2.7.2. Children and Play

2.7.2.1. The Concept of Play

Since the child starts to communicate with the outside world, and the perception of space begins to emerge, playing become very important in terms of the child's cognitive, physical and psychological development (Frost, Wortham & Reifel, 2001). According to Frost et al. (2001), play can also mediate for children to experience the real life; Play is a way of learning for the child and it allows the child to improve his or her abilities and creative potential. It develops the linguistic, cognitive, social-emotional and motor skills of the child in each developmental period; Play provides learning opportunities through experience and experimental knowledge that is essential throughout children's lives (Malone & Tranter, 2003). Learning can be performed permanently by virtue of the play; in other words, children learn physical and social environment around them through play (Kiper, 1999). Frost et al. (2001), also emphasize that play impels children to problem solving; Further to that, cognitive games allow children to explore, understand and interpret the environment. The purpose of such games is to lead players using their problems solving skills, selecting, constructing, investigating and finding new things; For this reason, cognitive games can be defined as a kind of informal education method (Malone & Tranter, 2003). Beyond solely being an entertainment activity, play is a process in which children can

challenge their abilities, develop creative thinking, and provide learning (Frost, 2001). Play contributes to a number of developmental qualities such as communication, collaboration, imagination, problem solving, creativity, taking responsibility and so on (Malone & Tranter, 2003). According to Moore, Goltsman and Iacofano (1997), the category, quality and variety of play environments specifically influence the type, quality and variety of children's play.

Malone and Tranter (2003) declares that, through the play, children learn by experience, not by being taught; children learn to research, to discover, to success and failure by experience. In addition to this they suggest that, as the age groups increases, children are more easily integrated into social participatory games. From this point of view, it can be said that the level of social participation of the child is parallel with his/her cognitive development. Optimum play environments for children should be produced based on the children's play needs, and social, physical and cognitive requirements for different developmental periods. Clashes and disjointedness usually occur in crowded environments or when play materials are restricted; Indeed, even in play environments with sufficient space, the absence of adequate play materials restrains children's play alternatives and increases the levels of distress and aggression on them; It also causes to insufficiencies in social, physical and cognitive development (Malone & Tranter, 2003). According to the studies keynoted by Malone and Tranter (2003), children find the more complex play environments with higher levels of difficulty and innovation more attractive. In addition, alterable and moldable play environments provide children more chances for environmental learning.

2.7.2.2. Types of Play

There are different categorizations for play in literature. As stated in several academic studies based on Parten's scheme (1932), there are solitary (singular) play, spectator play, parallel play, associated play and cooperative play. Some of these play types like associated play and cooperative play are defined as ‘social play’.

Solitary (singular) play defines a separated play from other children, A physical distance (at least one meter) or playing facing back to others regularly isolate the child from other children's activities and behaviors. Children play alone with their own toys.

Spectator play defined for the situation that children watches others playing but without joining in. One example to this type of play is observing and role playing of others.

In **parallel play**, children play freely of others despite the fact that they are in closeness, even though their play accompanied by others, children do not play in association. Children may continue to play on their own, but they sit beside other children and may be using the same toys.

Associated play identifies more conversable relationship more than former ones; Children play in similar actions with others. Play equipment are shared or traded and communication is established at a certain point but the common goal is not settled for the activity.

In **cooperative play** children share an objective or reason to attend in a social action, the group act in organization (Parten, 1932; Rubin, Watson & Jambor, 1978; Malone & Tranter, 2003). It is the highest level of social play where children play in groups and everyone is cooperating to achieve a common goal.

On the other hand, for 'cognitive' categorization of play, Smilansky's classification scheme, which takes Piaget, Bühler, Valentine and Isaacs as a background (Takhvar & Smith, 1990), overlaps at some point with the Parten's categorization. This hybrid categorization is consisting of Functional/Locomotor play, Constructive play, Symbolic/dramatic play and Games with rules/cooperative play (Ethier, 2017).

Functional/Locomotor play (or **active play**) is comprised of simple repetitive muscle movements with or without objects (Takhvar & Smith, 1990) and requires gross motor skills such as running, jumping, climbing, riding, digging and other use of large muscles (Ethier, 2017). In outdoor playscapes, activities using the natural elements such as rocks, logs, shrubs, dirt, and trees to manipulate physically by moving, digging, jumping, running, or climbing can be included in functional play (Fjortoft & Sageie, 2000).

Constructive play (or **manipulative play**) is defined as "manipulation of objects to construct or create something" (Takhvar & Smith, 1990, p. 113); and goal oriented (Ethier, 2017). Children use their imagination to create play objects; and throughout this creation process, they learn to solve problems, collaborate, and explore many different possibilities using their creativity and communication skills (Daly & Beloglovsky, 2014).

Symbolic/dramatic play is "the substitution of an imaginary situation to satisfy the child's personal needs and wishes" (Takhvar & Smith, 1990, p. 113). It can also be described as fantasy or imaginary play. (Ethier, 2017) In this way of play, children can produce and play scenarios as regards different roles and spaces; natural objects often become or represent other things depending on the child's imagination (Daly & Beloglovsky, 2014). Dramatic play leads children to use and enhance their physical, cognitive and social skills in carrying out a play theme (Frost, Wortham & Reifel, 2008). Moreover, in this play type natural elements as rocks, logs, trees, sticks and leaves enables children to more involve in creative plays that all age groups and abilities participated in (Bell & Dyment, 2006).

Games with rules (or **cooperative play**) can be conceptualized as "the acceptance of prearranged rules and adjustment to these rules" (Takhvar & Smith, 1990, p. 113) In this play type children leave from solitary or parallel play to the collectively working towards a common goal play (Kuh, et al. 2013).

Woolley and Lowe (2013) found that different playgrounds provide different forms of play: constructive play with loose and natural materials; Fantastic play in natural areas containing various elements; Smaller or more private space provided opportunities for more social interaction. On the other hand, Coffin emphasized that "Different types of play are not mutually exclusive but overlap: for example, building a den may involve construction (creative play), but also planning (intellectual), climbing, balancing, and sawing (physical), co-operation and discussion (social)" (Coffin, 1989, p.4). Woolley and Lowe (2013) noted that natural open spaces for more and various games provide more opportunities, while parental control playgrounds only contribute to the physical and social aspects of the play. Zamani (2012) contributes that natural elements afforded creative and constructive play opportunities, which improves the cognitive development, more than the manufactured play products; According to these, an outdoor playscape provides a variety of play, learning and developmental opportunities for young children.

2.7.2.3. The Importance of Play for Children's Learning

Play is a method for learning for children; It advances cognitive, physical, social and emotional improvement and offers the fundamental conditions for youngsters to develop and learn (Bento & Dias, 2017). Bento & Dias (2017) claims that play supplies children critical accomplishments, for example, to cope with problems and take care of issues, think innovatively, gain knowledge, collaborate with others, gain a more profound awareness about themselves and the world. They agreed that, for children, the chance to participate in unstructured play since an early age, in which he/she can choose what to do with whom and how, is very important in order to advance his/her self-esteem, self-confidence and independence. In addition, pediatricians assert that all the play types act an important role in easing the learning process; The most effective way for a child to acquire knowledge is practical rather than theoretical education, and plays give chances to such processes. (Loebach, 2005). Many philosophers of the developmental psychology confirm that situation with the following words;

> Dewey: "*children learn through experience*"; Piaget: "*children learn through actions on concrete objects*"; Keats: "*Nothing ever becomes real until it is experienced*"; Whitehead: "*From the very beginning of his education the child should experience the joy of discovery.*" Schiller: "*As for art, so for play, freedom is entirely necessary*." (Bruya, 1988).

Contingent upon the type of play, activities, repetitions and observations both help the physical development of a child and make a big contribution to his cognitive and social development; During the play, children ought to avoid the intervention of their parents (Acar, 2014). Children discover new things, imitate adult behavior, test their capacity, and thus expand their world when they are free in their games (Loebach, 2005). Numerous studies have shown that play has crucial implications for child development and learning; From the perspective of environmental design, play is an exceptionally valuable activity for children and it is also necessary to design suitable, sustainable, preferred and durable areas for children with good quality which contributes to the development and learning of children (Acar, 2014).

There are three fundamental classifications of play in connection to child development; The first category is the relation of play and physical (motor skill) development; This category consists of activities that develop child's body such as running, climbing, jumping, crawling and swinging (Malone & Tranter, 2003). This relationship is important in terms of gaining strength, agility and durability in relation with bone and muscle development and improvement in coordination skills in children; Playing on settled structures, taking part in organized games and utilizing free materials are some prominent features of motor skill development activities (Acar, 2014).

Another category is the relation of play and social development; Collective games allow children to share, collaborate, learn to respect different opinions, express their ideas, feelings and needs without mediating by an adult, which affects social and emotional development (Malone & Tranter, 2003). Children learn to interact with their

peers and develop a character through interactive games; Such games enable children to get the social aptitudes and emotional prosperity required for development (Acar, 2014).

The third category is the relation of play and cognitive development; Children find, investigate and build up a comprehension of nature around them through play (Malone & Tranter, 2003). By trial and error, they learn how to build or make new things with free materials. Activities like observing and connecting with nature, investigating surrounding environment, taking part in creative activities (pretending, drama, dream) intensify the cognitive development of children (Evans, 1997). By way of their investigation and experience of the social, physical and common habitat they become acquainted with patterns of life (Malone & Tranter, 2003).

The play experience is accepted as the center of cognitive, social and emotional development in children. According to Piaget (1956), practical knowledge precedes theoretical knowledge; and children first discover and then learn a phenomenon. He agrees that it is the learning process of the child; The child can learn and develop his/her abilities by playing in the playscapes (Piaget, 1973). He asserts that development of children's learning capacity is originated from stimulating attention, experimentation, imagination and play.

Play provides children physical, social, emotional and intellectual gains. Brown (2009) argues that play is a practice for the child's physical development, exercise for emotions, and the training for the mind. Spencer and Blades (2006) claims that children learn through adventure plays, risk-taking and exploration. Moore explains the term of adventure play "to describe activities where the environment is manipulated or acted on in some way by children activities generally regarded as having a high developmental value" (Moore, 2017, p. 48). Additionally, by taking his parents, teachers or older fellows as a role model and imitating them, children learn

the social roles and get ready for the real life (Kiper, 1999). Through the play, social adaptation develops; it is “an education for the public self” (Eberle, 2014).

Bergen has argued that the play is a mediator for learning at any age, because many features of the play develop the learning processes. According to him, “All human beings are active seekers of knowledge, and play is an integral facet of this ongoing quest. The pedagogical value of play does not lie in its use as a way to teach children a specific set of skills through structured activities called ‘play.’ Rather, play is valuable for children primarily because it is a medium for development and learning” (Bergen, 1988, p. 8).

Bergen (1998) developed a relationship between play and learning as following:

1. Play serves as a communication channel between children.
2. Play enables children to explore different materials, and experience them with creative techniques.
3. Play helps children develop and strengthen their language learning skills.
4. The risks taken in the play and the gains acquired as a result of these risks help the child to develop self-confidence and to improve his / her enthusiasm for dealing with difficulties.
5. The play allows children to feel strong enough to convey their strong ideas and to produce exciting effects.
6. Playscapes are the most appropriate learning environments where children can function and develop naturally; they can ease specific types of learning and help children to construct a knowledge.

In brief, according to the behaviorist and cognitive learning models, play - the activity-based, open-ended social learning process (Roussou, 2004)- mediates children to learn the practices about the surrounding world and the social roles in society; enhance the problem-solving skills of children, prove their rule making or rule breaking abilities by taking risks; and thus play implicitly promotes them to become more eager to

learning; ease their adaptation to school; and help them become more self-confident (Bergen, 2009).

2.7.2.4. The Importance of Outdoor Play for Children's Learning

Play in every environment but especially in outdoor spaces, has a critical role in healthy development and learning of children; The reviver characteristics of the outdoor environment accommodate various favorable circumstances for play (Stephenson, 2002). The outdoor environment can be portrayed as an open and continually evolving setting which provides socialization opportunities, cognitive and behavioral development under favour of taking risks, and connection with natural elements (Maynard & Waters, 2007). While playing outside, children take advantage from sunlight, nature and fresh air, such conditions promotes bones development, healthier immune system and physical activity (Bilton, 2010). The outdoor environment's evocatory elements such as sticks, rocks, flowers, soil and water and so on, catch children's concentration and interest, and lead them to explore beyond (Dyment & Bell, 2007). Natural elements are boundless materials, that can react to children's creative ability and necessities (Maynard & Waters, 2013). With the recreation process by meaning new attributions to objects like that a stick can be a weapon, a watercraft or a pen, children's cognitive abilities such as critical thinking, imagination and so on is triggered; Besides natural elements are more affordable rather than fabricated toys (Bilton, 2010).

The investigation of natural components is likewise vital to catch children's attention regarding the fruitfulness and decent variety of nature; the outdoor environments encourage the level of attention become higher (Martensson et al., 2009). Assuming that people are more rigorous and respectful about the elements that they value, it can be said that promoting the feeling of belonging and familiarity to the nature that will be developed from the childhood is very important in terms of generating ecological and sustainable behaviors and perspectives that will last throughout the life; Therefore, it is important to promote the sense of discovery and admiration that leads to the

development of an emotional connection to the environment (Bento & Dias, 2017) Through outdoor play and discovery and manipulation of natural elements, mathematics, science or language can be learned in its broadest sense; To illustrate, with an empty shell child can discover the concepts of volume, weight and time during the act of fill and empty the shell with water, soil, etc. (Sumpter & Hedefalk, 2015). In addition to correlation with learning abilities, it is also believed that interaction with natural elements, such as soil, strengthen the children's immune system; in other words, contact with a number of microbes found in the outdoor environment seems to help children to strengthen their immunity against diseases. (Haahtela, 2017). According to researchers, children should spend at least 2 hours of the day in outside; because children who spend longer times in outdoors, in every day and in all weathers, have fewer illness and less allergic reactions than others who are mostly in indoors (see, e.g. Hendricks, 2017; Haahtela, 2017). Outside environment provides opportunities to get beyond the personal limits, such as climbing a tree or using a tool. It is very vital in child development considering the positive effects and the sense of happiness of the achieved victories beyond the existing risk factors (Stephenson, 2003). The risk factor supports the child's abilities of stability, entrepreneurship, self-awareness, and problem-solving skills. Open-air games offer children more opportunities to experience success and failure and learning through trial-and-error; The risk factor provides children learning to cope with unforeseen situations and difficulties by themselves (Sandseter, 2012).

According to Maynard, Waters and Clement (2013), in outdoor games children tend to prefer collaborative games far more than conflicting ones. This is because, the unpredictable and unusual features of outdoor environment procure the development of common goals among children likewise the development of friendship among peers. During outdoor games, children share the knowledge and skills they have with each other to cope with different tasks and challenges, which makes them both in the role of teachers and students, and this cooperation also develops children's empathy skills, and enhance their knowledge by sharing. (Maynard, Waters & Clement, 2013).

Besides, the most outstanding feature of outdoor environment is that it has opportunities for interaction; Contrary to what is happening in indoors, outdoor settings offer children more opportunity to socialize with others (Bento & Dias, 2017).

2.7.3. Children's Environments

According to Hart (1979) children's development in their daily lives are complex, unique and spatial; Even before children go through their active periods (crawling, walking, running, etc.), they discover their environment and are attracted to most of what they are able to achieve. As Piaget suggests, these early discoveries have a significant impact on how children will recognize the world around them (Piaget, 1979). One way to understand the impact of space on children's development and learning is through scale; The scale provides a context in which different types of spaces and environments can be integrated and well understood (Bell, 2006).

The cognitive aspects of the relationship between space and scale have been studied by many environmental psychologists; According to their scales, the physical, cognitive and perceptual effects of the space on the individuals differ; Relatively large areas require different mechanisms from smaller areas (Egenhofer & Golledge, 1998; Freundschuh and Egenhofer, 1997; Garling and Golledge 1989; Montello, 1993). For example, if an object is hidden on a messy table, the person who wants to find it can move the objects around it; In a larger area, for example, in a university campus, the individual will have to move around in the space and have to take position his/herself according to that object in order to see that object hidden by other unmovable objects like buildings. Thus, actions for the same purpose in places of different scales, result in different behaviors (Bell, 2006). Children also interact with spaces of different scales in various situations. Piaget and Inhelder (1956) summarized cognitive spatial development based on the relationship between child and space; Accordingly, space affects the cognitive development of the child. In addition, the scale plays a role even in the earliest development period of the child on the spatial interaction between the child and its environment (Piaget & Inhelder, 1956). On the other hand, while larger

objects attract more attention of younger infants, older infants (after 8 months) tend to be more interested in smaller objects (Newman, Atkinson, Braddick, 2001). Although this research is related to objects, it explains that perceptual and relative magnitude causes behavioral differences even among very young children; Therefore, it is possible that there may be differences in behaviors based on scale and spatial dimension in each developmental phase of children and in different contexts. The type of interaction that a space provides to the individual plays an important role in how children (and adults) build mental representations - cognitive maps - of space. These interactions are differentiated intuitively according to the size and scale of the space. (Ittelson, 1973). This interaction is used to distinguish the space categories as following; "Can the space be entered? Or is potential interaction limited by its size? If interaction is limited by something other than size the possibility of interaction might still be enough?" (Bell, 2006, p. 21). The spaces which are characterized to produce qualitative differences with their dimensions provide different frames of reference, spatial relations and internal representations (Tversky, Bauer, Franklin & Bryant, 1999). This was confirmed by a study that required two different experimental groups with equal numbers of seven and nine-year-olds to learn and remember the locations of a series of geometric objects located at different scales in the same space; In the experiment carried out in two spaces that differ only in size, one was a large playground and the other one was a desktop, children tested in the large area have been more successful in remembering the location of objects than the children tested in small area; When they were asked to define verbally the location of objects, the children defined a larger area used more spatial terms, and based locations in a wider range of frame of reference (Bell, 2002). "In particular they used environmental features other than the experimental objects in the space. Even though the boundaries of the spaces and surrounding features were identical and in similar relationships with the experimental space and objects these items were not included in the descriptions of the small space" (Bell, 2006, p. 22). According to Bell (2006), this shows that children who try to remember objects in a larger area use more spatial knowledge than children who are trying to complete the same task in a smaller space; In other words,

children have developed different strategies to explore, interact and solve problems in different sizes of environments. To sum up, the scale is an important variable to be considered when examining the relationship between environment and cognitive development and decision making of children. The development of spatial skills involves abilities of using the space effectively, solving problems or performing meaningful activities (Risotto & Giuliani, 2006). A child's learning and developing knowledge store correlated to functional meanings of the space and its potential usability (Hart, 1979). Spatial information is combined with social information; Children learn different behavioral environments, human behaviors in society, social participation and help by experiencing their environment (Björklid, 1982; Moore, 1986). Thus, they become aware of the social, physical and behavioral differences that people in society represent; "they develop normative expectations about social life and social forms" (Siegel and Cousins, 1985, p. 361).

2.7.3.1. Children and Built Environment

The children built environments can be sorted as the homes, neighborhoods, schools, and special-care environments. All built environments have opportunities for children's development such as strengthening their personal identity; promoting the development of competence; providing opportunities for growth; developing security and trust; enabling both social interaction and privacy (David & Weinstein, 1987). On the other hand, it is the surrounding of the house (the front street or the neighborhood) where the child provides the first contact with the outside world that having the most stimulating properties (Leventhal & Brooks, 2000). Neighborhood is one of the most important environment affecting children; the neighborhood is more than a physical environment, it identifies a social universe for children (Proshansky & Fabian, 1987). Gehl (2011), On the other hand says that "children stay and play primarily where the most activity is occurring, or in places where there is the greatest chance of something happening"; Especially the outdoor spaces along the streets and houses, public buildings, workplaces etc. that are quite narrow and suitable for pedestrian traffic with close-range buildings (Gehl, 2011). The street is a place to learn about these rich with

stimulating environmental properties like nature, sun, wind, rain, climate. According to Carr & Lynch (1968) for children, streets are where interesting things happen with no borders have been drawn (Carr & Lycnh, 1968).

2.7.3.2. Children and Natural Environment

Many studies have shown that children find natural areas quite attractive; because these areas address children due to their variety and the feelings of timelessness values (White & Stoecklin 1998). Moreover, children, who have not adopted yet to the man-made and adult-scale world, instinctively prefer the natural environment rather than the built one (Barrows, 1995). In fact, in the memory of most adults, natural or external environments take place as the most valuable place as to their childhood (Sebba 1991). Natural environmental experiences also have cognitive and psychological benefits; Even the existence of a tree near their home has been found to improve children's cognitive abilities (Wells, 2000). Besides, as mentioned in the previous parts, playing in nature has positive effects on children's socialization, concentration, motor and learning abilities (Fjortoft & Sageie 2000). Spaces that allow direct contact with the natural aspects of the environment, including vegetation, soil, people and animals, have particular importance to children because these spaces help to improve the sense of place in the child; these spaces identify with areas of immediate access which enhance neighborhood participation and sense of ownership (Malone & Tranter,2004; Moore & Young, 1978).

In addition, according to studies of Wells & Evans (2003) focusing on the relationships between green spaces and children's behavior and welfare, children with more natural elements near their homes have lower scores than the children with less natural elements near their home, in the criteria of stress, behavioral disorders, anxiety and depression. This shows that children who are in close contact with natural elements are less psychologically distressed and more emotionally delighted (Taylor, Kuo, Spencer & Blades, 2006).

Motivation is an important factor in the perception of the environment, and so implicitly in the child's learning. The outdoor environment provides an important source of motivation for the perception of space (Kiper, 1999). Children should be able to conduct their own experiments and their own research in the outdoor environment. Although the child can be guided by parents or teachers, he must reconstruct or reinvent himself in order to learn something new; Exploration, production, restructuring, are important activities for learning (Kiper, 1999).

2.7.3.3. Learning Environments

There are two fundamental activity classification in the concept of learning environments. One of them is the formal activities carried out by teachers within the boundaries of the school curriculum, and the second is informal activities carried out by the children at its option (Tranter & Malone, 2004).

Both of the two class provides support to the physical, cognitive, social and emotional development of children (Loebach, 2004). There are activities for children to develop their physical development and skills according to their abilities in the learning environments that are performed outside the children's play activities; areas of observation, exploration and adventure that contribute to their cognitive development; Areas to develop new creative potentials and help promote new products; areas to support their social-emotional improvement and give them the opportunity to gather with peers in society; and areas to make an understanding about nature events, living organisms and environment (Acar, 2014). Environmental education includes information, awareness, advancement, balancing, actuator processes and creation of human behavior towards these processes; It also aims to identify and discriminate the social and biophysical environmental values (Güler, 2010). It is emphasized that a successful environmental education makes children to live more responsible, more knowledgeable, more experienced, more participative, more capable and more conscious (Acar, 2014) Children education and environmental education accords with each other (Davis, 1998). The knowledge and habits that a human acquired in

childhood will affect the adulthood. Moreover, getting in touch with natural elements such as water, sand, mud, fallen leaves, and creatures like birds, ants and etc., helps children to create a bond between environment and themselves; and improve a responsible and sensitive approach (a consciousness) to environment. At this point, it is a necessary thing for adults to provide such chance to children (Davis, 1998). The most effective and persistent kind of learning is learning through experience. In the same way, learning through touching, hearing, seeing and experiencing the outdoor environment is vital. Martin (2008) indicates that human beings have intense commitment to the environment that they contribute to its formation. In this way, the consciousness of environmental protection develops better, and harmful or fecklessly behaviors against environment are reduced (Acar, 2014).

Uzzell (1988) claims that, the environment with affordances to climb or hide under the elements, or features which are manipulative or shapeable, are perceived, used and converted in different ways by children at different stages of their development. Therefore, there is also a developmental relationship between the environment and children. The use of the external environment increases with the age of the child, as well as their cognitive, physical, emotional and behavioral capacities (Uzzell, 1988).

Wohlwill & Heft (1987) associate the notion affordance and the child-environment-learning relationship by using the following characteristics of environment:

Sensory stimulation: The stimulation potential of environmental characteristics due to its color, shape, pattern, size and variations in texture.
Response feedback: Areas that are sensitive to the child's actions, can be manipulated by children, providing continuous feedback about their abilities, capacities and behaviors to children (supporting and encouraging children's actions).

Affordances: Emphasizes the possibilities of action that are encouraged or allowed by environmental attributes or settings (Malone & Tranter, 2003).

Therefore, it can be said that the design and management of the environment designates pretty much the behavior and activities of children in the environment. Even the most social, creative and learning-motivated child will have great difficulty in being creative and social in a largely asphalt and concrete, sterile, and bleak place, in which there is no natural element.

For this reason, while designing, in order to trigger children's learning motivation in their living habitat, environment should be considered with features that allow the children to interact with others and their environment, taking into account the above-described criteria.

According to Titman (1994), there are four fundamental elements that can be considered for children's learning environment:

> '*A place for doing*' is providing opportunities for physical activity to children in order to expand their selves, develop new skills, find challenges and take risks.
>
> '*A place for thinking*' is offering intellectual stimulation and things that children can discover, understand and learn about it together with fellows or by themselves.
>
> '*A place for being*' is allowing children to realize to be 'individual' and to know their needs for being a child that are having a special personality in a public space, privacy, being alone with fellows, etc.
>
> '*A place for feeling*' is presenting colorful, aesthetical and interesting areas that children feel safe and care for the place and other people in it.

As Appleyard (1980) claims, because of the fact that the street is the outdoor place where most of the children spend their largest amount of time, it should have qualified features to play. According to him, these places should have diverse characteristics with different type of surfaces and enough space to play various street games that children like to take part in, can hide, can build something or play in the sand, in order to be a good place for children to play and learn. Although the backyards can meet

most of these needs, in central cities 'the street' is the only place available most of the time; 'the street' is a learning environment, on where children can learn a lot about nature through plants, trees, animals, sun and wind, as well as to learn about the social life by meeting or observing the people in the street (Appleyard, 1980; Karsten & van Vliet, 2006). Appleyard said that "Learning about the city depends on children's freedom to roam safely in their neighborhood" (Appleyard, 1980, p. 108)

In next chapters, this thesis aimed to examine the types and role of the streets in child's learning as an outdoor space, which's importance is presented and discussed in the above theoretical framework.

2.8. Physical Environmental Factors that Promote Learning

As emphasized in the previous chapters, play enhances learning for children. Children in different developmental stages engage in different types of play activities. For example, considering cognitive play types, in the early and middle childhood, constructive, exploratory and dramatic play are prevalent types, on the other hand in the middle and late childhood (adolescence), functional and games-with-rules play types dominate these periods. In case of considering the behavioral play approach, it is seen that generally in the earlier periods of childhood solitary play is prevalent. On the other hand, cooperative and associated play increases with the increasing age of children. In line with the literature reviewed (i.e., see, James,1983), the author considers that development and learning are an interactive process that proceed together and feedback each other. Play is, as to, a method for this development-learning process. For this reason, in this section, the factors affecting cognitive and social development and learning process will be determined through the areas or objects that afford the cognitive and social play types defined by the literature.

2.8.1. Physical Elements that Promote Cognitive Learning

Cognitive learning consists of two phases; 'cognitive phase' and 'motor phase'. Cognitive phase is triggered through the exploration of shapes, sizes, numbers and movement, especially until the middle childhood period. Places that include moving parts, different textures, materials, heights, vegetation and varying landform features enhances children's learning, through creativity (Zamani, 2013). As the child grows, the accelerator factors for cognitive learning also vary. Especially from the middle childhood, the opportunities that physical environment provides for abstract thinking, attention, focusing, and problem-solving abilities trigger learning of children. 'Motor phase' of the cognitive learning is triggered through the affordances that environment supports. Environment provides challenges to children to improve their fine and motor learning abilities, in each developmental period of children (Hendricks, 2001). Challenging environment forces children to improve their movement and coordination abilities. In order to improve child's physiological (motor) learning abilities, environment should allow opportunities for activities such as balancing, jumping, climbing and running. Moreover, use of sensory elements helps fine and gross motor skills through the manipulation of the materials such as sand, water, natural loose materials like mud, sticks, stones, leaves, etc., especially for children in early childhood period (Zamani, 2013).

Physical Diversity and complexity of places: Children's experience of the environment is inherent to their exploration. The richer this experience is, the greater their exploration, discovery, enjoyment, and learning of the world (Ward, 1978).

a. Sensory stimulation richness: Color, shape, surface richness to see; material and texture variations to touch; planting or vegetables for smell and taste are some of the triggering factors that stimulate child's senses to explore, and hence their learning (Hendricks, 2001).

b. Ground covers/Surfacing: Children are more in contact with the ground than their parents due to their height of eye-level. Furthermore, young people have a fine appreciation for surface details; they improvise their play in response to such details in the environment. Therefore, attention-grabbing details on the floor can enhance children's creative capacity (Hendricks, 2001). Soft surfaces can be counted as turf or natural ground covers. Some of ground cover species change according to the season, which enhances the sense of the passage of time. Some species attract small insects, which are a source of learning and excitement for children (Moore et al., 1997). Besides, soft surfaces are also suitable for constructive play behaviors like digging a hole (Zamani, 2013). Hard surfaces on the other hand, affords activities like running, sports games with balls, or motor skill activities like bike rodeos, skate-boarding, roller skating (Moore et al., 1997). Hard surfaces enable constructive, functional, games with rules play behaviors (Zamani, 2013). In addition to that, new projects, which regards children's learning, are being reviewed in this respect. For example, the grounds of school gardens are drawn by play rules like hopscotch, chessboard, mathematic games, various geometric shapes, etc. This kind of applications are also visible on the play streets nowadays.

Landform/Topography: Although flat surfaces easily provide opportunity to various types of play (such as ball and marble games), sloping lands or other spatial variations like mounds, stairs, digs can provide more amusing, creative and graduated challenging activities, as well as breaking the boringness of the flat surfaces and creating a climbing or gliding area (Walsh, 2016). Topography variations offer opportunities for rolling, running down, or sliding. Natural features such as grass and hills positively associate with children's gross motor skill; slopes in particular afford sliding, running, role-play, and games with rules. Outdoor topographic variations form physical patterns that suggest a purposeful meaning. (Moore et al., 1997).

a. Mounds, knobs, bollards, stairs, steps, sidewalk: These features provide a look point during a play (which gives sense of self achievement attained by reaching lookout point), a place for running up and over, a place to climb or sit, or balancing (Moore et al., 1997). High steps or sidewalks can work as an edging which affords a goal or an enclosure for games, a place to run handheld toys. Low steps, bollards, stairs, mounds or sidewalks on the other side afford to sit on or to walk, support balance both static and dynamic, jump over or again, a place to run handheld toys (Hendricks, 2001). These elements contribute to learning through enabling 'functional' play, and 'games with rules' play (Zamani, 2013).

b. Steep / sinuous street: Provide stimulation of orientation skills, viewing, rolling, challenging, sliding (i.e., in snowy weather) hide-and-go-seek games (Moore et al., 1997). These features contribute to learning through providing 'functional' and 'games with rules' play behaviors (Zamani, 2013).

c. Flat / straight street: Supports more games-with-rules play behavior. Provides possibilities of variety of 'games-with-rules' plays or motor skill activities such as running, skating, etc. (Moore et al., 1997).

d. Wide areas: More suitable for crowded play activities (Walsh, 2016). Wide areas, like wide street, street with front yard, or parking lot extension streets, enable 'games-with-rules' plays or motor skill activities such as running, skating, etc (Moore et al., 1997).

Variety of Behavior Settings: The formation of behavior settings arises parallel to the levels of privacy of spaces. A variety of behavior settings is necessary to foster children's learning (Hendricks, 2001). The complexity to this variety helps children to improve their range of skills, because different behavior settings allow different learning occasions. To illustrate, *open spaces* provide children activities like running or gathering with friends, learn by socializing and play at speed; *Active spaces* provide

challenging opportunities; *Quiet spaces* enable retreat of self as well as quiet exploration and learning by observation. A variety of spaces is important to fulfill different play needs in relation to the developmental periods (Walsh, 2016). Variety in size of spaces promote different social learning opportunities for children.

Table 2-2 Types of Behavior settings; adapted from Walsh, 2016

Types of Behavior Settings (Walsh, 2016)	**Open Spaces**	**Active Spaces**	**Quiet Spaces**	**Natural Spaces**
Provided Features by Behavior Settings	Support extensive movement types, and team (cooperative) play opportunities at speed.	Challenge children; by possessed affordable elements such as ramps, stairs, slides, handrails, ropeways, etc.	Consist of small spaces: enable children to retreat themselves, or to observe other children.	Includes natural elements. Provide manipulation opportunities.

Natural Environment: Plants, grass, flowers, trees, leaves, stones, soil and water, people, animals (pets), insects, natural colors, climatic factors, lighting, or variation in natural elements; Establishing a direct relationship with such natural elements excite children to recognize, learn, observe and discover the environment (Hendricks, 2001). For children, plants are the building blocks of play and experience (Walsh, 2016).

a. Trees: Excellent modifier of microclimate (creating play area by providing shade or shelter) Tree climbing gives children a sense of self achievement and improve child's 'motor phase' learning, with active play, large muscle, graduated challenge for ages 3-12; Provides variety of sensory stimulus on children with vary texture of leaves, color through the seasons, early leaves, late flowers, flowers and fruit, or fragrances (Moore et al., 1997). Besides trees enable to use tools like ropes in order to swing or movement abilities, to test

oneself' physical strength, twisting and twirling, and so on (Hendricks, 2001). Trees enable learning through 'functional', and 'exploratory' play (Zamani, 2013).

b. Shrubs: Shrubs give chance to play around, and to add creative features in fantasy play (Moore et al., 1997). Shrubs can be used for pretend play- twigs and leaves in food preparation in games and making toys, a place for hiding, potential source of insects or birds and change over seasons offering flowers, berries and different color leaves during the passage of the year, for collecting and sorting things (Hendricks, 2001). They provide learning through 'functional', 'exploratory' and 'dramatic' play (Zamani, 2013).

c. Vegetation: Provides variety of sensory stimulus on children (smell, look, touch). Provides a great diversity of texture. Adds soft, ambiguous enclosures and 'boundary' depth to play areas. Marks the passage of the seasons, teach children the seasonal facts (Moore et al., 1997). It enables 'functional', 'exploratory' and 'dramatic' play (Zamani, 2013). Vegetation has manipulative potential and provides opportunity for exploration (Hendricks, 2001).

Variety of Fixed &Loose Elements (non-living resources): Variety of fixed element in the area provides various affordance option for children;

a. Fixed Materials: This classification can contain fixed benches, shelters, shade covers, walls, fences, building facades, alternative seating, pergolas, arbors, wrought iron fence, information signboards, sculptures and trees. Such urban features may promote children to engage in fantasy play, or afford for physically challenging activities such as climbing and swinging. They may also afford for seating or just stimulate children's senses with features they have (like colors, textures, ornaments or patterns) (Hendricks, 2001). Moreover, information signboards (both can be a cultural or historical

explanation or a traffic sign) stimulate children's cognitive abilities like topological notions (i.e., a red triangle in a traffic sign) and enhance their knowledge (i.e., an information signboard on a historic building) (Hendricks, 2001).

Loose elements enable children play games including manipulating, shifting and changing, which develop children's 'cognitive phase' and 'motor phase' learning abilities by promoting mental thinking, problem solving, and concentration (Hendricks, 2001).

b. Loose materials: Things to manipulate and build up things from, can be set out as goals in the play or as bases for playing, look beautiful, for collecting, for throwing, for skipping or for making sound. Loose materials are movable equipment (can be natural or manufactured, junk or recycled), they even can be water, sand, mud or soil. These materials lead children to creativity and discovery (Walsh, 2016). They can be shifted, changed, manipulated, and enabling so loose materials add to the quality of the play (Hendricks, 2001). These materials promote learning by triggering the problem-solving skills of children. Loose materials are also beneficial to educate children about rules of nature.

Topological Features of the Designed Space: A child's first notions are topological in the mathematical sense (Hendricks, 2001). Size, shape, scale is continuity are some of the dimensions that produce a variety of spatial experiences suitable for different developmental stages. Besides, the topological relationships of designed spaces (their *scale, proximity, separation, order, enclosure, legibility* and *continuity*) influence the development of space concept for children. As it is discussed in the chapter 2.4, the presence/absence of such topological features affect children's familiarity with place, their place attachment and therefore, young people's emotional learning (Moore et al., 1997). The topological relations are the mediators for cognitive learning and the development of space perception skills of children (Hendricks, 2001).

a. Enclosure Level (Scale): As discussed previously in the chapter 2.7.3, Scale affects child's environmental perception. Children can easily grasp the topological relations in a larger space where they can position themselves in relation to a small desktop. On the other hand, because the children's perception is limited to eye height, the perception of these topological relationships in very large-scale places weakens. Such perception-related problems negatively affect children's cognitive learning. According to Speiregen (1965), in order to perceive a street as a whole, the optimum height of the building should be twice of the width of the street (see also Barlas, 2014; and Table 2.3). The 1:1 ratio of height/width creates a completely enclosed volume, while the 1:3 ratio of height/width gives the weakest sense of enclosure. If the enclosure effect of the space is weak, and the volume between buildings is hard to perceive, i.e. in large streets, children is challenged to perceive space and comprehend the spatial interactions. Therefore, compared to spaces that give better enclosure effect, children will miss the opportunities to learn the topological relations from building facades, forms or physical properties.

On the other hand, sinuous streets may contain serial vision components which provide Cullen's (1961) notion of 'sudden startle feeling'. It eases the space to leave a trace in the children's mind. Therefore, children can easily remember and visualize the space in their mind. It helps children to develop mental thinking abilities, mental coordination and therefore cognitive learning, especially in the period of fixed reference system process (i.e., see chapter 2.4). On the other hand, in a very narrow and sinuous street, it may also be difficult for children to comprehend the volume and pattern of the street and the part-whole relationship between the street and its elements.

Table 2-3. Perception of Enclosure Comparison with Vertical Angle (β), H/W ratio, and VSI; adapted from Putra & Yang (2005).

Vertical Angle (β)	H/W ratio	Spreirgen, 1965	Lynch, 1962	Ashihara, 1983	Viewsphere Indices
45	1:1	Full enclosure	Full enclosure	Balance of Enclosure	0.7071
27	1:2	Threshold of enclosure	Comfortable Enclosure	Expansive Space	0.4472
18	1:3	Minimum enclosure	Comfortable Enclosure	Comfortable Enclosure	0.3162
12	1:4	'looses' its enclosure	Enclosure ceases	Enclosure ceases	0.2425

b. Continuity

Spatial and visual continuity provided with spatial features (i.e., repetitive front gardens, facades, structure of the urban block (attached or detached), etc.) or elements (i.e., trees, vegetation, architectural features such as bay windows, ornaments, cantilevers, etc.) attract children's attention and concentration, which are the components of 'cognitive phase' of learning.

c. Proximity

According to Whyte (1980), when multiple stimulus objects stand side by side they create a synergy, a focal point which he called 'triangulation'. In this case, the proximity between the elements (which can support each other in the context of relationalities) can reinforce children's learning. Therefore, the contribution of the street elements to children's learning can be strengthened by the triangulation effect. To illustrate, a child can learn the notion of magnitude by courtesy of the proximity between a tree that he/she can climb and a wall that he/she cannot.

d. Legibility

The understanding of a space or the organization of a space can be defined as legibility (Bentley, 1985). Imageability specifically relates to legibility, as individuals are dependent on the imageability of a space to orientate and comprehend the physical features and the context of the space (Curran 1983). Legibility refers to the understanding of the layout on two dimensions: i. physical form and activity pattern (Bentley, 1985), ii. The physical components – nodes, edges, paths, districts, and landmarks – which clarify legibility (see Lynch, 1960). Individuals can understand the layout of the space and orient by taking reference from the cues of three-dimensional forms. Legibility also includes the establishment of a coherent visual and physical attribute. Especially, as previously mentioned in the Chapter 2.4., from the period of 'Fixed Reference System' children perceive, learn and define the space through referencing the fixed objects in the environment, and position him/herself according to them (Hart, 1979). Therefore, legibility qualities of the space can promote the development of children's spatial learning skills, by providing recognizable routes, intersections, and landmarks to help children find their way around.

2.8.2. Physical Elements that Promote Social Learning

Buell et al. (1968) indicated that a child's level of social play increased by reinforcing the child's use of a particular piece of outdoor play equipment. In all these studies, differences in social play were directly related to differences in play materials and not to differences in the children themselves. Appropriate play materials would serve to maximize children's opportunities to practice social and cooperative play behaviors, and therefore opportunities to learn from their peers. This social training, traditionally left to chance, could be planned so that all children have the maximum possible opportunity to develop their social skills. Play materials that set the occasion for

aggressive play, verbal behavior, sharing behavior, or competition might be used with groups of children suffering certain behavioral play deficits (Quilitch & Risley, 1973)

Natural Environment

a. Trees: afford variety of social play opportunities: can be used as an element for cooperative plays (like hide & seek) or provide shading to create gathering area under itself (Moore et al., 1997).

b. Shrubs: Provide excellent hideaway places. By functioning as a barrier, creates quiet nook areas (Moore et al., 1997). However, they may also provide a quiet place for getting away from crowd, and promoting explorative play activities (Hendricks, 2001).

c. Vegetation: Vegetation and trees can afford programmed activities. For example, such features can function as the landmarks of meeting and gathering places (Moore et al., 1997). Moreover, they may also provide quiet and secret areas for exploration.

Landform/Topography

a. Mounds, knobs, bollards, stairs, steps, sidewalk: mounds can define gathering places, support cooperative activities like hide & seek and chasing games. Moreover, multilevel structures support different body positions and variety of social interaction (Moore et al., 1997). For example, a cobblestone or street staircase can function as gathering point for group chats, by allowing children to sit on. An object or a living element, for example, a cat house, a bird house placed on a tree, which is placed on the street, may attract to children and can create an opportunity for learning. Sometimes the sounds produced by different materials which can teach children the relationship between volume and material.

b. Steep street: steep street provides seasonal opportunities both individual, a quiet observation, or with fellows; like a sliding surface in winter which enables associated play (Moore et al., 1997). Besides, because of its compelling nature, it can encourage children to play cooperative or competitive games.

c. Flat street: Allows every type of social play, children can easily see each other, plain surfaces provide more potential of interaction.

d. Wide areas: Allow for team games and social interaction (Walsh, 2016). These areas enable gathering, meeting and working, and hence are critical for increasing social interaction and supporting leadership functions. Furthermore, these areas provide opportunities for children to engage in active and noisy play, which are not allowed to be done in indoors (Moore et al., 1997).

e. Narrow areas: Allow for retreat, mostly enables isolated play opportunities (Walsh, 2016). On the other hand, intimate enclosures stimulate close social contacts. Besides, quiet spaces support quiet exploration, such as under low platforms, spaces on different levels, areas screened by vegetation (Moore et al., 1997).

Variety of Behavior Settings

a. Ground covers/Surfacing: Hard surfaced areas, like concrete or asphalt, afford to community activity, especially for cooperative play such as ball games (basketball, football, etc.). Additionally, these areas also provide opportunity for less-structured activities: bike rodeos, skate-boarding, roller skating (Moore et al., 1997). Soft surface areas (like a flat grass lawn) enable children to lay in the sun, to build up something or a game both individually or in group activity, and to talk and socialize with friends (Hendricks, 2001).

Variety of Fixed &Loose Elements (non-living resources):

a. Historical or Cultural Features: Historical elements, structures and areas are the base that children enable to establish a relationship with the history and tradition of a society. Such places or elements allow children to feel themselves as part of a community (see Sancar and Severcan, 2010), and accordingly contribute to their social learning.

b. Architectural Features:

Different structural features such as cantilevers, sheds, arcades, bay windows, balcony, etc. may become as a part of different behavior settings by creating different spaces under itself. For example, they can provide sheltered or shading playgrounds for children in rainy or sunny weather.

Safe and Secure Environment: Polluted soil, sand or water, crowded traffic or traffic danger and poor waste management, and a contaminated environment have a negative impact on children in the biological sense and have a deterrent effect on children and families to spend time outdoors and engage in physical activity (Moore et al., 1997). The pollution factor restricts the accessibility of children to public spaces (Sideris, 2003). Additionally, fear reduces children's access to outside learning areas.

Exclusionary Restrictive Policies

Although a space is full of physical facilities that promote learning, some of the adult rules may block access to these physical facilities. Some examples include prohibition signs of dousing feet or bathing into an ornamental pool, and 'don't step on the grass' warnings. In areas with such restrictive policies, the contribution of children's learning also reduces.

2.9. A Conceptual Model for Assessing the Learning Environment of Children's Geographies

In this assessment model, referring to the model developed by Illeris (2004), learning was studied by examining two different processes: cognitive and social. According to

Illeris (2004), cognitive and social learning are two sub-parameters of learning. Learning occurs as a result of fulfilling qualifications of different abilities. For cognitive learning parameters, these are mental thinking, attention, problem-solving, concentration, movement and coordination abilities. For social learning parameters these are sharing, social interaction, aggression, delay of gratification, and cooperation abilities (Illeris, 2004). The model examines the impact and contribution of the physical properties of the environment on the sub-parameters of learning. On the other hand, as aforementioned, children's learning and development are consistent processes that they have reciprocal effects on each other (James, 1983). While milestones in learning have an accelerating impact on children's development processes, learning capacity develops as developmental processes are completed.

This model explores the improving effect of physical environmental attributes on the interactive relationship between children's learning and development processes through focusing on children's sensory perception and recognition of the physical environmental characteristics (see Figure 2.6).

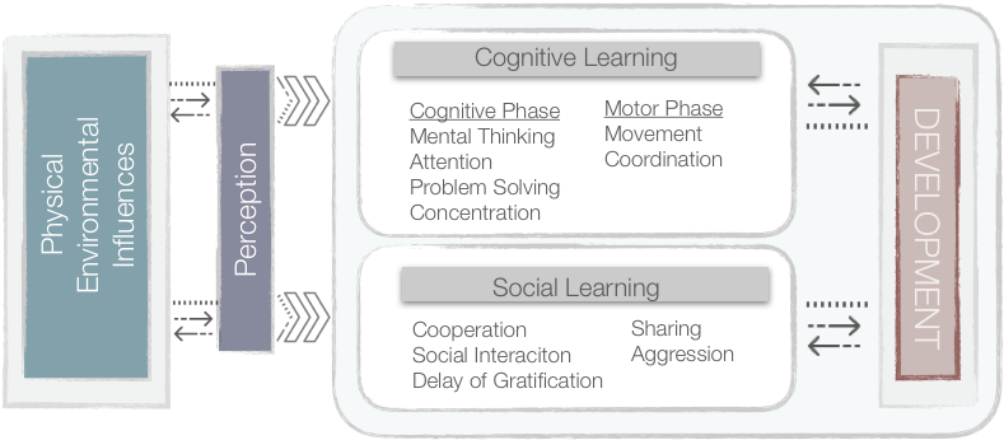


Figure 2-4 Conceptual Scheme for the Study: Assessing the Learning Environment of Children's Geographies

The characteristics of different categories of children's developmental periods, and the factors affecting children's learning, which were discussed in chapter 2, are summarized by the author in the table below (see Table 2.4).

Table 2-4 Author's conceptualization of 'Benchmarks of Children's Developmental Periods and Related Prominent Physical Requirements that Promote Children's Learning'

		DEVELOPMENTAL BENCHMARKS	PROMINENT PHYSICAL REQUIREMENTS FOR PROMOTING LEARNING
INFANCY PERIOD	Cognitive	Understand objects, colors, shapes	Sensory Stimulation richness
	Physical	Development of simple reflexes Development of motor skills based on maturation, experience and perception	-
	Socio-emotional	Communication with other children influences cognitive and psychosocial development	-
EARLY CHILDHOOD	Cognitive	Ego-centric perception influences Symbolizing objects as alternative things Rapid development of imagination	Sensory Stimulation Richness Loose Material Richness Quiet & Natural Behavior Settings for exploration
	Physical	Rapidly advanced motor development Motor activity become well developed Muscle, bone maturation Improving balance and coordination, greater motor and fine motor skills	Active behavior settings for challengeable environment Fixed attributes or landforms to provide challenge
	Socio-emotional	Often anti-social tendencies occur As approaching at age 6 associated play types can be seen	Quiet behavior setting for individual exploration, observation of other children Open and active behavior setting to get together
MIDDLE CHILDHOOD	Cognitive	Logical reasoning develops Topological relations, notions of number, time, size, volume, space, distance improve Problem solving skills develop	Manipulable loose material access Sensory stimulation richness
	Physical	Well-developed motor skills Sports habit formation for ages ahead	Fixed attributes or landforms to provide challenge
	Socio-emotional	Close peer to peer relationships	Open spaces for team games Gathering areas
ADOLESENCE	Cognitive	Solve complex problems both in concrete and abstract ways. Gain autonomy and independence	-
	Physical	Rapid acceleration in growth	Open behavior settings for active sport games
	Socio-emotional	Depressive mood can occur Peer to peer relationships gain importance	Nature for curative effect Open and active places Gathering areas

CHAPTER 3

STREETSCAPES OF ANKARA

3.1. Research Methodology

To assess streetscapes in terms of their sufficiency in supporting social and cognitive learning processes in children, an assessment tool is prepared. The assessment tool aims to investigate to what extent different streetscapes with diverging physical characteristics support children's learning to put forth insights for future urban design studies responsive to the needs of children and their learning processes.

The evaluation tool has been prepared with the concern of objectivity, which could be used universally in different contexts. The parameters of this tool are derived from the earlier theoretical discussions in Chapter 2. The tool is prepared to help the author define the physical features in a setting that can be easily perceived by a child whose sensory functioning is not impaired. Individual factors and experience of children are not considered within the model.

The assessment tool consists of three main parts: i. Physical environmental factors that promote cognitive learning, ii. Physical environmental factors that promote social learning, and iii. Other environmental characteristics that enhancing or inhibiting the functioning of these factors. Physical environmental factors that promote cognitive learning are based on Gibson's 'Affordance Theory' (Gibson, 1979). Physical environmental factors that promote social learning are based on theoretical discussions on 'Social Learning Theory' developed by Bandura (1978).

The physical environmental factors are discussed under six categories of parameters which include; physical diversity (in terms of sensory stimulation and affordance

potentials) and complexity of places, landform/topography, the variety of behavior settings, natural environment, the variety of fixed and loose elements, and topological features in the third dimension. These categories are derived from the discussions in chapter 2.7.3.4.

The physical environmental factors that promote social learning are discussed under four categories of parameters: natural environment, landform/topography, the variety of behavior settings that enables different types of play behaviors (see Table 2.2 in Chapter 2.7.3.4.1), and the variety of fixed and loose elements. These categories are repetitive with the previously discussed ones since all these aspects of the place contribute to social and cognitive learning of children. Lastly, other environmental characteristics that enhance or inhibit the functioning of previously defined factors are set as safety and security of the environment, and availability of restrictive exclusionary policies. Most responses were quantifiable, some in Likert scale and some in a multiple-choice format where the responses are ordered by frequency of count, distance, and so on. Exceptions include, for example, the questions that ask the researcher to name the degree of slope and alignment of the street (e.g., a flat and straight street versus a flat and a sinuous street).

In addition to these, it is also important to note that, while only other environmental characteristics refer to neighborhood scale, these parameters refer to the investigations on the scale of one street section (the volume between two building blocks).

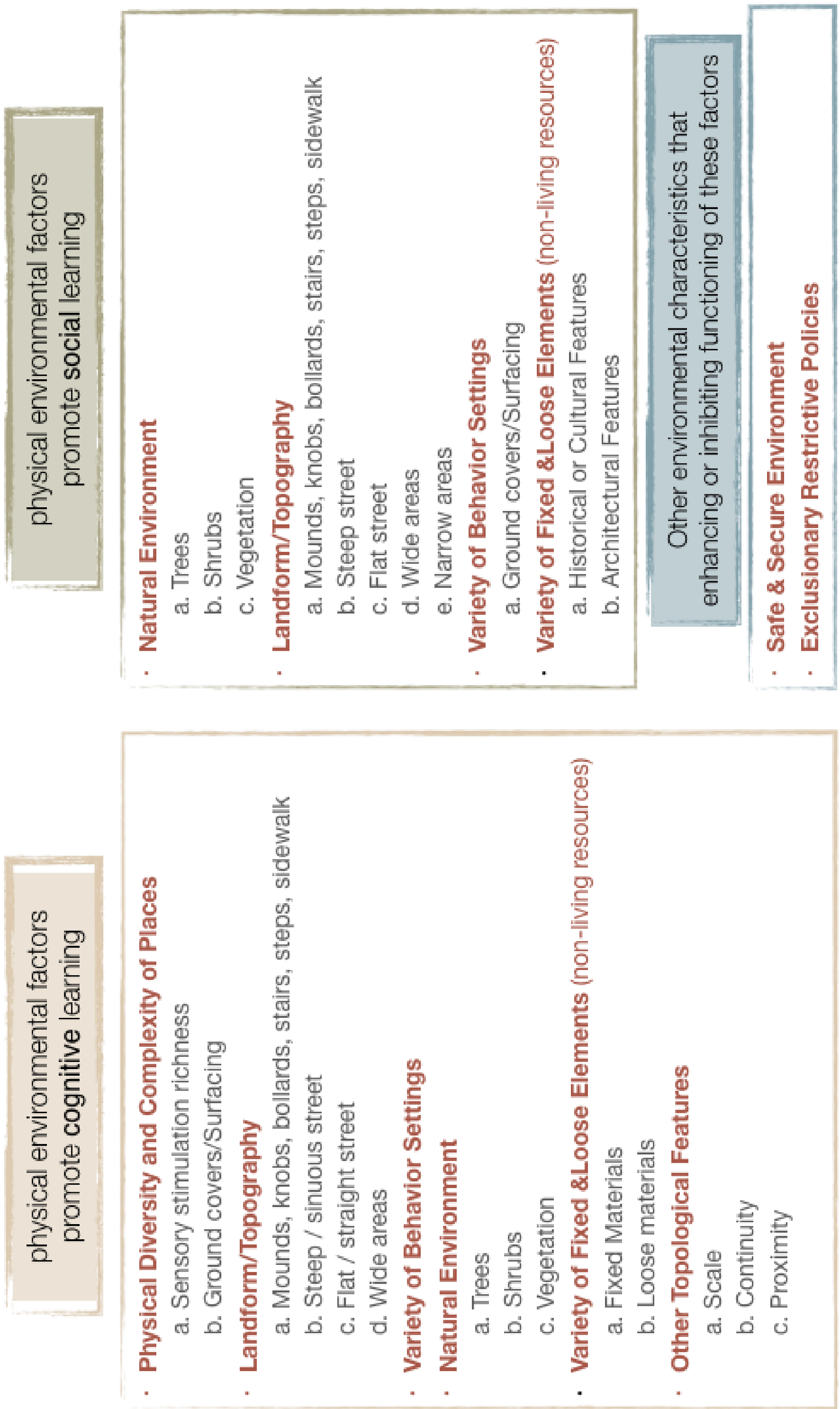


Figure 3-1 Main Categories and sub-Categories of Physical Environmental Factors

Table 3.1. *Physical Factors That Promote Cognitive Learning*

Contribution Score on Social Learning		0	1	2	3	4	5
C.a. Number of Fixed Physical Attributes	**C.a.1. Cimb-able elements**	none	one	two-three pieces	four-five	six-seven	more than 8 pieces
	C.a.2. Swing-able elements	none	one	two-three pieces	four-five	six-seven	more than 8 pieces
	C.a.3. On sit-able elements	none	one	two-three pieces	four-five	six-seven	more than 8 pieces
	C.a.4. On balance-able elements	none	one	two-three pieces	four-five	six-seven	more than 8 pieces
	C.a.5. Read-able elements	none	one	two-three pieces	four-five	six-seven	more than 8 pieces

Table 3.2. *Physical Factors That Promote Cognitive Learning*

Contribution Score on Social Learning		0	1	2	3	4	5
C.a. Sensory Stimulation Richness of Fixed Physical Attributes	**C.a.6. different textures** in fixed physical attributes (e.g., wood, plastic, etc.)	none	one	two-three pieces	four-five	six-seven	more than 8 pieces
	C.a.7. different textures in ground surface (e.g., wood, plastic, etc.)	none	one	two-three pieces	four-five	six-seven	more than 8 pieces
	C.a.8. different colors in fixed physical attributes	none	one	two-three pieces	four-five	six-seven	more than 8 pieces
	C.a.9. different colors in ground surface	none	one	two-three pieces	four-five	six-seven	more than 8 pieces

Table 3.3. *Physical Factors That Promote Cognitive Learning*

Contribution Score on Social Learning		0	1	2	3	4	5
C.a. Sensory Stimulation Richness of Fixed Physical Attributes	**C.a.10. different ornaments** in fixed physical attributes	none	one	two-three pieces	three-four	four- five	more than 5
	C.a.11. different ornament s in ground surface	none	one	two-three pieces	three-four	four- five	more than 5
	C.a.12. different patterns in fixed physical attributes	none	one	two-three pieces	three-four	four- five	more than 5
	C.a.13. different patterns in ground surface	none	one	two-three pieces	three-four	four- five	more than 5
	C.a.14. different shapes in fixed physical attributes	none	one	two-three pieces	three-four	four- five	more than 5
	C.a.15. different shapes in ground surface	none	one	two-three pieces	three-four	four- five	more than 5
	C.a.16. Play guides (e.g., written rules, shapes)	none	one	two-three pieces	three-four	four- five	more than 5

Table 3.4. *Physical Factors That Promote Cognitive Learning*

Contribution Score on Social Learning		0	1	2	3	4	5
C.b. Loose Physical Attributes (Move-able, change-able, manipulate-able, shift-able materials; can be natural or manufactured, junk or recycled, leaf, sticks, water, sand, mud or soil stones, water, sand, bark, moss, leaves, mud, logs, fruit)	**C.b.1. Access to natural loose materials across the site**; (across entire site or in areas of the site)	no access	little access	very small quantities and very small, defined location	small quantities or small defined location	useable and movable, sufficient amount of	useable, movable, manipulable, excess amount of
	C.b.2. Types of natural loose materials across the site; (across entire site or in areas of the site)	no access	one type	Two types	Three types	Four types	5 and more types
	C.b.3. Access to manufactured loose materials (i.e. junk) across the site; (across entire site or in areas of the site)	no access	little access	very small quantities and very small, defined location	small quantities or small defined location	useable and movable, sufficient amount of	useable, movable, manipulable, excess amount of
	C.b.4. Types of manufactured loose materials (i.e. junk) across the site; (across entire site or in areas of the site)	no access	one type	Two types	Three types	Four types	5 and more types

Table 3.5. *Physical Factors That Promote Cognitive Learning*

Contribution Score on Social Learning		0	1	2	3	4	5
C.c. Natural Resources (Plants, trees, grass, flowers, leaves, stones, soil and water, people, animals (pets), insects, etc.)	**C.c.1. Number of Trees**: climbable, according to height of branches	none	one	two-three pieces	four-five	six-seven	more than 7 pieces
	C.c.2. Types of Trees: Variety of tree types with different leaves (i.e., to learn wind effect, to learn sources of different fruits, flowers and leaves)	none	one	two-three pieces	four-five	six-seven	more than 7 pieces
	C.c.3. Number of Shrubs: as a play element, hiding element, enclosure element, exploration area	none	one	two-three pieces	four-five	six-seven	more than 7 pieces
	C.c.4. Amount of Vegetation: provide sensory stimulation richness, exploration	none	minimal	limited types partly in the certain area	limited types in the whole area	several different types partly in the certain area, visually stimulating or encourages interaction	several different types across whole area, visually stimulating and encourages interaction
	C.c.5. Number of Water supply elements: street fountain, water channel, decorative pool	no access	one type	Two types	Three types	Four types	5 and more types

Table 3.6. *Physical Factors That Promote Cognitive Learning*

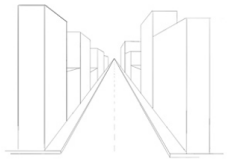
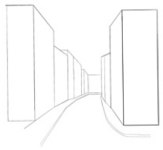
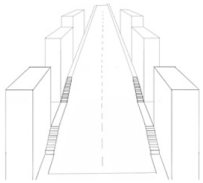
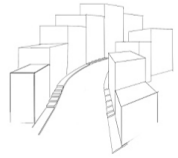
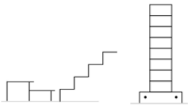
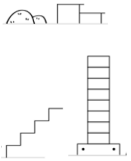
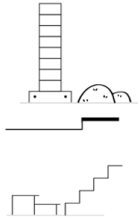
Contribution Score on Cognitive Learning		0	1	2	3	4	5
C.d. Landform / Topography (Flat or steep surfaces, spatial variations like mounds, stairs, steps, elevated platforms (sidewalk), knobs)	**C.d.1. Degree of Slope and Alignment**	-	Flat and straight 	Flat and sinuous 	Steep and Straight 	Steep and sinuous street 	Mixed
	C.d.2. Types of raised planes mounds, knobs, garden walls, stairs, steps, sidewalk:	None	One 	Two 	Three 	Four 	All 

Table 3.7. *Physical Factors That Promote Cognitive Learning*

Contribution Score on Cognitive Learning		0	1	2	3	4	5
C.e. Variety of Behavior Settings (Active, open, natural, quiet)	**Access to different type space settings**: *Quiet space* settings (small spaces) for individual retreat, observation of other children or quiet activities; *Natural space* settings to interact with natural elements and to make exploration; *Active space* settings to challenge children (i.e., spaces including ramps, stairs to jump, climb, etc.); *Open space* settings supporting movement at speed for group and team activities	None	One	Two	Three	Four	All

Table 3.8. *Physical Factors That Promote Cognitive Learning*

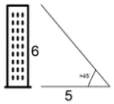
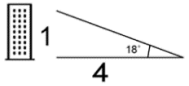
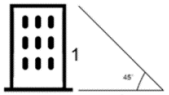
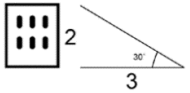
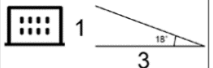
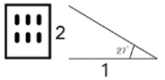
Contribution Score on Cognitive Learning		0	1	2	3	4	5
C.f. Topological Relations in 3rd Dimension (Scale, Size, shape, scale, continuity, proximity, separation, order, enclosure)	**C.f.1. Spatial / visual continuity**: Attached, detached houses, architectural distinctive characteristics	very little spatial / visual continuity; detached houses, no distinctive architectural characteristics	less spatial / visual continuity; attached houses, no distinctive features	low-medium spatial / visual continuity; detached houses, no distinctive architectural characteristics	medium spatial / visual continuity; attached/detached houses, distinctive architectural characteristics	less-good spatial / visual continuity; attached houses, no distinctive architectural characteristics	good spatial / visual continuity; attached houses, distinctive architectural characteristics
	C.f.2. Enclosure: The scale ratio of Height to Width	High (H), Narrow /Medium(W) 	High (H), Wide (W) 	Medium (H), Narrow/Medium (W) 	Medium (H), Wide (W) 	Low (H), Wide (W) 	Low (H), Narrow/Medium (W) 
	C.f.3. Degree of proximity: interaction of elements (by location) that reinforces learning (the triangulation effect)	None	few elements with non-relational proximity 	few elements with affinitive proximity 	adequate elements (min3) with non-relational proximity 	adequate elements (min3) with affinitive proximity 	rich elements (more than 3) with affinitive proximity 
	C.f.4 Legibility elements number of landmarks, nodes, edges, districts that make the space more legible and imaginable	None	One	Two	Three	Four	Five and more

Table 3.9. *Physical Factors That Promote Social Learning*

Contribution Score on Cognitive Learning		0	1	2	3	4	5
S.a. Natural Resources (Plants, trees, grass, flowers, leaves, stones, soil and water people, animals (pets), insects, etc.)	**S.a.1. Number of Trees**: provides shade, shelter, and gathering area for socialization	none	one	two-three pieces	six-seven	four-five	more than 7 pieces
	S.a.2. Number of Shrubs: as play element, hiding element, enclosure element, exploration area	none	one	two-three pieces	six-seven	four-five	more than 7 pieces
	S.a.3. Amount of Vegetation: provide sensory stimulation richness, exploration	none	minimal	limited types partly in the certain area	limited types in the whole area	several different types partly in the certain area, visually stimulating or encourages interaction	several different types across whole area, visually stimulating and encourages interaction

Table 3.10. *Physical Factors That Promote Social Learning*

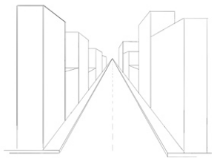
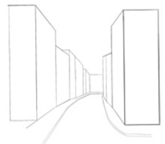
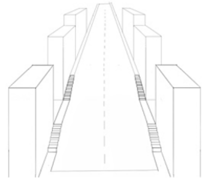
Contribution Score on Social Learning		0	1	2	3	4	5
S.b. Landform / Topography (Flat or steep surfaces, spatial variations like mounds, stairs, steps, elevated platforms (sidewalk), knobs)	**S.b.1. Degree of Slope and Alignment**	-	Flat and straight 	Flat and sinuous 	Steep and Straight 	Steep and sinuous street 	Mixed
	S.b.2. Types of raised planes *higher* ones define edges of different sized areas for behavior settings: mounds, knobs, garden walls, stairs, steps, sidewalk	None	One	Two	Three	Four	All
	S.b.3. Types of raised planes *lower* ones afford sitting, gathering and socializing etc.: mounds, knobs, garden walls, stairs, steps, sidewalk	None	One	Two	Three	Four	All
	S.b.4. Proportion of hard/soft surfaces: hard surfaces are disadvantageous due to shared use (ie., vehicles, pedestrians) therefore may limit the opportunity to play freely; soft surfaces enables more to play freely	-	completely hard surface	hard surfaces: more than half	equal proportion	soft surfaces: more than half	completely soft surface

Table 3.11. *Physical Factors That Promote Social Learning*

Contribution Score on Social Learning		0	1	2	3	4	5
S.c. Variety of Behavior Settings (Active, open, natural, quiet)	**Access to different type space settings**: ***Quiet space*** settings (small spaces) for individual retreat, observation of other children or quiet activities; ***Natural space*** settings to make exploration both individually or in company; ***Active space*** settings to challenge children (i.e., spaces including ramps, stairs to jump, climb, etc.) and lead them cooperation; ***Open space*** settings supporting movement at speed for group and team activities	None	One	Two	Three	Four	All

Table 3.12. *Physical Factors That Promote Social Learning*

Contribution Score on Social Learning		0	1	2	3	4	5
S.d. Fixed Physical Attributes	**S.d.1. Historical or cultural elements:** that will develop the historical or cultural consciousness (therefore the sense of community)	None	One	Two-Three	Four-Five	Six-Seven	More than seven
	S.d.2. Architectural features: that create space and provide socialization (i.e., an arbor, a cantilever or bay window to gather children under it)	None	One	Two-Three	Four-Five	Six-Seven	More than seven

Table 3.13. *Other Environmental Characteristics that Enhancing or Inhibiting the Learning Function of Environmental Factors*

Contribution Score on Learning		0	1	2	3	4	5
E.a. Safety and Security	**Traffic, stranger-danger** (due to the density of daily use) **or pollution problems**	crowded and fast traffic flow, polluted environment/stranger-danger	traffic problem, polluted environment/stranger-danger	slow traffic, polluted environment/stranger-danger	pedestrianized area, polluted environment/stranger-danger	slow traffic, quiet neighborhood zone	pedestrianized area, quiet neighborhood zone
E.b. Exclusionary Policies	**Restrictive signboards**: that do not allow the use of children	5 and more	Four	Three	Two	One	None

The assessment tool is conducted in different streetscapes located in Ankara. During the assessment, both qualitative and quantitative methods including; direct observation, spatial analysis, photographs are used to track the physical traces of the streetscapes. The survey for the assessment for the streets is conducted by the author in a week day in December 2018 between 9:00 am and 4:00 pm. Each observation took approximately an hour to complete.

3.2. Site Selection

This study asked: "*To what extent do the urban streets promote children's learning?*" To answer this research question, four streetscapes were selected from different neighborhoods of Ankara. All cases have different spatial layouts and topological relations, such as enclosure level (scale), continuity, proximity, and other serial vision elements (from Townscape book, Cullen, 1961). The selected cases are located in different types of residential areas, corresponding to different stages in Ankara's macroform development: i: A historical neighborhood (Ulus); A traditional neighborhood setting (Bahçelievler Neighborhood); A redeveloped neighborhood in Ankara (Birlik Neighborhood), which has a 'play street'; and a mass housing area (TOKİ). The purpose of selecting these neighborhoods was to show how children's opportunities to learn from their physical environments (streets) change as the places they live in transform.

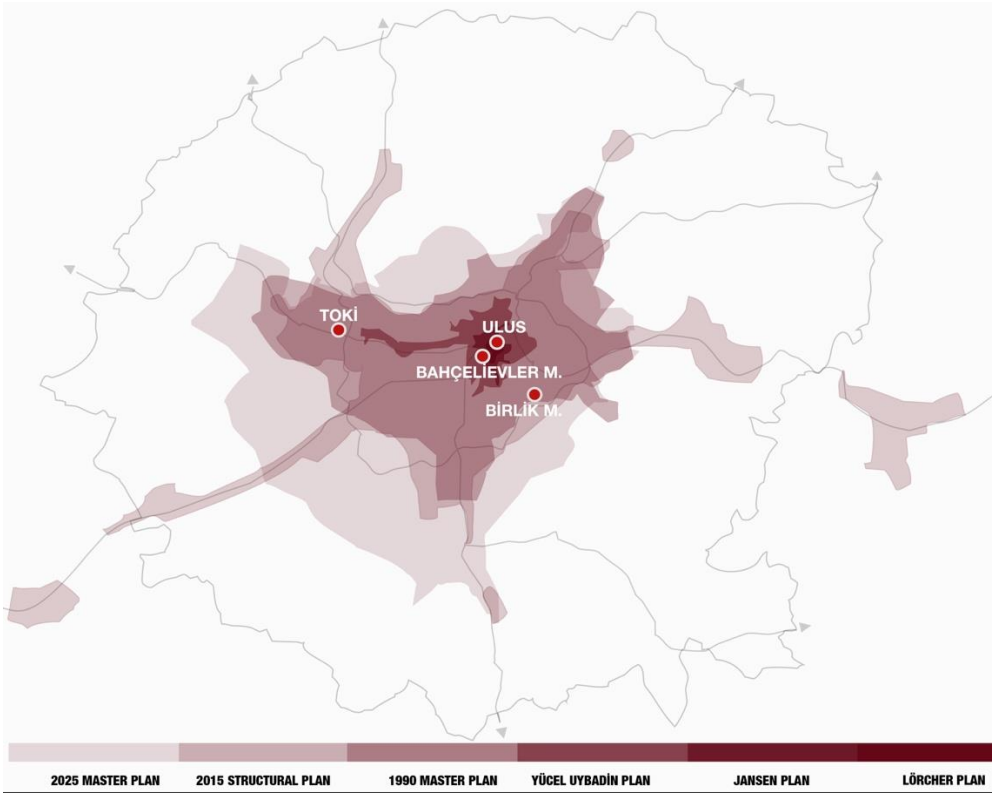


Figure 3-2 Macroform development of Ankara, applied by author adapted from Ankara Büyükşehir Belediyesi, 2023 Nazım İmar Planı

3.2.1. Cluster type: Historical settlements

Typical Characteristics of the Streets of Historical Settlements in Ankara:

Streetscapes in historical settlements in Ankara includes historical structures and street patterns. They usually have 2-3 floor mud-brick, brick or wooden houses with bay window or cantilever. Unlike the contemporary neighborhoods where the buildings have visible front yards, in historical neighborhoods the building facades usually define the streets (in historical settlements, most buildings have courtyards or backyards; for privacy purposes, the front yards of houses are surrounded by high walls). They have a narrow street layout, generally paved with cobblestone. Streetscapes in Ankara's historical settlements promote strong neighborly relationships. In these historical settlements street layout allows residents to take

ownership of the street beyond their individual properties. In other words, street is a public living space in these kinds of settlements.

Characteristics of the Selected Study Area: (Sample Area: Ulus, Alitaş St.)
Alitaş street is a historical streetscape with 1-2 storey attached mud-brick houses. There are 23 housings in the investigated block of the street, 9 of them have outstanding architectural features such as bay windows, wood window, cantilevers, white plastered facades. The area has begun to be restored newly, thus all housings are age-old and decrepit currently, except one restored building. The ornaments on doorframe and window details are clearly legible on the newly restored well-conditioned housing. In the expanding openness of street in front of that building, there is a restored historical fountain as well. The land is separated into two elevation levels in one expanding gap (underscored with the number of 1 in the following figure); and separated into three elevation levels in the other expanding gap of the street (underscored with number of 2 in the following figure). These different elevation levels and separation in the streetscape supplies multi-hierarchical land uses and gathering places between surrounding residences. Moreover, the street has an organic, sinuous layout in company with diverging gaps (because of expanding and narrowing street layout), and landmarks. It gives a strong serial vision (see Cullen, 1961) along the streetscape. The clustered organization of the site's open spaces (the cellular formation of public, semi-public and semi-private spaces) based on proximity relations of built environment of the street. The pavement texture of the street is cobblestone. There are no sidewalks, but due to the sinuous layout and the cobblestone pavement of the street, there is low volume traffic density. Moreover, the historical site can be defined as pedestrian oriented. Gardens of the housings are enclaved with high walls; therefore, the permeability is not accessible in transition between private/semi-private areas that belong to residences, and the street. As previously mentioned, historical street layout also allows residents to take ownership of the street. Therefore, in this streetscape, areas beyond individual property walls are accepted as semi-private spaces.

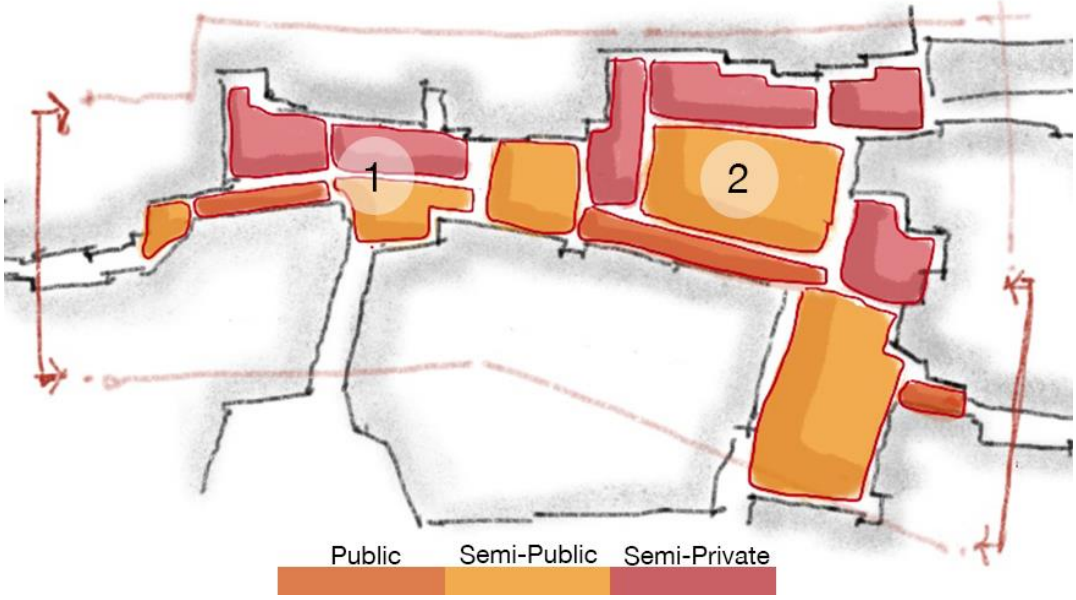


Figure 3-3 Variety of Spatial Hierarchy of a Section of the Streetscape in Alitaş Street, Ulus

Figure 3-4 Plan Section of Alitaş Street, Ulus

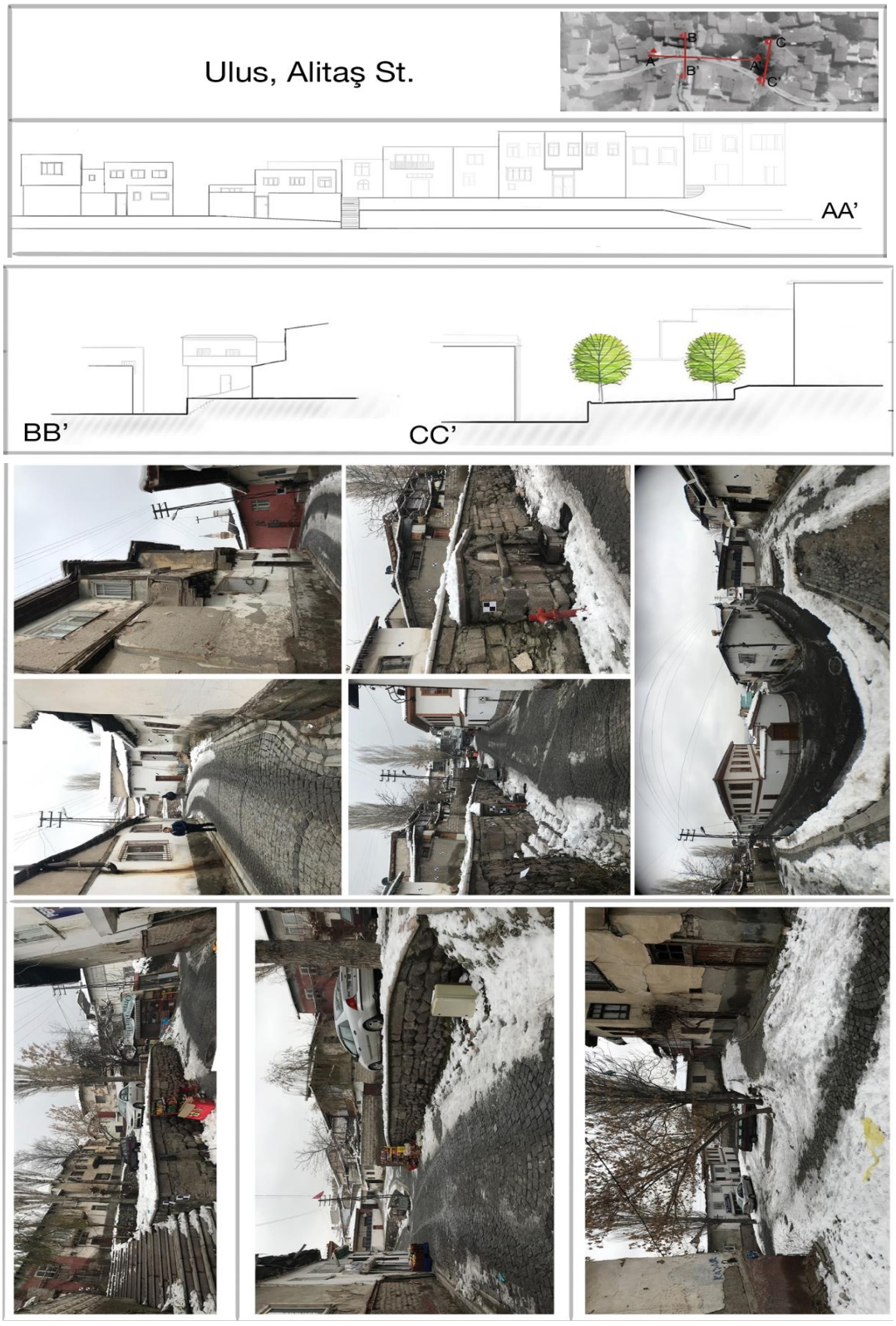


Figure 3-5 Sections, Elevations and Photos of the Area

3.2.2. Cluster type: Traditional Neighborhood Settings

Typical Characteristics of the Streets of Traditional Settlements in Ankara:

In the traditional neighborhood settings of Turkey, built after the Republican era (1923), the organization of traffic and the pedestrian flow works together. The street surroundings are arranged both to enable the public life practices in the neighborhood, and to regulate the flow of traffic. Streetscapes in traditional neighborhood settlements of the post-Republican era in Ankara usually consist of 4-5 storey detached housings with front yards and reflect the architectural features of a period. Resembling to the streets in historical settlements, street layout of traditional neighborhoods in Ankara promotes good neighborhood relations. Like what Southworth and Ben-Joseph (2003) found in most American small towns built before the 1920s, Ankara's traditional neighborhoods possess the connectedness, structure, walkability, and accessible land use patterns which are exposed to disappear in today's new residential developments. These traditional street settings are now subject to invasion by automobiles, and often suffer from the noise and contamination that come with excessive traffic flow (Southworth and Ben-Joseph, 2003).

Characteristics of the Selected Study Area:(Sample Area: Bahçelievler Nbh.,39 St.)

The selected study area of Bahçelievler represents modernist approach of Hermann Jansen. Although Jansen's proposed low-dense and low-rise housing types have not reached to the present day, due to the contemporary urbanization effects, parcel layout of his plan can still in sight today. Wide front gardens of Jansen's plan are now functioning as semi-public places of the linear organized street with five-storey houses (some of these houses still represent the architectural characteristics of 1960's and 1970's). The livable characteristic of the Bahçelievler streetscape with wide front yards and physical attributes, encourage residents to interact with others. Front gardens are hosting various types of vegetation which contribute to the richness of landscape of the streetscape. Additionally, because these front-yards function as gathering places of the residents, they include several types of common manufactured loose materials; such as tables, benches, and other garden furniture and decoration

elements. Different kinds of trees (black pine, spruce tree, oak tree, etc.) aligned throughout both sidewalks of the street, create a canopy effect, providing shading and sheltering in rainy and sunny days. Because of the absence of parking spaces in the neighborhood, the automobiles invade the sidewalks of the street.

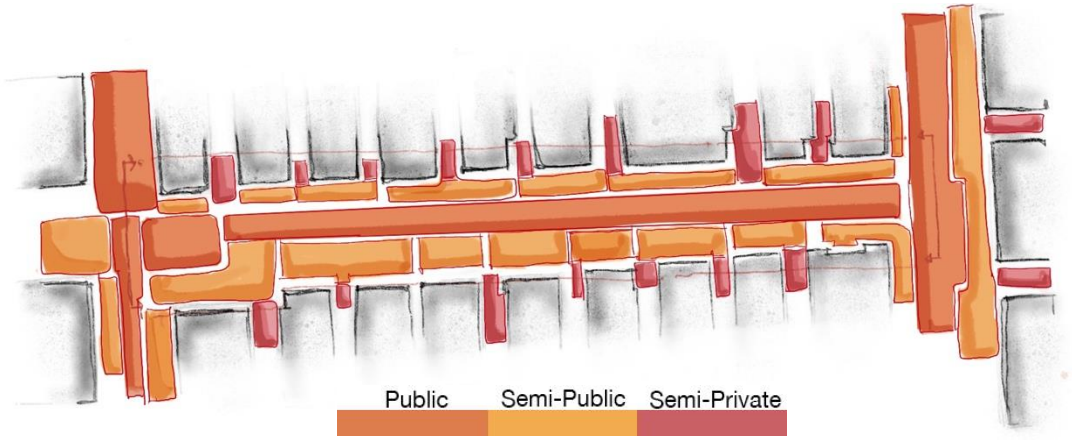


Figure 3-6 Variety of Spatial Hierarchy of a Section of the Streetscape in Alitaş Street, Ulus

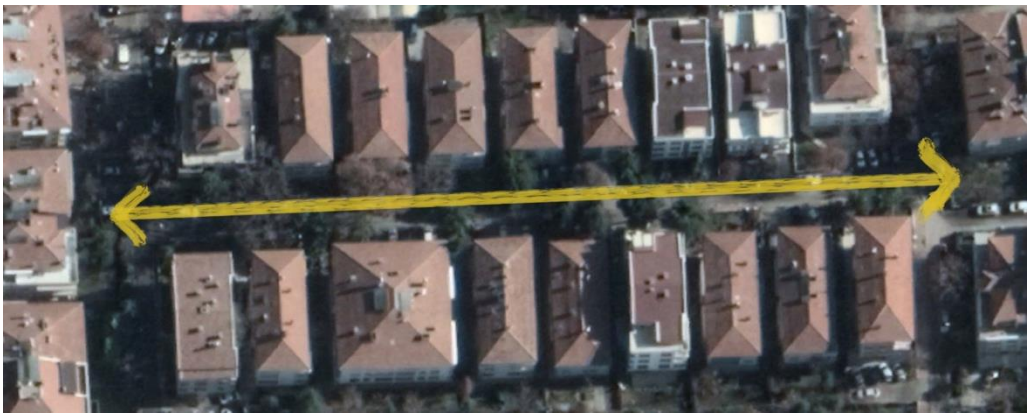


Figure 3-7 Plan Section of 39th Street, Bahçelievler Neighborhood

Figure 3-8 Sections, Elevations and Photos of the Area

3.2.3. Cluster type: Mass Housing Neighborhood

Typical Characteristics of the Streets of Mass Housing Settlements in Ankara:

Since the population has increased in the cities and the urbanization has gain speed, the housing shortage problem has arisen in Turkey. As a solution, the public sector has been affording mass housing to families from different economic backgrounds. Because of the physical and social problems which were brought by rapid urbanization to the city centers, new residential settlements, and the mass community systems have started to appear in the periphery of the cities. The mass housing settlements usually found on the new development areas or periphery regions of Ankara. They are developed by a governmental institution, TOKİ (Turkish Housing Development Administration), and these projects consist of high-rise housing units in high-density (Karaman, 2013). These settlements are including standardized super-block structures like potato printings, with no diversity; and they arrayed in wide open areas. A typical traditional or historic neighborhood is defined by the structures of a street; However, in the TOKİ project areas, the street is mostly in a 'road' format, and functions as a separator element between different TOKİ sites. The paths within TOKIs are standard pathways about 1.5 meters wide, which are connecting an apartment in TOKI to other apartments, car parks or playgrounds.

Characteristics of the Selected Study Area: (Sample Area: Eryaman-TOKİ, 90 St.)

90^{th} Street in TOKİ neighborhood is a pedestrianized area. The surrounding built environment consists of 9 storey detached apartment blocks with monotype architectural feature (which is determined by public sector's design regulations). The distance between the collocated buildings are 19 meters, whilst the facing buildings have approximately 75 meters in between (including approximately 2.600 m^2 common green area). The selected streetscape takes only one side from the built facades, and the other side is opening to the green area. Based on these factors, the street has very weak enclosure level. On the other hand, the area consists of 70% of soft surface, and 30% of hard surface; and thus, includes a great amount of natural loose materials. Although the area has variety of trees in a great amount, these trees neither create

spatiality nor a continuity or enclosure effect in the site. It is due to the lack of proximity relations in between them, and randomness in their order. Moreover, based on the lack of proximity relations in the area, spatial hierarchy is not as legible as in the other selected study areas. The selected site includes standard and fixed physical elements (like benches and street lights). It is possible to see these elements in all TOKİ estates across the country. Thus, the area is not diverging in terms of manufactured loose materials.

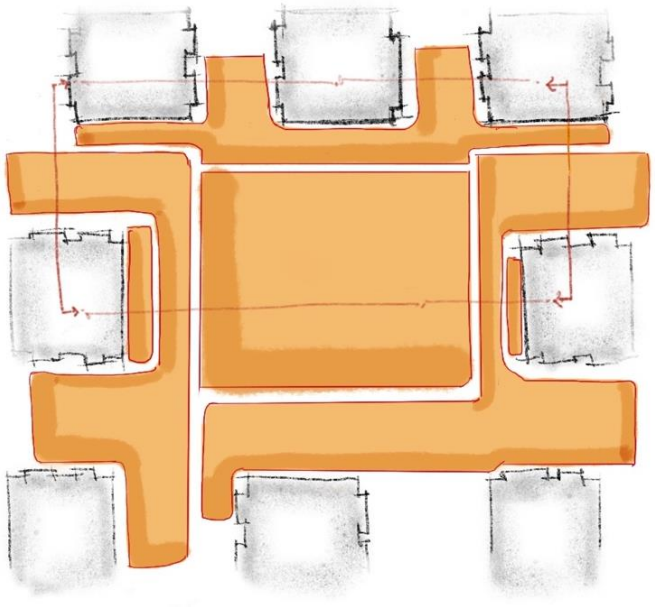


Figure 3-9 Variety of Spatial Hierarchy of a Section of the Streetscape in TOKİ

Figure 3-10 Plan Section of 90th Street, TOKİ

Figure 3-11 Sections, Elevations and Photos of the Area

3.2.4. Cluster type: Redeveloped Neighborhood with a 'Play Street'

Typical Characteristics of the Streets of Contemporary Urban Settlements in Ankara:

'Play street' is a concept that has emerged as a result of the efforts to redefine street's publicity and meaning, which have changed as a result of urbanization policies (as it can be seen in the world as a result of neoliberal policies). The new urbanization policies and the construction boom turned into the streets entirely a transportation-oriented, thus vehicle-oriented spaces from a living space. This change was reflected in the physical environment through neighborhoods; certain urban environments are having unqualified buildings with no architectural value (contractor type). The concept of 'play street' is a policy designed to reduce the traffic flow and to make the street safer for people and children in the crowded neighborhoods. One of the most and first known examples of different countries is Aldo van Eyck's play street design in the Netherlands. Between 1947 and 1978, he designed seven hundred playgrounds by redesigning the open urban areas for children to give them 'freedom of action' (Memik, 2004). His redesign of open areas (and traffic islands) in Amsterdam "slows down the traffic, extends and foregrounds protected encounter areas, shifts the focus of attention from remote vistas to the locality of the site" (Lefaivre & Tzonis, 1999, p.69). He sought to make the transition from 'closed' playgrounds into 'open' playground system for each neighborhood; and as a contrary to today's playground design approach, he did not consider these areas as fenced and physically segregated from the outdoor environment to protect children from the traffic risks (Memik, 2004). By 1970s, '*woonerf*' notion occurred as a new design approach, which aims safer residential streets with slow-traffic to provide play space and social space. Boundaries of *woonerf* are clearly defined, and traffic regulations are applied to the street in order to make the area more pedestrianized (generally in a winding layout with letter P typed car parking lots). The street is equipped with many trees, street furniture, different paving materials, plant tubs and parking racks for bikes (Memik, 2004).

Characteristics of the Selected Study Area: (Sample Area: Birlik Nbh., 455 St.)
The 455th Street in Birlik neighborhood consists of 4 storey detached apartment housings with contemporary architecture, near to a mosque. The width of the sidewalk (2.5 meters) is enough for two or three children to walk together. Fixed parking barriers are located at one side of the sidewalk (the mosque side) prohibiting the invasion of the sidewalks by automobiles. For children, the only place to play in is the sidewalks, because the front yards of the building are so narrow to be a play space. In fact, the front yards are covered with vegetation and shrubs, restricting children to use these settings for playing and socializing. Additionally, skinny trees are placed along the wider side (the mosque side) of the street. These 'skinny' trees not only do not provide shade/shelter to pedestrians, but they also cannot create a curtain effect as seen in the Bahçelievler case. The street, on the other hand, has traffic calming regulations; the layout of the roadway is slightly sinuous.

The 455th Street is the first 'play street' project implemented in Turkey. The project aimed to increase the possibilities of social interaction of street residents, and to create living outdoor space for children. To provide a safer zone for children, the fore-mentioned traffic calming regulations implemented; Additively, in order to make the street more attractive for children, colorful manufactured play elements are placed in the sidewalk, and the garden walls of the nearest mosque painted in colorful ornaments and figures.

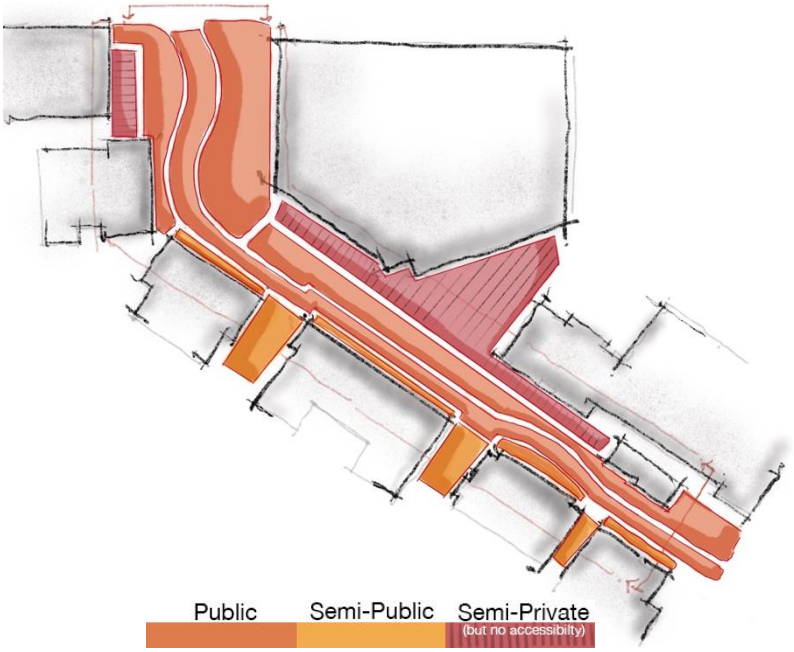


Figure 3-12 Variety of Spatial Hierarchy of a Section of the Streetscape in Birlik Neighborhood

Figure 3-13 Plan Section of 455th Street, Birlik Neighborhood

Figure 3-14 Sections, Elevations and Photos of the Area

CHAPTER 4

RESULTS

This study explored the relationship between the physical attributes of streets and their impact on children's cognitive and social learning. Through an observation leaded by the urban design survey tool, descriptive data were gathered. Detailed assessment tool survey can be seen in the Appendices.

Assessment tool results should be interpreted according to the aggregation of categories of each parameter. (For example: to see the contribution of the street's topographical features on children's cognitive learning (C.d.), the results of the categories of 'Degree of Slope and Alignment' (C.d.1) and 'Types of Raised Planes' (C.d.2.) should be aggregated).

4.1. Cluster type: Historical settlements (Sample Area: Ulus, Alitaş St.,)

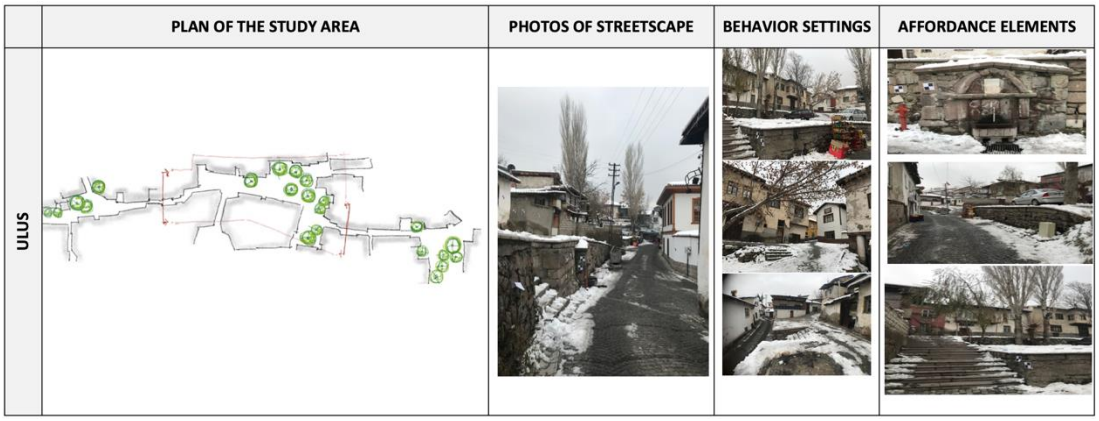


Figure 4-1 Sample Area: Ulus, Alitaş St.

Alitaş street, in a historical neighborhood area of Ulus district, has the highest ranking of topological relations in the third dimension, due to its historical settlement pattern. The street consists of low-rise housings (The ratio of the height of buildings to the

width of the street is 1:1, and due to this ratio, the street gives strongly perceivable enclosure effect for children), and has prominent architectural features (i.e., historical Ankara houses with bay windows or cantilevers). By the rhythm and architectural repetition on the building facades, and the attached form of the buildings, the street has a strong visual continuity effect. Due to this feature, the street can easily attract children's attention and concentration, and therefore has a positive effect on their cognitive learning. Furthermore, the legibility of the space is high (see C.f.4 in Appendix A), since the street has clear landmarks (such as the historical fountain, a resorted registered building, a poplar tree), nodes with different hierarchies (a car parking area, an empty plot, an expanding hub of the street in a higher elevation), physical edges (retaining wall which separates the car parking are into two different elevation). Alitaş street also found as potentially strong in terms of promoting cognitive learning, due to having variances of affordance features (with the score of 53 over the total scoring of 80 in the category of fixed physical attributes; see Appendix A for details). The rich fixed physical attributes (stairs, steps, sidewalk, trees) and the proximity between these elements also generate better triangulation possibilities. In Alitaş street, there are strong triangulation relations arising from the fixed physical elements that are in juxtaposition such as triangulation case i. stairs, a fountain, and a fire hydrant; triangulation case ii. mound, stair, retaining wall and a tree. The strong triangulation effect on this area is prosperous in promoting children's cognitive learning. Additionally, as previously mentioned in chapter 3.2.1, the streetscape has a variety of privacy settings in interlocking relation. Additionally, the results of the assessment tool (aggregate value of the scores of C.e and S.c subjects) indicate that the streetscape is rich in a variety of behavior settings (e.g. open space, quiet space, active space). Because of the urbanization effect, today's neighborhoods do not provide enough the variety of behavior settings; therefore, children usually have to seek safe and playful environments outside their urbanized neighborhoods (generally exceeding their home-range). The spatial variety and the enclosure level of Alitaş streetscape, on the other hand, enable the area to be safe and playful for different gender and age groups. Therefore, children do not need to seek suitable outdoor play

areas that exceed their home-range borders. However, younger children, and especially female children, until after the primary school age, usually restricted by their families to play far away from their home range (Kiper, 1999). Alitaş street has a great advantage for both genders and the younger age groups when considered from this point of view.

Moreover, due to its historical characteristics (like including registered buildings, cobblestone pavement which is peculiar to historical sites, located in an urban conservation site), the area contributes to developing historical and cultural consciousness for children (see Gruenewald, 2003), and therefore the sense of community. Because the site was built in respect to the inclined condition of the land, the area offers richness in terms of affordances as well as the range of behavior settings, thus variety and hierarchy in landform richly provides gathering and socializing spaces. This contributes to social learning of children. Moreover, the degree of slope and alignment of the street (having both steep, sinuous, flat and straight parts) offers the potential of the 'sudden jerk feeling' (Cullen, 1961) and serial vision, which eases children to remember and visualize the space in their mind. Therefore, the Alitaş street's landform features help children to develop mental thinking abilities as previously discussed in Chapter 2.8.1. However, the environmental pollution in the street has a negative effect on the accessibility of this site.

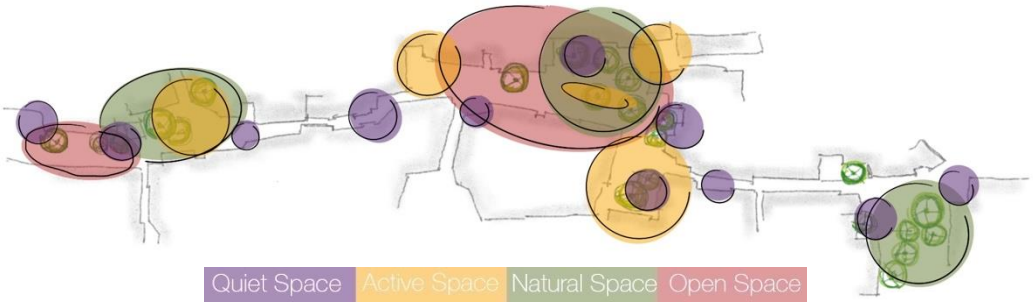


Figure 4-2 Behavior Setting Map of Alitaş Street, applied by author based on Chapter 2 discussions

4.2. Cluster type: Traditional Neighborhood Settings (Sample Area: Bahçelievler Nbh., 39 St.,)

Figure 4-3 Sample Area: Bahçelievler Nbh., 39 St.

Among all the selected cases, Bahçelievler 39. Street has the greatest contribution to the cognitive learning of children. The major contribution arises from its affordances for different age groups (early and middle childhood, and adolescence), especially regarding the affordances provided by its fixed physical attributes and loose physical attributes (with the score of 68 over the total scoring of 80 in the category of fixed physical attributes; and 18 over the total scoring of 20 in the category of loose physical attributes; see Appendix A for details). The site has semi-public front yards which are functioning as a shared space. Such wide front-yard housing typology provides children the opportunity to access 'loose materials.' The richness of loose materials provides children to manipulate their environments, thereby increasing children's cognitive learning, as it was discussed in Chapter 2.8.1. Bahçelievler 39. Street has found to be the most effective streetscape that promotes children's learning in the overall assessment, due to its physical characteristics that promote both social and cognitive learning. The base features of this judgment are as following: i. Vegetation and tree types are quite diverging which may enhance children's knowledge about nature. The repetition in the order of landscape elements as trees and vegetation, additionally, provides strong continuity effect to the site, which highly stimulates the children's attention and perception skills. ii. Additionally, the enclosure level is comfortable (Lynch, 1962) with the approximate ratio of 3:5 (the vertical angle of 30°). iii. Moreover, the street contains all kinds of predefined (see, Chapter 2.7.3.4.1)

behavior settings (like open space, active space, natural space, quiet space) due to its hierarchical specialization (which enables almost all types of play behaviors); and thus, provides socialization opportunities in different levels. Finally, the richness of fixed physical attributes with affinitive proximity contributes to the triangulation effect and creates a focal point to several play types, with the elements of trees, laundry hangers in the front yards, parking barriers and garden walls.

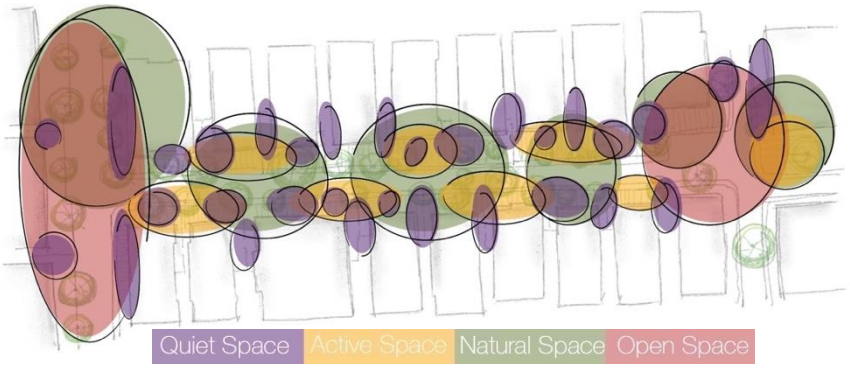


Figure 4-4 Behavior Setting Map of 39. Street, applied by author based on Chapter 2 discussions

4.3. Cluster type: Mass Housing (Sample Area: Eryaman TOKİ, 90 St.)

Figure 4-5 Sample Area: Eryaman TOKİ, 90 St.

Compared to the other selected cases, 90. Street in the selected mass housing estate received the highest score in terms of safety and security (it is a pedestrianized street, a quiet neighborhood and there are is no stranger danger effect or pollution factor). On the other hand, the ranking of physical attributes that promote cognitive learning of the site is the lowest. The weakness of topological relations in the third dimension is the most significant factor on this result; The scale slightly exceeds the ratio of 1:3

which indicates the weakest sense of enclosure (Spreiregen, 1965). Therefore, it is tough for children living in mass housing to recognize the spatial relations in the street.

Additionally, the score of total physical attributes (both fixed and loose) that promote cognitive and social learning is below the average (score of 49 over total scoring of 110). In terms of fixed physical attributes in the street, there is little diversity. In fact, because of the inadequacies of fixed physical attributes, the triangulation feature cannot occur successfully. Although the building facades surrounding the street look similar, it is hard for children to comprehend this sameness because of the large-scale factor. Additionally, although the area is diverging in terms of behavior settings (having both quiet, active, open and natural areas which are previously discussed in the literature review), there is no strongly legible spatial hierarchy in the streetscape. Hence, the continuity impression cannot be seized successfully. In other respects, under the favor of the abundance of natural areas and elements, the loose physical attributes are enough to provide manipulative activities for cognitive learning of children. Furthermore, natural elements are enough to provide shade, shelter or to define gathering areas for socialization and to be used as play or hiding element or to make exploration. If children are allowed to step on the grass or interact with nature, the streets of mass housing areas offer great opportunities for children to socialize, play and learn from each other.

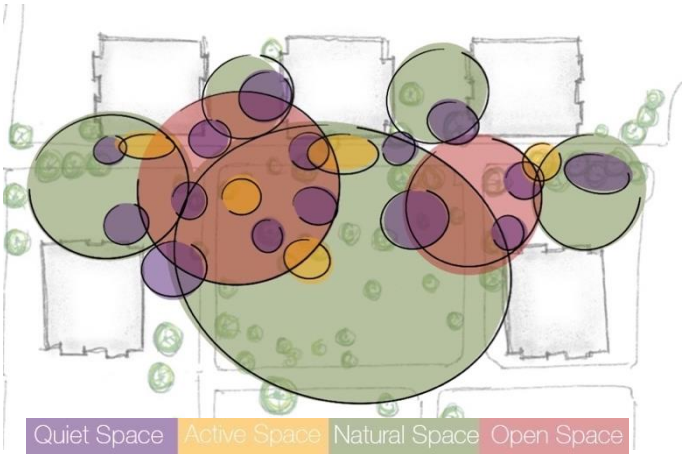


Figure 4-6 Behavior Setting Map of 90. Street, applied by author based on Chapter 2 discussions

4.4. Cluster type: Redeveloped Neighborhood with a 'Play Street' (Sample Area: Birlik Nbh., 455 St.)

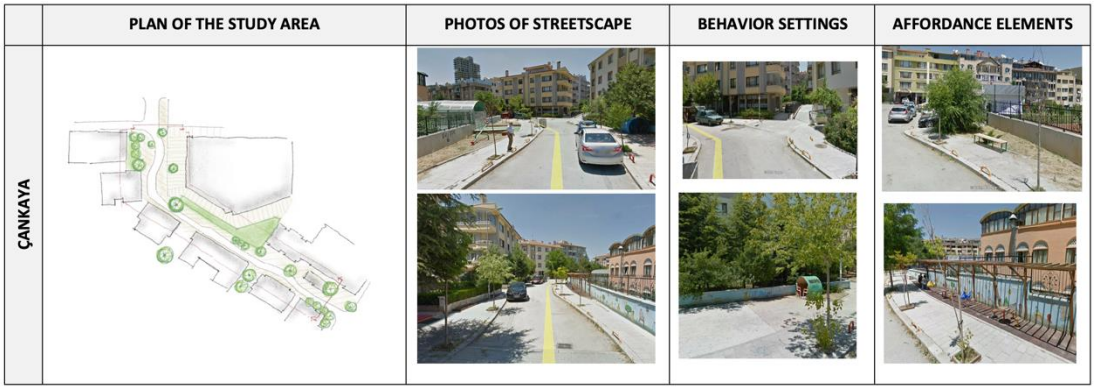


Figure 4-7 Sample Area: Birlik Nbh., 455 St.

Although 455. Street is an example of a designated 'play street'; it has the lowest overall score of physical attributes that promote learning. This result is based on the limited potential of the area in terms of both the natural resources and landform features, and the total score of fixed and loose physical attributes. The physical features provided by 455th Street remained incapable in the evaluation made with the exclusion of the play elements. Both the fixed physical attributes (including both architectural features, sensory stimulation materials, and the physical element's affordances) and the natural resources of the streetscapes are not qualified enough for children's learning. It is because there are limited number of affordance elements and sensory stimulation elements (such as the counted number of climbable elements are 3-4; number of swingable elements are 2-3; sensory stimulation of richness of different ornaments, patterns, shapes are 2-3). Although the alignment of the sidewalk has a subtly sinuous layout to slow the traffic flow, it does not suffice to create startling visions and visual distinctness.

Moreover, at the entrance point of the street, there is a hub for crowd play, yet it mostly addresses children in middle childhood period, because of its dimensions. The hub enables cooperative (team) play activities for this age group. However, because the 'play street' is designed as a narrow linear form and the only enclosing element is a

next to mosque's garden wall, there is no strongly legible spatial hierarchy on the street. Furthermore, although the floor level is the same with the case on Bahçelievler, the enclosure feeling of the 455th Street is not strong as in the Bahçelievler case. It is because that, only one façade of 455th Street is defined by the buildings, and the other side of the street is defined by a low garden wall.

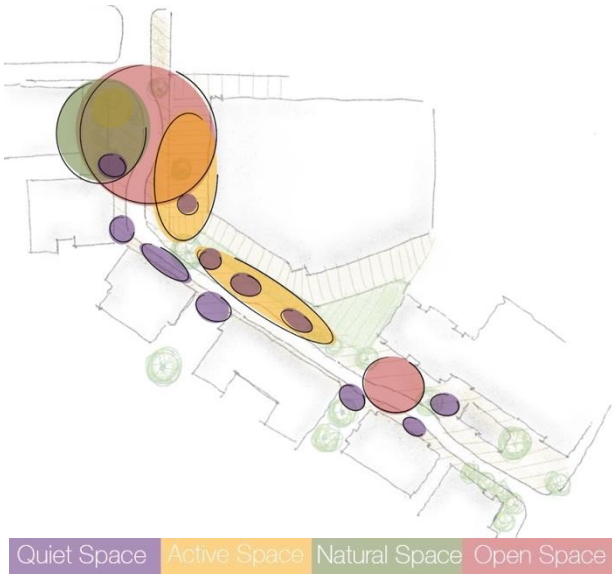


Figure 4-8 Behavior Setting Map of 455. Street, applied by author based on Chapter 2 discussions

4.5. Comparative Assessment of Physical Factors that Promote Cognitive Learning in Selected Study Areas

The clusters of Bahçelievler and Ulus is showing the highest results of physical attributes that promote children's cognitive learning. Natural resources and landform features, and topological relations in the third dimension are at high values in the selected historical neighborhood. The variety of behavior settings is differentiating in mass housing and traditional neighborhood from other cases. Additionally, the physical attributes are at the highest level in selected traditional neighborhood case.

Table 4-1 Scoring of Physical Factors Promote Cognitive Learning of Different Areas in Ankara

SCORING OF PHYSICAL FACTORS THAT PROMOTE COGNITIVE LEARNING (Over 160)	ULUS (Alitaş St)	TOKİ (90. St)	BİRLİK (Play St/ 455. St)	BAHÇELİEVLER (39. St)
Fixed Physical Attributes (over 80)	**53**	**38**	**49**	**68**
Loose Physical Attributes (over 20)	**9**	**10**	**7**	**18**
Natural Resources & Landform (over 35)	**24**	**18**	**12**	**18**
Variety of Behavior Settings (over 5)	**4**	**5**	**4**	**5**
Topological Relations (over 20)	**17**	**8**	**13**	**17**

4.6. Comparative Assessment of Physical Factors That Promote Social Learning in Selected Study Areas

The study of total ranking of physical attributes that promote children's social learning indicates that approximate values have emerged in all areas (see, Table 2). On the other hand, the fixed physical attributes promoting children's social learning are rather at the high value in the selected historical neighborhood, with a score of 7 over 10.

Table 4-2 Scoring of Physical Factors That Promote Social Learning of Different Areas in Ankara

SCORING OF PHYSICAL FACTORS THAT PROMOTE SOCIAL LEARNING (Over 50)	ULUS (Alitaş St)	TOKİ (90. St)	BİRLİK (Play St/ 455. St)	BAHÇELİEVLER (39. St)
Fixed Physical Attributes (over 10)	**7**	**1**	**2**	**1**
Natural Resources & Landform (over 35)	**25**	**23**	**15**	**24**
Variety of Behavior Settings (over 5)	**4**	**5**	**4**	**5**

4.7. Comparative Assessment of Total Physical Factors that Promote Social and Cognitive Learning in Selected Study Areas

According to the sum of the data obtained from Table 4.1 and Table 4.2, total physical attributes promote children's cognitive and social learning of the selected study areas can be seen in the following table. Total natural resources and landform values that promote children's learning of the clusters; Ulus case (49), TOKİ case (41), Birlik case (27), Bahçelievler case (42), Total variety of behavior settings that promote children's learning in clusters; Ulus case (8), TOKİ case (10), Birlik case (8), Bahçelievler case (10). For each of the selected case, the scores for the total topological relations in third dimension that promote children's learning in clusters are; Ulus case (12), TOKİ case (6), Birlik case (10), Bahçelievler case (5).

Table 4-3 Total Scoring of Physical Factors That Promote Learning of Different Areas in Ankara

TOTAL SCORING OF PHYSICAL FACTORS THAT PROMOTE LEARNING (Over 210)	ULUS (Alitaş St)	TOKİ (90. St)	BİRLİK (Play St/ 455. St)	BAHÇELİEVLER (39. St)
Total Physical Attributes (Over 110)	**69**	**49**	**58**	**87**
Total Natural Resources & Landform (Over 70)	**49**	**41**	**27**	**42**
Total Variety of Behavior Settings (Over 10)	**8**	**10**	**8**	**10**
Total Topological Relations (Over 20)	**17**	**8**	**13**	**17**

4.8. Comparative Assessment of All Physical Factors Affecting Children's Learning

According to Table 4.4, Bahçelievler case has the highest ranking of physical factors that promote cognitive learning with the score of (121), while Ulus case has the highest ranking of the physical factors that promote social learning with the scoring of (36). TOKİ has the highest ranking of other environmental characteristics both in terms of high volume of traffic, stranger danger risk, and environmental pollution.

Table 4-4 Overall Scoring of Different Areas in Ankara

OVERALL SCORING	ULUS (Alitaş St)	TOKİ (90. St)	BİRLİK (Play St/ 455. St)	BAHÇELİEVLER (39. St)
SCORING OF PHYSICAL FACTORS PROMOTE COGNITIVE LEARNING (OVER 155)	**102**	**77**	**82**	**121**
SCORING OF PHYSICAL FACTORS PROMOTE SOCIAL LEARNING (OVER 50)	**36**	**29**	**21**	**30**
OTHER ENVIRONMENTAL CHARACTERISTICS (OVER10)	**7**	**10**	**7**	**9**

All in all, the contribution to cognitive learning of children is found most influential in the selected traditional neighborhood area, the Bahçelievler case; while the contribution to social learning of children is found with more value in selected historical neighborhood settlement, the Ulus case. On the other hand, as it can be seen in the following table, the scores of the contribution to cognitive and social learning are showing similar results both in the pair of traditional and historical neighborhoods (highest); and mass housing and redeveloped urban neighborhoods (lowest).

Table 4-5 Distribution of Learning Parameters in the Areas

DISTRIBUTION OF LEARNING PARAMETERS IN THE AREAS	ULUS (Alitaş St)	TOKİ (90. St)	BİRLİK (Play St/ 455. St)	BAHÇELİEVLER (39. St)
CONTRIBUTION TO COGNITIVE LEARNING	**65%**	**49%**	**52%**	**78%**
CONTRIBUTION TO SOCIAL LEARNING	**72%**	**58%**	**42%**	**60%**

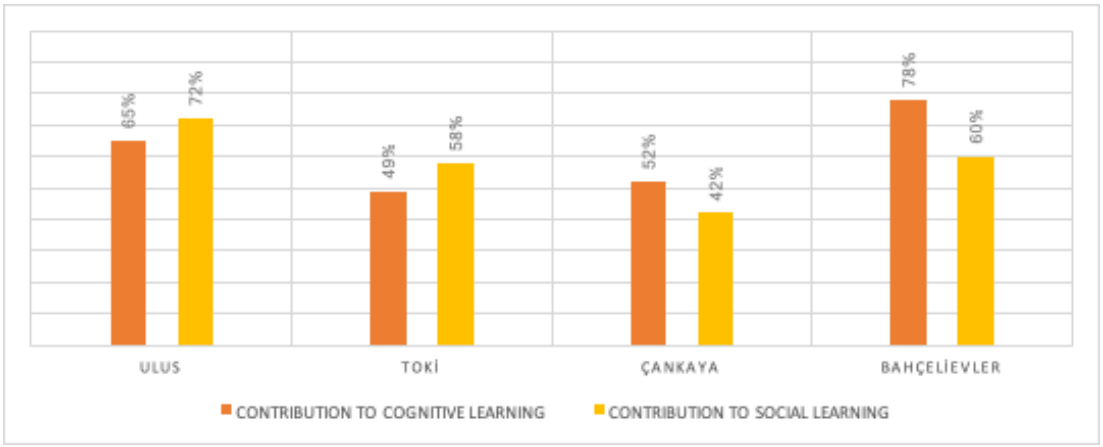


Figure 4-9 Distribution of Learning Parameters in the Areas

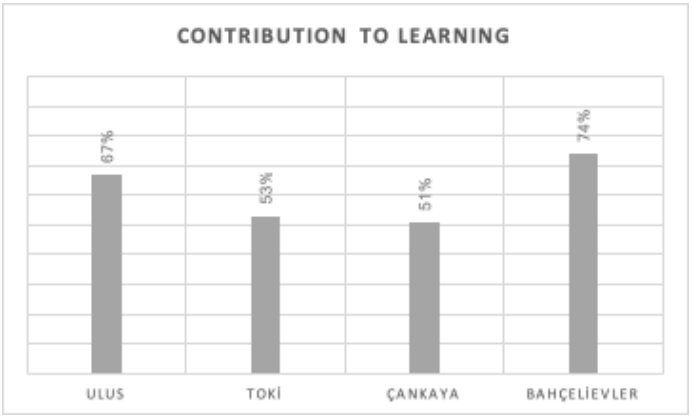


Figure 4-10 Contribution to Learning of Each Area

CHAPTER 5

CONCLUSION

This thesis suggests the streetscape is an immense resource that every child can make discoveries and learn new things both in the social, cognitive and emotional sense. It also argues that the publicness of the streetscape is so crucial that it cannot be compensated by any manufactured landscapes or substituted indoor areas.

This thesis aims to measure to what extent the streetscapes contribute to children's learning. To this end, a conceptual model is proposed to evaluate the sufficiency of different streetscapes regarding their contribution to children's learning. Results showed that different physical settings with various types of physical features provide different learning opportunities for children. The key findings of this research study are summarized as follows; i. The impact of publicity on the child's development, learning and behavior are substantial; ii. Contemporarily manufactured spaces with the new urbanization trends and regulations (as can be seen in redeveloped neighborhoods) do not provide the physical and spatial richness as that of the traditional and historical ones; iii. The impact of the design of physical settings and the designers'/planners' approaches to producing spaces is vital for the child's development, learning and behavior. Public spaces are found to be important in a child's development. As Ward (1978) indicates, public space is where children can learn through experiencing the social differences, and by manipulating their environment.

Moreover, natural resources lead children to try something new and enhance their learning abilities based on the potentiality of exploration. However, the built indoor environment remains non-productive in terms of exploration potential in comparison

with the outdoor environment (Burton, 2011). Additionally, public spaces provide the occasion what learning theory asserts about children's learning process; children get in contact with several adults and peers in the public spaces and perform learning by observing and imitating the behavior of these people (Bandura, 1978). For this reason, the layout and hierarchical set-up of the public spaces are essential in terms of affording these observation and socialization opportunities for children. Furthermore, the outdoor spaces have much more inventory for children to play, move, and experience through senses compared to their indoor living areas. Outdoor spaces provide physical diversity for all age group of children with each level of affordances. However, because of the never-ending changes in urbanization trends which have been seen in all periods of the time up until now, the physical environment has been exposed to alteration. Therefore, the spatial quality and the fruitfulness (regarding affordable things on offer) of an urban space also get a change in time. This alteration can be seen in the results of this thesis' survey part (in the conducted assessment tool). The assessment study was made in outdoor spaces of different residential areas showing different periodical characteristics of spatialization, on the street scale. Especially the variety in levels of privacy and topological features in the third dimension of the streetscapes are changing in each case study due to their periodical characteristics.

All in all, it can be judged from the polytomously scored results of the assessment tool survey that, the outdoor settings of contemporary and redeveloped, settlements are not successful in providing physical and spatial richness to promote children's learning, as the traditional and historical settlements are. Consequently, arrestingly to this evaluation, designers and planners as occupational groups who can interfere and operate these spatialization movements, should consider the spatial quality and affordability ratio of outdoor space design in order to promote children's learning. In the next chapter, the key findings of this study are summarized in the light of the literature reviewed in Chapter 2.

5.1.1. Discussion of the Findings

Findings of the selected study areas reveal that the spatial layout and physical environmental attributes of traditional and historical settlements give children more opportunities for learning, contrary to the redeveloped and contemporary ones. To illustrate, the concept of the 'play street' aims to encourage children to go out, play and learn in the safer outdoor area. However, the made regulations under the name of 'play street' in order to improve the conditions of the street for children, remain as make-up interventions. In this study, the reason for the failure of the 'play street' is based on the insufficiency in the assessment survey of the redeveloped neighborhood, which's physical characteristics are formed by the implementations of new urbanism trends. Even the 'play street' application cannot compensate for the inadequacies of these kinds of 'modern' settlements. In the streets that have strong relations with nature, there is much more opportunity for learning, compared to the 'play street' which is artificially produced with the aim of making insufficient environments more usable for children. Natural areas are significant for children's creativity, problem-solving ability, learning of nature rules, abstract thinking ability, and so on.

Moreover, as previously mentioned in the existing literature (see Chapter 2.6), experiencing through exploration is one of the most critical factors in children's learning. In designed areas like 'play streets,' all the potentials that children can reach through exploration is given readily. Thus, they do not allow and encourage children to learn new things through discovery. As being the exact opposite, natural outdoor environments lead children into a wealth of exploration. In short, although the 'play street' has a potential to strengthen the chances of learning, the bottom line is on the total quality of living environment's physical attributes (both the topological relation of a built environment, and the proportion and quality of natural environment) and spatial qualifications. However, in order to generalize about 'play streets' similar to this assertion, further investigations should be made on these types of streets.

Moreover, although some scholars such as Taylor, Kuo, Spencer, and Blades (2006), and Wells and Evans (2003) claimed that natural environment is highly effective to make a difference in children's cognitive and social learning, according to the comparative findings conducted by author's assessment tool, nature is not solitarily sufficient. The case of TOKİ, 90th Street is a striking example of this claim. Although the case of TOKİ neighborhood is having the highest acreage of natural resources, the total assessment shows that 90th Street is having the second lowest percentage of contribution to social learning (58%), whilst having the lowest percentage in contribution to cognitive learning (49%), (52% in total; see Chapter 4.8). This result underscores the importance of the collective contribution of all determined parameters.

5.1.2. Implications for Urban Design

Through the proposed assessment tool in this study in order to track the physical environmental traces that promote children's learning, physical urban environments (selected according to their differentiating inputs) were evaluated according to previously discussed parameters which are deduced from the theoretical framework. These parameters are the main components for the design of physical environment: i. Sensory stimulation richness; ii. Variety in behavior settings (which are enabling different types of play activities for different age groups; see Chap.2.7.3.2 and Chap.2.8.1); iii. Affordances (in natural and manufactured fixed physical elements and topographical features) and response feedback; and iv. Topological relations of the space in the third dimension (enclosure level/scale, continuity, legibility, proximity, spatial hierarchy).

According to the results obtained from each categorization, implications for urban design can be summarized as follows:

- Sensory stimulation richness in the urban environment is provided by the variety of patterns, textures, ornaments, shapes, and colors in architectural or

urban furniture elements, and in the ground surfaces. The more diversity results in more stimulation of children's senses. Therefore, the spaces having richness in these inputs are more attention-grabbing and attractive places. As a result of this, these spaces more successfully promote cognitive learning of children (Hendricks, 2001; see also Chap.2.8.1), especially who are in the early and middle childhood period (see Chap.2.3.1, and Chap.2.3.2).

- Hierarchically differentiated space settings promote different play types and socialization opportunities (see Chap.2.7.3.1). Therefore, having more hierarchical relations in the spatial organization increases the potential of the areas' contribution to children's both cognitive and social learning. Moreover, variation in behavior setting is one of the most critical parameters according to the author; Because, if the area involves all types of behavior setting with diversified hierarchies and sizes, the preferability of the space for play, for each age group of children is getting higher.

- Affordances are the most crucial indicative parameter of children's cognitive learning, according to the Ecological theorists (see Chap 2.2.; see also, Gibson, 1979). Since affordance is in relation with the perception notion (Gibson 1979), it is shifting from child to child by their developmental periods (see also, Chap. 2.3). Moreover, natural and built environment provide affordance opportunities respectively. Therefore, the more diversity and abundance of affordable elements (both natural and manufactured), means the better contribution ratio in cognitive learning. Together with this, the landform/topographical features also have an impact on triggering the cognitive learning both regarding affordances, and visual and perceptual stimulation. For example, spaces having steep or sinuous layout challenge children more, compared to the flat or straight ones. On the other hand, areas with more affordance elements contribute explicitly more effectively to

middle-aged children, because the motor-phase development of cognitive learning is rapidly developing at this developmental period.

Furthermore, natural settings provide more manipulation opportunity for children by including a significant number of loose materials (Walsh, 2016; Hendricks, 2001). Additionally, natural areas are more response feedback because they provide continuous feedback about children's abilities, and support and encourage children's actions. Therefore, natural elements have great importance for children's cognitive learning, especially for the ones in the early childhood period (see Table 2.1; see also Chap.2.3.2: 'Cognitive Development')

Moreover, as previously discussed in Chap.2.7.3.2, play in nature is positively affecting children's socialization abilities and welfare. In accordance, it can be said that urban settings which are having more natural components, have greater impacts on children's learning than setting having no or little vegetation.

- Topological relations are directly correlating with individual's perception (Gibson, 1979). Therefore, the most important topological factor is scale in the third dimension, when considering the environmental contribution to children's learning. It is because children get the information from the outdoor environment as far as they can perceive (Rapoport, 1977).

- Legibility is significantly vital in assisting children's spatial learning and improving their orientation skills. Through legibility features that a streetscape has, especially in the period of the fixed reference system (for further review, see Chap.2.4), children's development of space perception is being fostered (Hart, 1979). To increase the legibility of streets, urban designers should consider the components of legibility (landmarks, nodes, districts, edges,

paths) as Lynch defined (1960). Landmarks should be more used, the edges of the streets should strongly be described, and multiple nodes in different hierarchies should be provided in order to make the street more legible and educatory.

- Degree of proximity between multiple stimulus elements (not only natural elements, but also urban furniture, architectural or cultural/historical elements, and buildings) may form a focal point (Whyte, 1980), in which all age-group children can find new educative hints about comprehending mathematical and geometrical notions such as size, volume, amount, form, also space, and even the notion of time.

5.1.3. Implications for Research

This thesis focused on the role of physical environmental factors and the perception and recognition of these attributes in children's learning. However, as previously mentioned in Chapter 2.6, individual, social and experiential factors are also influential in children's learning process. For example, a child living in a mass housing estate may learn more from its environment than a child living in a historical settlement because of his/her assets, motivation, encouragement received by his/her parents and so on. In this context, future research should investigate the selected streetscapes from a broader perspective, and examine which factors (physical, social, individual) determine children's learning in different urban environments. Researchers may also develop more complex tools to understand how children, who are having different sociodemographics (age, gender, level of income, etc.), learn from their physical environments in different contexts.

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LEARNING	PHYSICAL FACTORS THAT PROMOTE COGNITIVE LEARNING	SCORING 0-5	ULUS (Alitaş St)	TOKİ (90. St)	BİRLİK (Play St/ 455. St)	BAHÇELİEVLER (39. St)
COGNITIVE	**C.a. Fixed Physical Attributes** (Elements such as benches, shelters, shade covers, walls, fences, building facades, alternative seating, pergolas, arbors, wrought iron fence, information signboards, a sculpture, trees, etc.)	**C.a.1** Number of pieces of materials: climb-able elements **0)** none **1)** one **2)** two-three **3)** four-five **4)** six-seven **5)** more than 8 (please explain, climbable for which age group?)	**5** Exp: trees, retaining walls Climbable for age groups of 2-6, 6-12, 12-18	**4** Exp: trees, benches, arbors Climbable for age groups of 2-6, 6-12	**3** Exp: benches, separation wall, entrance of building, arbor Climbable for age groups of 2-6, 6-12	**5** Exp: trees, garden walls Climbable for age groups of 2-6, 6-12
		C.a.2 Number of pieces of materials: swing-able elements **0)** none **1)** one **2)** two-three **3)** four-five **4)** six-seven **5)** more than 8 (please explain, swingable for which age group?)	**2** Exp: trees, fences Swingable for age group 6-12	**2** Exp: arbor, ramp Swingable for age group 6-12	**2** Exp: arbor Swingable for age group 2-6 Exp: entrance shed Swingable for age group 6-12	**4** Exp: garden door, laundry hanger, parking barrier Swingable for age group 2-6, 6-12
		C.a.3 Number of pieces of materials: on sit-able elements **0)** none **1)** one **2)** two-three **3)** four-five **4)** six-seven **5)** more than 8 (please explain, sit-able for which age group?)	**5** Exp: garden wall, stairs, taboret, step Sitable for age group 2-6, 6-12, 12-18	**5** Exp: garden wall, stairs Sitable for age group 2-6, 6-12, 12-18	**5** Exp: taboret Sitable for age group 2-6, 6-12, 12-18	**5** Exp: garden wall, retaining wall, stairs, taboret, step Sitable for age group 2-6, 6-12, 12-18
		C.a.4 Number of pieces of materials: on balance-able elements **0)** none **1)** one **2)** two-three **3)** four-five **4)** six-seven **5)** more than 8 (please explain, balanceable for which age group?)	**5** Exp: garden wall, paving stone, step Balancable for age group 2-6, 6-12, 12-18	**2** Exp: concrete flowerpot, paving stone Balancable for age group 2-6, 6-12, 12-18	**4** Exp: barriers, little tables Balancable for age group 2-6, 6-12	**5** Exp: garden wall, paving stone, stone steps, parking barrier Balancable for age group 2-6, 6-12, 12-18
		C.a.5 Number of pieces of materials: read-able elements **0)** none **1)** one **2)** two-three **3)** four-five **4)** six-seven **5)** more than 8 (please explain, readable for which age group?)	**2** Exp: street name signboard, shop sign	**1** Exp: site name signboard	**2** Exp: publicity poster, street name signboard	**5** Exp: publicity poster, street name signboard, apartment names in different fonts, graffiti
		C.a.6 Sensory stimulation richness: number of fixed physical attributes different textures (e.g., wood, plastic, etc.) **0)** none **1)** one **2)** two-three **3)** three-four **4)** four-five **5)** more than 5	**5** Exp: wood, mud brick, plaster, briquette, metal, stone, brick stone, moss, bark, concrete	**3** Exp: plaster, plastic, wood coating, concrete	**3** Exp: wood, concrete, metal, plastic	**5** Exp: wood, marble, plaster, briquette, metal, stone, brick stone, concrete, moss
		C.a.7 Sensory stimulation richness: number of different textures in ground surface (e.g., wood, plastic, etc.) **0)** none **1)** one **2)** two-three **3)** three-four **4)** four-five **5)** more than 5	**3** Exp: stone, metal, concrete	**2** Exp: soil, stone, tile	**5** Exp: asphalt, pebble, concrete, soft rubber, artificial grass, metal	**5** Exp: marble, metal, plaster, wood, concrete, plastic, soil, asphalt, ceramics, moss
		C.a.8 Sensory stimulation richness: number of fixed physical attributes with different colors **0)** none **1)** one **2)** two-three **3)** three-four **4)** four-five **5)** more than 5	**5** Exp: orange, white, grey, brown, yellow, green, red	**5** Exp: orange, blue, green, brown, yellow, black	**5** Exp: orange, white, blue, yellow, green, red	**5** Exp: orange, white, grey, brown, yellow, green, red, blue, black
		C.a.9 Sensory stimulation richness: number of different colors in ground surface **0)** none **1)** one **2)** two-three **3)** three-four **4)** four-five **5)** more than 5	**2** Exp: grey, brown, pink	**3** Exp: red, grey, green, yellow	**3** Exp: red, yellow, brown, grey	**3** Exp: brown, grey, red, green
		C.a.10 Sensory stimulation richness: number of fixed physical attributes with different ornaments **0)** none **1)** one **2)** two-three **3)** three-four **4)** four-five **5)** more than 5	**5** Exp: window rails, door details	**0**	**5** Exp: varied character figures	**5** Exp: garden door and window profiles, facades
		C.a.11 Sensory stimulation richness: number of different ornaments in ground surface **0)** none **1)** one **2)** two-three **3)** three-four **4)** four-five **5)** more than 5	**2** Exp: manhole cover, floor details	**2** Exp: manhole cover, pedestrian floor details	**1** Exp: manhole cover	**4** Exp: manhole cover, pedestrian floor details, apartment entrance floor (each one is different)
		C.a.12 Sensory stimulation richness: number of fixed physical attributes with different patterns (e.g., grid, curvilinear, radiation, tiling, etc.) **0)** none **1)** one **2)** two-three **3)** three-four **4)** four-five **5)** more than 5	**4** Exp: radiation, grid, spirals, tiling, fractal	**1** Exp: tiling	**2** Exp: lineer, grid	**4** Exp: grid, tiling, weave, curvelinear, radiation
		C.a.13 Sensory stimulation richness: number of different patterns in ground surface (e.g., grid, curvilinear, radiation, etc.) **0)** none **1)** one **2)** two-three **3)** three-four **4)** four-five **5)** more than 5	**3** Exp: spirals, tiling, grid	**2** Exp: weave, grid	**2** Exp: weave, grid	**4** Exp: weave, spiral, grid, tiling
		C.a.14 Sensory stimulation richness: number of fixed physical attributes with different shapes **0)** none **1)** one **2)** two-three **3)** three-four **4)** four-five **5)** more than 5	**5** Exp: square, triangle, rectangle, organic, cylinder, curvelinear, circle	**3** Exp:, rectangle, linear stripes, circle, cylinder	**4** Exp: square, triangle, rectangle, trapezoid, cylinder	**4** Exp: triangle, circle, rhombus, curvelinear, linear stripes
		C.a.15 Sensory stimulation richness: number of different shapes in ground surface **0)** none **1)** one **2)** two-three **3)** three-four **4)** four-five **5)** more than 5	**3** Exp: square, circle, rectangle	**3** Exp: rhombus, circle, rectangle	**3** Exp: square, circle, rectangle	**5** Exp: fluctuated curves, square, rectangle, rhombus, triangle, circle
		C.a.16 Sensory stimulation richness: number of physical attributes in the setting that guide play (e.g., written rules, shapes) **0)** none **1)** one **2)** two-three **3)** three-four **4)** four-five **5)** more than 5	**0**	**0**	**0**	**0**

LEARNING	PHYSICAL FACTORS THAT PROMOTE COGNITIVE LEARNING	SCORING 0-5	ULUS (Alitaş St)	TOKİ (90. St)	BİRLİK (Play St/ 455. St)	BAHÇELİEVLER (39. St)
COGNITIVE	**C.b. Loose Physical Attributes** (Move-able, change-able, manipulate-able, shift-able materials; can be natural or manufactured, junk or recycled, leaf, sticks, water, sand, mud or soil stones, water, sand, bark, moss, leaves, mud, logs, fruit)	**C.b.1** Access to natural loose materials across the site; (across entire site or in areas of the site) **0)** no access, **1)** little access, **2)** very small quantities and very small, defined location **3)** small quantities or small defined location **4)** useable and movable, sufficient amount of **5)** useable, movable, manipulable, excess amount of (please explain the type of loose material)	**3** Exp: water, vegetation	**4** Exp: soil, vegetation, stone	**3** Exp: stone, vegetation, pebble	**4** Exp: soil, vegetation
		C.b.2 Types of natural loose materials across the site; (across entire site or in areas of the site) **0)** no access, **1)** one type, **2)** two types **3)** three types **4)** four types **5)** 5 and more types (please explain the type of loose material)	**2** Exp: water, vegetation	**3** Exp: soil, vegetation, stone	**4** Exp: soil, vegetation, pebble, sticks	**4** Exp: soil, vegetation, stone, sticks
		C.b.3 Access to manufactured loose materials (i.e. junk) across the site; (across entire site or in areas of the site) **0)** no access, **1)** little access, **2)** very small quantities and very small, defined location **3)** small quantities or small defined location **4)** useable and movable, sufficient amount of **5)** useable, movable, manipulable, excess amount of (please explain the type of loose material)	**2** Exp: tabouret, fruit box	**2** Exp: bicycle	**0**	**5** Exp: junk, benches, tabouret, table, palette box, empty flowerpots
		C.b.4 Types of manufactured loose materials (i.e. junk) across the site; (across entire site or in areas of the site) **0)** no access, **1)** one type, **2)** two types **3)** three types **4)** four types **5)** 5 and more types (please explain the type of loose material)	**2** Exp: tabouret, fruit box	**1** Exp: bicycle	**0**	**5** Exp: junk, benches, tabouret, table, palette box, empty flowerpots
	C.c. Natural Resources (Plants, trees, grass, flowers, leaves, stones, soil and water, people, animals (pets), insects, etc.)	**C.c.1** Number of Trees: climbable, according to height of branches **0)** none **1)** one **2)** two-three pieces **3)** four-five **4)** six-seven **5)** more than 7 pieces (please explain, for whom the tree/trees is/are climbable?)	**2** Exp: Climbable for age groups of 6-12, 12-18	**1** Exp: Climbable for age groups of 6-12, 12-18	**0**	**3** Exp: Climbable for age groups of 6-12, 12-18
		C.c.2 Types of Trees: Variety of tree types with different leaves (i.e., to learn wind effect, to learn sources of different fruits, flowers and leaves) **0)** none **1)** one **2)** two-three **3)** four-five **4)** six-seven **5)** more than 7 types (please explain what kind of-coniferales/latifolius/etc.?)	**5** Exp: coniferals (black pine, spruce tree, etc.), latifolius (oak tree, etc.)	**5** Exp: coniferals (black pine, spruce tree, etc.), latifolius (oak tree, etc.)	**3** Exp: coniferals (black pine, spruce tree, etc.), latifolius (oak tree, etc.)	**5** Exp: coniferals (black pine, spruce tree, etc.), latifolius (oak tree, etc.)
		C.c.3 Number of Shrubs: as a play element, hiding element, enclosure element, exploration area **0)** none **1)** one **2** two-three pieces **3)** four-five **4)** six-seven **5)** more than 7 pieces	**3** Exp: play element, exploration area	**5** Exp: play element, exploration area, enclosure element, hiding element	**2** Exp: exploration area	**3** Exp: play element, exploration area
		C.c.4 Amount of Vegetation: provide sensory stimulation richness, exploration, **0)** none **1)** minimal **2)** limited types partly in the certain area **3)** limited types in the whole area **4)** several different types partly in the certain area, visually stimulating or encourages interaction **5)** several different types across whole area, visually stimulating and encourages interaction	**3**	**4**	**2**	**5**
		C.c.5 Number of Water supply elements: street fountain, water channel, decorative pool (please explain if there is more alternatives) **0)** none **1)** one **2)** two **3)** three **4)** four **5)** 5 and more	**1** Exp: fountain	**0**	**0**	**0**

LEARNING	PHYSICAL FACTORS THAT PROMOTE COGNITIVE LEARNING	SCORING 0-5	ULUS (Alitaş St)	TOKİ (90. St)	BİRLİK (Play St/ 455. St)	BAHÇELİEVLER (39. St)
COGNITIVE	**C.d. Landform / Topography** (Flat or steep surfaces, spatial variations like mounds, stairs, steps, elevated platforms (sidewalk), knobs)	**C.d.1** Degree of Steep/Sinuous, Flat/Straight street: **1)** Flat and straight **2)** Flat and sinuous **3)** Steep and Straight **4)** Steep and sinuous street **5)** mix of all of above	**5**	**1**	**2**	**1**
		C.d.2 Types of landform: mounds, knobs, garden walls, stairs, steps, sidewalk: **0)** none **1)** one **2)** two **3)** three **4)** four **5)** contains all of above (please explain the element)	**5**	**2** Exp: stair, knob	**3** Exp: step, sidewalk, knob	**1** Exp: step
	C.e. Variety of Behavior Settings (Active, open, natural, quiet)	Access to different type space settings: Quiet space settings (small spaces) for individual retreat, observation of other children or quiet activities; Natural space settings to interact with natural elements and to make exploration; Active space settings to challenge children (i.e., spaces including ramps, stairs to jump, climb, etc.); Open space settings supporting movement at speed for group and team activities **1)** not available **2)** one of above **3)** two of above **4)** three of above **5)** contains all of above (please explain the detected behavior setting(s))	**4** Exp: quiet, active, open	**5** Exp: quiet, active, open, natural	**4** Exp: quiet, active, open	**5** Exp: quiet, active, open, natural
	C.f. Topological Relations (Scale, Size, shape, scale, continuity, proximity, separation, order, enclosure)	**C.f.1** Is there a spatial / visual continuity that will provide visual attention and concentration? Attached, detached houses, architectural distinctive characteristics **0)** very little spatial / visual continuity; detached houses, no distinctive architectural characteristics **1)** less spatial / visual continuity; attached houses, no distinctive features **2)** low-medium spatial / visual continuity; detached houses, no distinctive architectural characteristics **3)** medium spatial / visual continuity; attached/detached houses, distinctive architectural characteristics **4)** less-good spatial / visual continuity; attached houses, no distinctive architectural characteristics **5)** good spatial / visual continuity; attached houses, distinctive architectural characteristics	**3** Exp: attached houses, partially distinctive features (historical)	**3** Exp: detached houses, no distinctive features, but continuous landscape elements	**2** Exp: detached houses, no features	**4** Exp: detached houses, partially distinctive (periodical) features, continuous gardens and façade elements
		C.f.2 Enclosure Level (Scale): the ratio of Height to Width **0)** High (H), Narrow /Medium(W) **1)** High (H), Wide (W) **2)** Medium (H), Narrow/Medium (W) **3)** Medium (H), Wide (W) **4)** Low (H), Narrow/Medium (W) **5)** Low (H), Wide (W) (please indicate the floor number)	**4** Exp: 2 floors, 9m wide	**1** Exp: 9 floors, 100m wide	**3** Exp: 4 floors, 20m wide	**3** Exp: 4 floors, 20m wide
		C.f.3 Degree of proximity: Is there any interaction of elements (by location) that reinforces learning? (the triangulation effect) **0)** none **1)** few elements with nonrelational proximity **2)** few elements with affinitive proximity **3)** adequate elements (min3) with nonrelational proximity **4)** adequate elements (min3) with affinitive proximity **5)** rich elements (more than 3) with affinitive proximity (please indicate the elements, and draw the map of the relation)	**5** Exp: stairs, fountain, fire hydrant; mound, stair, retaining wall, tree	**2** Exp: stairs, concrete flowerpot	**5** Exp: benches, small arbors, small fixed tables, barriers	**5** Exp: trees, laundary hanger, parking barrier, garden walls
		C.f.4 Legibility elements: Is there any landmarks, nodes, edges, districts that make the space more legible and imageable? **0)** none **1)** one **2)** two **3)** three **4)** four **5)** more than five (please indicate the elements)	**5** Exp: landmarks, nodes, edges, districts	**2** Exp: node, landmark	**3** Exp: landmarks, node	**5** Exp: landmarks, nodes, edges, districts

LEARNING	PHYSICAL FACTORS THAT PROMOTE SOCIAL LEARNING	SCORING 0-5	ULUS (Alitaş St)	TOKİ (90. St)	BİRLİK (Play St/ 455. St)	BAHÇELİEVLER (39. St)
SOCIAL	**S.a. Natural Resources** (Plants, trees, grass, flowers, leaves, stones, soil and water, people, animals (pets), insects, etc.)	**S.a.1** Number of Trees: provides shade, shelter, and gathering area for socialization **0)** none **1)** one **2)** two-three pieces **3)** four-five **4)** six-seven **5)** more than 7 pieces (please explain the feature)	**5** Exp: shelter, gathering area	**5** Exp: shade, gathering area	**2** Exp: shade	**5** Exp: shelter, shade, gathering area
		S.a.2 Number of Shrubs: as play element, hiding element, enclosure element, exploration area **0)** none **1)** one **2** two-three pieces **3)** four-five **4)** six-seven **5)** more than 7 pieces (please explain the feature)	**3** Exp: exploration, play	**5** Exp: hiding, exploration, play, enclosure	**2** Exp: exploration, play	**4** Exp: exploration, play, enclosure
		S.a.3 Amount of Vegetation: provide sensory stimulation richness, exploration, **0)** none **1)** minimal **2)** limited types partly in the certain area **3)** limited types in the whole area **4)** several different types partly in the certain area, visually stimulating or encourages interaction **5)** several different types across whole area, visually stimulating and encourages interaction	**3**	**4**	**2**	**5**
	S.b. Landform / Topography (Flat or steep surfaces, spatial variations like mounds, stairs, steps, elevated platforms (sidewalk), knobs)	**S.b.1** Degree of Steep/Sinuous, Flat/Straight street: Plain surfaces provides more potential of interaction, steep areas has compelling nature **1)** Steep and sinuous street **2)** Steep and Straight **3)** Flat and sinuous **4)** Flat and straight **5)** mix of all of above	**5**	**2**	**3**	**4**
		S.b.2 Number of higher mounds, knobs, garden walls, stairs, steps, sidewalk: higher ones define edges of different sized areas for behavior settings **0)** none **1)** one **2)** two **3)** three **4)** four **5)** contains all of above (please explain the elements)	**4** Exp: stairs, garden wall, mound, knob	**2** Exp: ramp, stairs	**1** Exp: garden wall	**1** Exp: garden wall
		S.b.3 Types of lower mounds, knobs, garden walls, stairs, steps, sidewalk: lower ones afford sitting, gathering and socializing etc. **0)** none **1)** one **2)** two **3)** three **4)** four **5)** contains all of above (please explain the elements)	**4** Exp: steps, stairs, garden wall, knob	**1** Exp: knob	**3** Exp: step, sidewalk, knob	**2** Exp: garden walls, steps
		S.b.4 Proportion of hard/soft surfaces: hard surfaces are disadvantageous due to shared use (ie., vehicles, pedestrians) therefore may limit the opportunity to play freely; soft surfaces enables more to play freely. **1)** completely hard surface **2)** hard surfaces: more than half **3)** equal proportion **4)** soft surfaces: more than half **5)** completely soft surface (please indicate the ratio)	**1** Exp: %100 hard surface	**4** Exp: %30 hard surface %70 soft surface	**2** Exp: %90 hard surface %10 soft surface	**3** Exp: %55 hard surface %45 soft surface
	S.c. Variety of Behavior Settings (Wide, active, open, narrow, quiet)	Access to different type space settings: Quiet space settings (small spaces) for individual retreat, observation of other children or quiet activities; Natural space settings to make exploration both individually or in company; Active space settings to challenge children (i.e., spaces including ramps, stairs to jump, climb, etc.) and lead them cooperation; Open space settings supporting movement at speed for group and team activities **1)** not available **2)** one of above **3)** two of above **4)** three of above **5)** contains all of above (please explain the detected behavior setting(s))	**4** Exp: quiet, active, open	**5**	**4** Exp: quiet, active, open	**5**
	S.d. Fixed Physical Attributes	**S.d.1** Are there any historical or cultural elements that will develop the historical or cultural consciousness? (therefore the sense of community) **0)** none **1)** one historical or cultural element **2)** 2-3 historical or cultural element **3)** 4-5 historical or cultural element **4)** 6-7 historical or cultural element **5)** more than 7 historical or cultural element (please explain)	**5** Exp: historical site, historical buildings, details	**0**	**0**	**0**

LEARNING	PHYSICAL FACTORS THAT PROMOTE SOCIAL LEARNING	SCORING 0-5	ULUS (Alitaş St)	TOKİ (90. St)	BİRLİK (Play St/ 455. St)	BAHÇELİEVLER (39. St)
SOCIAL	**S.d. Fixed Physical Attributes**	**S.d.2.** Are there any architectural features that provide socialization? (i.e., an arbor, a cantilever or bay window to gather children under it) **0)** none **1)** one feature **2)** 2-3 features **3)** 4-5 features **4)** 6-7 features **5)** more than 7 features (please explain the architectural feature)	**2** Exp: cantilever, bay window	**1** Exp: arbor	**2** Exp: shed, arbor	**1** Exp: cantilever

ENVIRONMENTAL CHARACTERISTICS	SCORING 0-5	ULUS (Alitaş St)	TOKİ (90. St)	BİRLİK (Play St/ 455. St)	BAHÇELİEVLER (39. St)
E.a. Safety and Security	Does the area has traffic, stranger-danger (due to the density of daily use) or pollution problems? **0)** crowded and fast traffic flow, polluted environment/stranger-danger **1)** traffic problem, polluted environment/stranger-danger **2)** slow traffic, polluted environment/stranger-danger **3)** pedestrianized area, polluted environment/stranger-danger **4)** slow traffic, quiet neighborhood zone **5)** pedestrianized area, quiet neighborhood zone	**2**	**5**	**2**	**4**
E.b. Exclusionary policies	Restrictive signboards that do not allow the use of children **0)** 5 and more **1)** four **2)** three **3)** two **4)** one **5)** none (please explain the signboard)	**5**	**5**	**5**	**5**