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**COLOUR AND PLANTS IN THE INTERIOR DESIGN OF EARLY
CHILDHOOD ENVIRONMENTS**

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COLOUR AND PLANTS IN THE INTERIOR DESIGN OF EARLY
CHILDHOOD ENVIRONMENTS

By

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This study titled "COLOUR AND PLANTS IN THE INTERIOR DESIGN OF EARLY CHILDHOOD ENVIRONMENTS" and presented as Master Dissertation by Sılay EMIR has been evaluated in compliance with the relevant provisions of Middlesex University. The jury members whose signatures are below have decided for the defense of this dissertation and it has been declared by consensus / majority of votes that the candidate has succeeded in dissertation defense day dated 14.10.2014.

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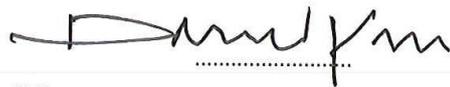
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ABSTRACT

Pre-school education plays an essential role at the beginning of the continuity of education process. The rise of the life standards causes that women take part in working life. Because of this situation, to grow and develop children in a better way, an important necessity of people and institutions for children's care and education arises. Generally, the personal development of children, starting from the early childhood, continues on the same way in the following years. Furthermore, the aim of the pre-school education is to make children gain social and personal character to become useful individuals, productive and actively participating members in the society. To achieve the aims of the pre-school education, education system should be designed and provided in accordance with the needs, physiological and psychological characteristics of children. In this content, suitable environmental conditions for their needs have been investigated. Space organisation and environmental conditions have been observed. Besides, within the framework of these space organisations, the samples of pre-school educational centres have been given. Within the scope of this dissertation, kindergarten education buildings in which the child meets and understands social environment after his/her family, have been analyzed. In the light of pre-schools designed with the awareness of the environment protection consciousness, the findings obtained were compiled here.

Pre-school education buildings design has a crucial importance for children of 0-6 years age group and colour and plants in interior design are the major parts of preschool education. Aiming how children perceive spaces; the effects of the physical environment on children's perception were considered and visual surveys and interviews were carried out. Pre-school educators participated in the visual survey about using plant and colour in kindergarten design. A visual survey was applied for detecting teachers' choice with the help of recoloured and planted examples of early childhood environments on Photoshop. Then, the results have been presented. In light of the survey, interviews and data, suggestions for sample designs for children which aim to develop visual perception, to contribute to the education, and to get maximum benefit from the nature have been presented in the conclusion.

In the next part, the definition of pre-school education, its purpose, its importance, and its necessity have been explained. Pre-school education institutions were examined both in Turkey and in England. Afterwards, the history of pre-school education was investigated and its development in Turkey and in the world, was discussed. The relationship between kindergarten and its environment, its urban relations, physical and functional features, and its interior-exterior space organisation were discussed. Interior and exterior space is linked with each other. So, outdoor environment could be used more commonly and children could have the love of nature. Consequently, international kindergarten samples were investigated. The effect of space organisation in pre-education was criticized. Also, the contribution of

space arrangement to children's perception and learning were discussed. The data about the features and the structures of the kindergartens were obtained.

The aim of this study is to analyse kindergartens through examples according to early childhood environment design criteria determined under the name of physical environment data, structural form, efficient landscape designs, effective use of colour in interiors, and sensory interior design. Implementing surveys on early childhood environment design with kindergarten teachers is one of the most important aims of this research. This study will serve as a source that sheds light on conscious designs in kindergarten buildings, and the examples of which have not been seen in Turkey. By encouraging the development of children's visual perception with colours and plants, this study will contribute to kindergarten buildings that will be designed from now on.

KEY WORDS: Pre-school Education, Plants, Colour, Visual Perception, Design

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1. INTRODUCTION

Education is a phenomenon and a process that must continue throughout the life of human beings. Early childhood period is the most important stage in order to educate better generations. It is obvious to consider that the human mind, the character, the desire can never been developed as quickly as in the pre-school years. A number of studies have revealed that experiences gained during preschool years have a great impact on the subsequent accomplishments of an individual, and that kindergartens have a major influence on child development since these are places where children spend most of their pre-school time. Early childhood education has a special importance among all other education processes because development is shaped at a large extent during the 0-6 year period of children. According to the research done by Bloom and et all, 50 % of intelligence level measured in seventeen years old is developed between pregnancy and the ages of four; 30 % of that occur between the ages of four and eight; in between the ages of eight and seventeen, only 20 % of that is developed. The early childhood environment is one of the most effective elements in child development. At the same time, pre-school period has a great impact on children and society since this period plays an important role as a contribution to social development.

When looking at the historical development process of pre-school education building designs built with the aim to serve children, it has been observed that they were designed within basic frameworks such as location, building structure garden arrangement, furniture equipment and interior space organizations as a result of the inadequacy of laws and regulations on the school building design, lack of people specializing in pre-school education buildings and auditing. As a result, generated structures are concrete jungles insensitive to the environment.

Child development, supported by a good pre-school education system should be done in a healthy environment. Environment conditions are as essential as the education system. The quality of the physical and social environment affects child development in this education process. According to Piaget, children's development could be affected by the environment. Preschool education is a process in which children leave the restricted home atmosphere to join a wider social network. High-quality education contributes to a child's intellectual, social, physical and emotional development (Cirhinlioğlu, 2001).

As Nicholson (2005) points out, children discover the world through their senses. Thus, by nourishing senses and emotions, architecture plays an important role in child development (Day, 2007). Indoor and outdoor environments for children and youth help the completion of their development and facilitate their learning. So, these environments should be well-designed, and the needs in education building should be met consciously because it will affect children's physical health, mental development, motor skills, social intelligence and future life. In short, this research

reveals that user requirements in education buildings must be met with sustainable design solutions and environment conditions must be improved consciously. Early childhood environments designed by benefiting from colour and vegetation might be helpful in order to develop children's visual perception and increase their success in the school life. In the end, the ideal learning environment for children is aimed to create by providing lush vegetation and a direct connection to outdoor space.

Today's children will shape the world in the future. To support them in every aspect is essential. According to the researchers on this subject, most of character education is shaped between 0-6 years of age. Moreover, this age group spends most of their times in kindergarten because of their working mothers. Thus, kindergartens which are appropriate for the needs and physiological and psychological characteristics of children should be well-designed in terms of architecture

Consequently, enabling the child to have an education in a correctly designed environment enriched with stimulus increases the number of successful individuals in life and the number of people who interpret visual aesthetic correctly in spaces. During education period, abilities and awareness are rapidly developing, mental development accelerates and the happiness of children increases.

1.1 Problem Statement

Children go to kindergartens not only take education, but also for communication, spending efficient time, meeting their friends, developing their skills and other social activities. Therefore, kindergartens provide the integrated functions of education centre; children care centre, and even courtyard and playground. Thus not only sight, other senses like smelling, hearing, and haptics also need to be well considered.

The use of vegetation in the space plays an essential role for children in terms of learning, gaining the love of nature and taking responsibilities. Moreover, we could contribute to children's education with the colours used in the interior. Maybe, they could arrange their behaviours and perceive faster with the use of right colour in the right place.

In interior design practice, sight generally plays a dominant role. Designers always pay attention to colour, materials, formation, illumination, and so on, however, other senses, such as odour, hearing, haptics, are barely considered. Without non-visual sensory design, interior space would be uncomfortable. Although sight is the most important sense while human perceiving the world, other sense systems are also significant. Non-visual sensation can strengthen visual perception, and deliver a distinct identity to an interior space.

Designers play an integral role in the development of successful ECE facilities that foster learning and stimulate their most important user—the child. However, designers often face many problems in creating successful learning environments

Moreover, interior designers should consider following questions: What causes a kindergarten to be preferred by parents apart from a good quality of education? How does a kindergarten engender a strong impression for parents and children? How is a kindergarten remembered by parents? This thesis tries to answer these questions based on sensory study. Sensory design achieves an impressive and memorable space which enhances user sensory perceptions.

Children mean our future. So, we should pay attention to their development and spaces where they grow up because they could be affected by the environment easily. For instance, their creativity might be restricted by the design of the space. The subject came up because there are some kindergartens in Turkey which are not planned by skilled designers. I have been to a few kindergartens and their design was different from each other.

The goal is to get a good and useful solution from this report. I am going to try to go to some kindergartens here in London and Turkey and talk to people that work in the kindergartens and base my research on that. Then, I will research how kindergarten interior can be improved and support with the use of colour and indoor plants.

1.2 Purpose

My objective was to design interior spaces which appeals to young children's senses by benefiting from colour and vegetation. Early childhood environments have a crucial role on children's spiritual and mental development. In this study, it was aimed to create a sustainable space which is able to meet children's learning and entertainment needs at the same time. Also, children's desire for learning might be enhanced thanks to colours, aesthetic, harmony. Environmentally friendly spaces might be encouraged with using vegetation in design. Thus, children's love of nature is strengthened.

The user needs in education structure must be responded with sustainable design solutions by supporting suitable and healthy environment conditions. Therefore, it was aimed to develop children's visual perception and success, to provide the visual aesthetic in design.

1.3 Significance of the Project

Cognitive development comprises an extremely complex process that continues throughout the life of human beings. The most important period of this process, without doubt, is childhood and teenage years that the fastest development occurred. People's individual, psychiatric, social awareness or unawareness is directly related to the education they took.

The lack of space can affect the user's psychology. In parallel to this, user's request should be considered while designing a space. Especially, children may be affected from the space easily because they consider details rather than adults. Areas where

children play, in our fast urbanised cities, could not relieve children and also could not meet their game needs. Thus, children could not learn and contribute their mental, spiritual and perceptual development while playing. Among all living creatures, children are the ones who need the most protection, love, and care throughout their lives. Especially, their education holds a very important place in their later life. Behavioural disorders and learning difficulties could be experienced due to the wrong use of materials in design.

Children are exceedingly sensitive to space; they respond to many kinds: big spaces, open spaces, small spaces, cosy spaces, and especially hidden private spaces. The right kind of space creates activity, imagination, and educational opportunities (David & Wright, 1974). Research documents that children remember places far better than they remember people and things; thus, every design detail within a space is essential (Olds, 2001).

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1.4 Difficulties

It could be difficult to determine children's choice and preference because they are so energetic and their mode is constantly changeable. So, visual surveys and interviews should be presented to their teachers who have known the children closely.

2. LITERATURE REVIEW

2.1 CHILDHOOD and PRE-SCHOOL EDUCATION

In the second chapter the concept of children was defined and the definition of pre-school education, historical development and pre-school education units were described under main and sub-headings.

2.1.1 Definition of Childhood

The concept of children was also described with definitions such as the living being that experiences the process from birth to adolescence, young citizen, developing human (Çelik, 2005).

According to Bilgiç, children can never be described as the small replica of an adult individual. The child is different in its perception and interpretation of its surrounding. The Swiss scientist Jean Piaget indicated that the child had its own thinking, perception and interpretation characteristics and that the child was thinking concretely (Bilgiç, 2005).

Moreover, it is a fact that there are characteristics that distinguish the child distinctly from others. Notwithstanding that every child has its own character, behaviour, intelligence and appearance upon the birth process, the child is also equipped with different creative forces and talents. Therefore, the child should be regarded as a unique individual.

2.1.2 Characteristic of Early Childhood Period

According to developmental psychology, early childhood period is separated from other periods and has different requirements. During this period, basic skills are learned by every individual. Children gain most of their basic motor skills and abilities as a part of physical development in the preschool period. Moreover, this is the period when personality, social sensitivity and creativity start to be shaped. The experience gained in this period is very important. For this reason, this period is the most essential part of our life. So, psychologists are questioning patients' childhood period. Creating spaces for children should be dealt with this approach that means human- centred design.

According to Montessori approach, period between 0-6 years old is divided into two consecutive sub-phases as a period of 0-3 years and a period of 3-6 years. In this context, children in these two sub-phases are equipped with special understanding ability. So, Montessori thinks that 0-6 years old is the most intense period for learning (Schafer, 2006). During this period, obtaining skills and learning are quite easy for children. In this period, children are open to knowledge, interested, motivated to learn. Also, as if a separate learning window in the brain opens and all attention is directed to the environment or specific areas. As a result, the child will learn easily. The brain absorbs information, after passing through the process, keeps in mind. If children do not obtain what they need to gain in this period, it will not be easy to gain knowledge and skills later. For each child, knowledge and skills acquisition time and duration may vary. For example, in the sensitive period for language, to gain language skills for children is fairly easy and almost effortless. If there are not specific developmental stimulus for children in this period and children miss this period, the brain will miss the opportunity in order to get this ability easily (Grim, 2011; Schafer, 2006).

In addition, the basis of personality and individualism is established in this period. It is seen that children are creative and indecisive. In the first stage of this period up to 3 years, the development of creative energy with experience is evident. In terms of children, the diligence of unconscious intelligence is clear in this first three-year period. Children gain sensitivity for movements. As a result of this, behaviours such as coordination of hand movements, standing in balance and walking are observed. Along with the movement and hearing, the development of language occurs. Internal and external layout are started to set up. Also, the relationship is provided to

recognize. In the second sub-phase covering the 3-6 age groups, impressions from the environment are analyzed. Children, with activities around them, become individuals who demonstrated the development of an unconscious exploration towards a conscious working experience. Thus, gained experience which was obtained beforehand is updated and improved. Joining a group to provide social cohesion is very important for children (Arslan, 2008).

The most accurate response of kindergarten buildings to the needs of 3-6 years old children and their individual differences is possible by virtue of environments created by taking into consideration their physical, psycho-motor, social, emotional and cognitive development levels.

2.1.2.1 Physical and Motor Development

According to Brotherson physical development provides children the ability to explore their environment and interact with the world (Brotherson, 2006). A three year old child can ride a 3-wheel bike, can perform jumping, climbing and bouncing, and can improve in speaking language. The child is interrogative and sets up a world in itself besides the family.

Growth is continuous in children at an age of four and five. Climbing down from stairs, depicting human figures, imitating circle-triangle forms, developing language properly, being interested in the activities of adults is an appropriate physical development process for a child within this age range. (Bilgic, 2005).

2.1.2.2 Psycho-Social Development

The development process that contains cognitive, emotional and moral developments is called as the "psycho-social development" process. According to Piaget, the 3-6 years-old child named to be in "pre-process stage" is egocentric. Despite the fact that they seem to play within a group, they have created their own worlds. Children at this age group start to significantly develop their cognitive processing abilities and to question their causal thoughts. This indicates that awareness resulting from questioning is raised.

2.1.2.3 Perceptual Development

Perception is an action in which information from the environment is acquired by means of senses such as hearing, tasting, smelling, seeing, touching. In other words, it is the organism's responding situation by virtue of the information acquired from the environment (Bilgic, 2005).

This mental process covers mental activities such as perception, concept formation, language acquisition, memory, symbolization, categorization, thinking, problem solving and creation.

At the same time, this process includes the learning process which helps us to acquire and use the information; to understand and recognize our world. During this period, a three-year old child has the ability to recognize and match colours, to identify an object it sees, to identify three-piece objects and to complete a missing human picture, etc. (MEGEP, 2007).

Abilities such as organizing or shaping four-eight piece objects, drawing a human figure in a state including 6-pieces, sequencing an event in order of occurrence, ability to respond the question, ability to distinguish materials, completing missing pictures with reference to the model, establishing the reason - cause relationship etc., indicate the perceptional development of a 4-5 year old child (MEGEP, 2007).

As stated above, the physical and motor, psycho-social and perceptual development characteristics of a 3-6 year-old child give information about growing children up in a healthy and conscious way and at the highest possible level.

Early childhood educators and neurologists agree that the first eight years in a child's life are a critical time for brain development (Exelby & Isbell, 2001). The first three to five years in a child's life are vital in the development of language, attention span, social skills, and problem-solving capabilities (National, 2000). For example, three-, four- and five-year-olds begin distinctly developing their gross motor skills; they can catch a ball, run, and climb. Fine motor skills and language also increase as these children can now use scissors, draw, paint, write, complete puzzles, speak in ten-word sentences, listen, and retell a story. Cognition also improves drastically as preschool aged children begin to count and solve simple problems (Crawford, 2001). These children are curious and interested in learning about their world; they have many creative ideas and approaches, and they are capable of making decisions and selecting materials to implement projects (Exelby & Isbell, 2001). Preschoolers are active and eager learners; they are constantly exploring, manipulating, and experimenting. Preschoolers rely heavily on their senses, are beginning to use symbols and reason, and have begun to think abstractly. An increase in physical coordination and strength allows preschoolers to handle new materials, build creatively, and initiate new activities (Munro & Paciorek, 2004). Cognitively, these children begin to recognize differences, distinguish spatial relationships, and can think in terms of symbols. Group play also becomes very important in the successful development of chidren ages five to six.

2.1.3 Definition of Pre-School Education

Pre-school education is an education chain which includes childhood years by rejecting family from this planned and supervised development process. This

education stats with birth and continues until compulsory education (Çetinkaya, 2006).

The child is most convenient and open for shape and learning in pre-school education period. Therefore, the importance of this period might be better understood. The basic pre-school education process aims to prepare the child for school and living in terms of mental and social development by providing physical environment facilities. In research by Gardner, experiences gained during the childhood process were more effective than experiences gained in later years (Bicer, 1994).

The pre-school education process can also be defined as a learning process. In this period, children's behaviour is shaped. Conducted researches have revealed that experiences gained between the ages of 0-6 have an impact on the development process.

As a result, pre-school educational institutions support the healthy development of children in offered educational environments, and make their adaptation to environment and future life easier. "With the change of life conditions, in order to solve the family problems which economic and social environment brought, to improve children's and families' welfare, kindergartens were established. Kindergartens also provide day care services for the children of working mothers. These institutions help babies' and young children's physical, mental and social development" (Uysal, 2006).

2.1.4 Pre-School Education

Pre-school education is given in the family and at institutions. Although the role of family could not be ignored in the first stage, the family and the environment may be insufficient to meet the developmental needs of the child in later years. In this case, pre-school education institutions step in to provide an environment in which children can live their development in the healthiest and most natural way by creating their own environments with their peers.

Pre-school education institutions play an important role in terms of showing performance in a group, applying the necessities, building healthy relations, and rules of daily life and in terms of acquiring and developing social responsibility. In addition to these, these institutions prepare environments by giving the opportunity for children to recognize their sexual identity, to develop their self-existence and to express themselves. In this way, the child develops its personal control and gains its free personality.

The benefits of learning centres include the promotion of a child's independence, choice making, acquisition of new skills, and increased autonomy. Curriculum areas also allow teachers to embed learning opportunities across a range of ability levels

within any given learning centre. Basic learning centres focus on areas of development such as logical thinking, language, and emotion. Early childhood classrooms often include areas for art, music, a library, listening and writing activities, blocks, dramatic play, science and discovery activities, mathematics and games, woodworking, sand and water tables, and quiet activities. These areas should reflect the children's age, development, growing abilities, and changing interests; learning areas are not static (Brewer, 2001).

One of the objectives of education is to bring and execute the individual's education right to modern standards in developing social welfare and raising living standards, in light of social, economic, scientific and technological developments. For this reason, preparing a quality education environment for children have gained importance in order to correctly meet the gradually growing demand for pre-school education.

Pre- school education institutions are divided according to the different age groups. For this reason; institutions for 0-2 years old children are called as "crèche", institutions for 2-4 years old children are called as "nursery", and care and education institutions for 4-6 years old children are called as "kindergarten".

2.1.5 Objectives of Pre-School Education

The purpose of pre-school education is to develop the child's innate abilities and characteristics by taking into consideration its physical, mental, emotional and social development. Supporting the child to participate efficiently and productively in society is also among the objectives of pre-school education.

In the 20th article of the National Education Basic Law published in the 1973 dated official gazette, supporting children's physical, mental and emotional development, providing gain of good habits, preparing individuals to primary education, creating a common growth environment for children with unsuitable conditions and ensuring that children speak a right and nice Turkish were defined as the objectives and tasks of pre-school education (The State Journal of Turkey, 1973).

Gaston Mialeret, who headed a long time the World International Organization for Pre-School Education (OMEP) announced the universal objectives of pre-school education in 3 sections (Oktay, 1999).

These can be grouped under following headings:

• Social Objectives
• Educative Objectives
• Developmental Objectives

To improve socialization by ensuring the child to be together with its own peers and environment, to care the children of working mothers and to provide equal educational opportunities for each child and to support personal development are composed social objectives. Educative objectives provide training of the child's sensory organs, teaching the child environmental awareness and sensitivity, and giving the child accepted behaviours in society (colour, sound, aesthetic, social rules, etc). To support the child's natural development and to give importance to life experiences in compliance with the child's development level, speed and feature are the main developmental objectives of the pre-school education.

One extremely significant goal of early childhood education is the encouragement of development through discovery and creativity (Council, 2006). Children interpret the environment holistically and evaluate it for all the ways they can interact with it; they use the environment to aid their development and improve themselves (White, 2004).

Goren describes volunteer involvement in improving environmental awareness in all social layers of society, introducing problems and providing positive behavioural changes towards these problems and in protection natural, historical, cultural and socio-aesthetic values as "environmental education" (Goren, 2007). Kindergarten which makes up the basis of pre-school education includes also environmental education in addition to play and basic education. Environmental education given to a 3-6 years old child will help the child to understand the natural environment and to orientate its values and behaviours in a positive direction. Improving the sensitivity to recognize, protect and use natural environment is the basis of environmental education. It is a fact that life-long habits of the individual are intensively gained between the ages 3-6, starting environmental education and awareness creation at this stage is very important for their future lives.

Rapid growth rate in construction dependent to metropolitan life as a result of increase in population is excluding children from the natural environment. Metropolitan life which leaves very little opportunity to interact with nature has reduced levels of interest in the environment. Therefore, children are not able to make a link with nature and cannot see themselves as a part of natural life. The basis of destroying this awareness is to teach and sustain environmental education in the best way. A child having environmental awareness and sensitivity learns to influence the environment and to live in harmony with its surrounding besides being influenced by the environment (Tombul, 2006).

2.1.6 Historical Development of Pre-School Education in the World

Information about pre-school education is found in the 4th century BC. The works of Socrates and Plato, who are among the ancient philosophers, highlight the need and

importance of pre-school education. Plato, in his work named "State", mentioned the importance of early childhood education related to the development of talents and adaptation (Oğuzkan and Oral, 1983). In addition to Plato and Socrates educators such as Montaigne, Jean Jacque Rousseau, Fenelon, Madame Necer, Montaigne, Madame Montessori, Dr. Decroly, Pestalozzi, Frobel, Madame Pape Carpantier, Piaget, Ferriere, Dottrens, Miss Parkhurst and Carleton Wasbaune worked on studies on pre-school education.

In addition to Plato and Socrates educators such as Montaigne, Jean Jacque Rousseau, Fenelon, Madame Necer, Montaigne, Madame Montessori, Dr. Decroly, Pestalozzi, Frobel, Madame Pape Carpantier, Piaget, Ferriere, Dottrens, Miss Parkhurst and Carleton Wasbaune worked on studies on pre-school education. In the early years, institutions generally undertook poor, homeless children's education. In the first half of the 1800s, "Industrial Revolution" which emerged in Europe had affected the nuclear family. As a result of parents' full-time work in factories, 0-6 years old children's care, nutrition and protection emerged as a major problem. Owen from England, Fröbel from Germany and Montessori from Italy are accepted as theorists of early childhood pedagogy and architects of this idea (Dirim, 2004; p. 9).

The famous Italian educator Dr. Marie Montessori, who has many works in the field of child education, thought that positive results in the development of normal children could be taken with the method applied to mentally disabled children.

At the beginning of the 20th century, Italian medical doctor Maria Montessori conducted important studies on pre-school education. In this education system, known by her own name, the child's self-orientation, its ability to use personal initiative is important. In the Montessori education, the teacher prepares educative materials and then the teacher shows child what to do and observes the behaviour of the child by withdrawing (Tos, 2001).

Famous educator J. J. Rousseau's book, called "Emile" has an impact on young children. Private schools were opened for them. These institutions are called in French "crèche", in German "kindergarten-children's garden" (Dirim, 2004; p. 12).

French philosopher Jean Jacques Rousseau, in his novel named "Emile" explained that the development characteristics of child individuals were different from adults, that education should be provided in dependence on the child's development characteristic and described the implementation of this education process with samples. Together with the "Emile" work, schools allocated to provide pre-school education began to be opened in France in 1779 (Tos, 2001).

Jean Frederic Oberlin in 1774 in France, educator W. Froebel in 1840 in Germany, Dr. by Maria Montessori in 1907 in Italy opened the first children's homes (Kantarcıoğlu, 1971; p. 1; Özgür, 1956; p. 9; Aytaç, 1998; p. 2 71).

Germany, one of Europe's most developed countries, has started the issue of pre-school education in 1887 by means of the pre-school system named "kindergarten" established by educator Friedrich Frobel. In this system, the individual has ceased to be recipient and was active and creative at the same time. Importance was given to games and songs in order to gain mobility to education. With the use of toys and lesson means, children were aimed to gain concepts related to arts, arithmetic, geometric shapes and daily life (Tos, 2001).

The famous Swiss scientist JH Pestalozzi (1742-1827) opened a school for poor children in a rural area on the basis of observations on his own children (Dirim, 2004; p. 12). After this date, schools opened for young children have become common.

Swiss educator Johann Heinrick Pestalozzi who explained the basis of education with "love" has brought to life the learning by practice education model in the 19th century. Pestalozzi, who believed that problems could be overcome with a good education, opened schools for children of poor families in which they were able to develop their handcraft skills and experiences (Spodek, 1973).

2.1.7 Development of Pre-School Education in Turkey

The edict issued by Sultan Mahmud 11 in 1824 has made primary education compulsory in the Ottoman Period Turkish Education System. The "National Education General Regulations" accepted under the leadership of Ali Pasha in 1869, public schools attendance began at an age of 5. Children between the ages of 5-6 were educated at these primary schools opened by end of the 19th century, which were referred as "neighbourhood school", "stone school" or as "youth school" (Cetinkaya, 2006). These schools are also referred as "Sıbyan Schools". Children learned to read the Koran, arithmetic and writing in these schools (Onur, 2006).

The "Turkish Grand National Assembly Ankara Government" founded in April 23, 1920 upon the proclamation of the Republic established the Ministry of National Education in May 2, 1920. With the alphabet revolution executed in 1928, the effort to bring every Turkish Citizen to literacy level has increased the importance of primary education. Existing kindergartens were closed as a result of using appropriations allocated for kindergartens and pre-school classes within the scope of primary schools (Cetinkaya, 2006).

In 1920's, the development of the children's body health was aimed, 1940's, social and emotional development were focused, after 1960's, cognitive achievements have gained importance" (Kamii, 1971). After 1960's, kindergartens have come to their present state and especially after 2000's they have started to be contemporary.

The nursery schools in Turkey were established in the time of the second Constitutional Monarchy (1908 - 1918). In this period, a special attention was devoted to the development of these schools. Teachers were sent to European

countries; lots of books related to the nursery schools were bought from Europe and translated into Turkish.

The definition of pre-school education was mentioned in the 19th article of the regulation on National Education Basic Law, issued in the official journal dated June 24, 1973, as its objectives and tasks were described with the 20th article (The State Journal of Turkey, 1973).

According to 6th and 7th articles of the official gazette writing on the "Regulation on Pre-School Educational Institutions", published in July 2004, pre-school educational institutions aim children to show love towards Ataturk, the country, the nation and the flag as well as behaviours such as love, respect, tolerance, solidarity and sharing behaviour, to enrich their imagination, to gain creative and critical thinking abilities, which were enriched with sub-titles such as to develop their cognitive, emotional and social aspects, to acquire basic habits such as nutrition, sleeping and self-care as well as to teach children love towards the environment in order to make them gain environmental awareness and to apply game events as a method of learning (The State Journal of Turkey, 1973).

2.1.8 Development of Pre-School Education in the UK

The first nursery in the UK was opened to enhance the health and care of poor families' children in 1911.

The first applications made on pre-school education were started in the United Kingdom and the United States in the 16th century. Education was started in small schools opened by women in their own homes which were called as "Dame Schools". In these structures which made up the first of kindergarten samples, the alphabet was taught, religion was taught and children were assigned daily home work (Tos, 2001).

The first kindergarten opened by an educator named Robert Owen in 1816 started pre-school education in England. This school met the shelter, education, and care needs of children whose fathers and mothers were working until late hours as a result of the industrial revolution (Tos, 2001).

2.2 CHILD and PERCEPTION

Between birth and puberty, people constantly change and develop. This period is called childhood. After the birth, child starts to interact with the environment and people. Children's reactions, as a result of perception, are different from adults. In order to better understand the differences, the process of perception-behaviour should be analysed.

2.2.1 The Process of Perception and Behaviour

The expression of perception comes from the Latin word "percipere". It means as a word; to cognize, to understand, and to feel (Rapoport, 1977).

Human is perception, cognition and behaviour mechanism. As shown in Figure 2.1, this mechanism begins with perception. Perceiving is an action that provides to obtain information from the environment through the senses. First, perceiving action starts with interpretation, then continues with transmitting to memory, and finally responds to the environment through reactions (Gür, 1996).

Lange made some observations about perception: Perception is multimodal. Perception is an active process rather than passive. Human-environment relationship is dynamic. Past experience is reflected to the current situations related to the person's needs (Lang, 1987).
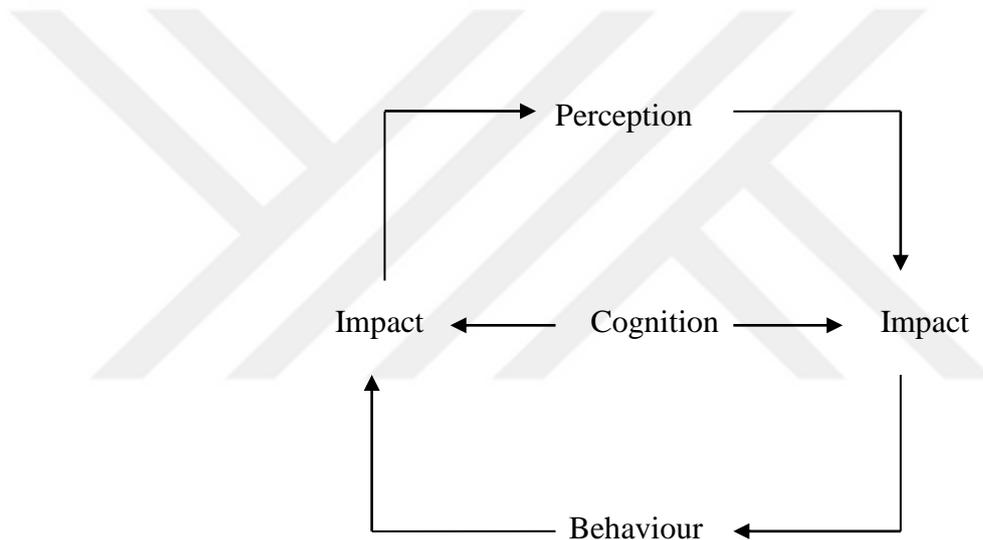
Figure 2.1: Human as perception, cognition, and behaviour mechanism (Örer, 2002).

As stated by J. Noble, "We will help to shape people's future behaviour as architects, thanks to the environment we create. In all steps of the design, we make predictions about human behaviour, and the success in our works or failure depends on the ability to predict human behaviour "(Lang and et all., 1974).

2.2.2 Human Perception System

People need to know and understand the environment in order to benefit from it, adapt it. Perception of the physical environment contains many complicated process.

This process begins with warnings conveyed by the environment. A variety of sensory organs get these warnings.

As shown in Figure 2.2, numerous warnings come to people in their environment. People realize these warnings with their eyes, ears and other sensory organs. This action often occurs unintentionally.
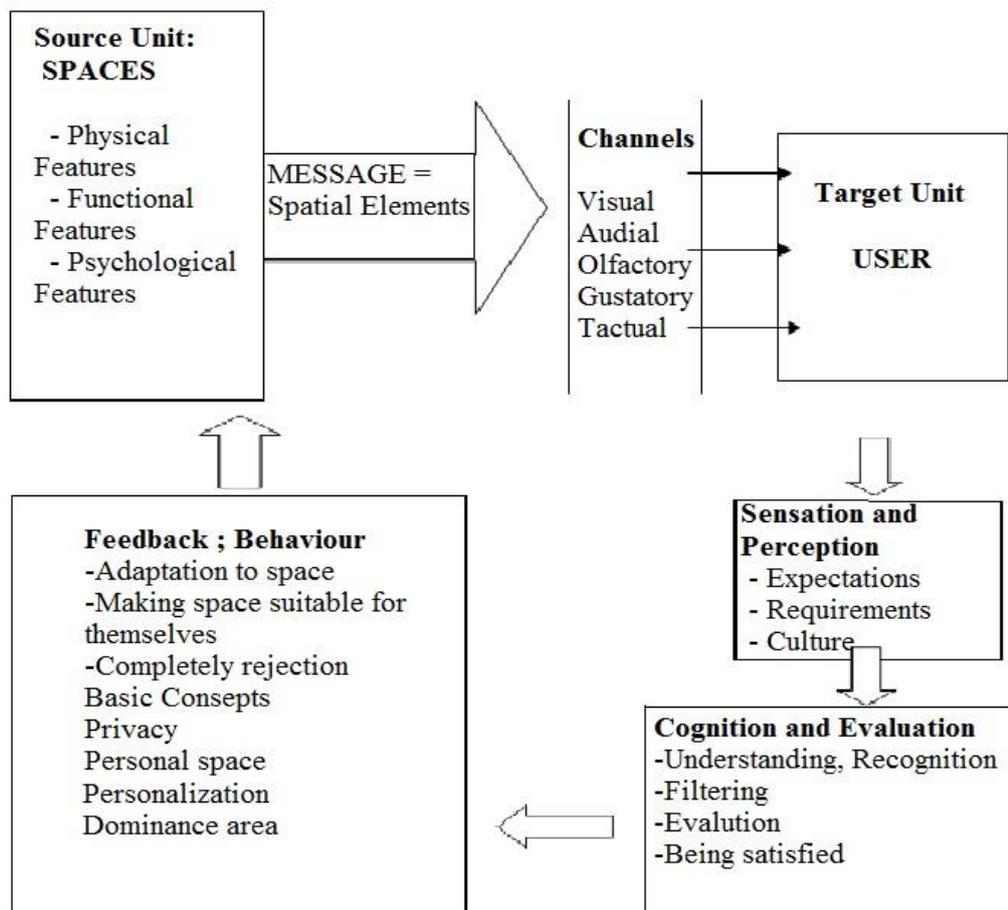
Figure 2.2 The Process of Communication (Günal, Esin, 2007).

2.2.3 Visual Perception of Space

Since architecture is a visual art, structures should be satisfying in terms of visual effects, so they should be designed accurately. In the design of structure forming spaces, it is crucial to evaluate how this affects people.

Furthermore, the perception of the space could show differentiation from person to person because of the physical capacities of the sensory organs. So, the diversity of the perception in the space occurs as sensory. Thus, objects could create the perception of proximity and distance according to their own qualifications. The principles of depth may be applied consciously by making use of the same basis. For

instance, while warm colours create an effect of proximity, cool colours give a sense of distance. Pleasure we get from the space is produced by our way of perceiving it. Therefore, it is very important to emphasize that how our mind and eyes perceive and interpret the visual data belonging to architectural life.

Arnheim stated about the perception that eyes cannot be restricted to just save about the outside world, perception consists of something done in the past, living in the memory and innumerable acquisition. So, with the wider meaning, perception also includes the relationship between mental representation and its direct sensory observation (Arnheim, 2009). Changing factors among people such as age, experience and culture could lead to the formation of different perceptions. Perception is complex phenomenon. Unconsciously, we perceive everything around us with our senses such as smelling, hearing, seeing and touching. Then, to see the overall picture in our minds, we organize them as form, colour, and sound or image format. We associate indefinable objects with previously known things. Through experience gained in children's physical and mental development, it is possible to perceive their environment. Physical and mental activities for children and adults show differences in perception and evaluation of the environment.

Piaget had many important information and definitions about evaluating the concept of space as well as numeric concepts, such as volume, length, and weight. Piaget argued that there is a sharp difference between perception and intelligence. He defended the same difference between perceptual space and mental space. Perceptual space has always the characteristic of individualized subjectivity (Akarsu, 1984).

2.2.3.1 Visual Perception in Early Childhood Period

In Pillow and Flavel (1986)'s studies, it is detected that child in pre-school period could start to understand the visual results of the relationship between the spatial change and size, shape and realize the changes in projective size and shape. Both the size-distance relationship and shape- orientation relationship information is obtained during four years old. It has been observed that three-year-old children have some abilities to pay attention to the changes in size and shape. Children may notice changes in the view without having systematic understanding.
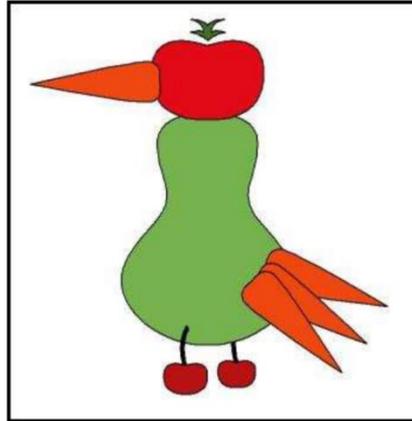
Figure 2.3 Combination of vegetable-fruit-bird (Feldman, 2004:237)

The increase in the development of visual skills also plays an important role on the development of social skills (Kurtz,2006: 24).

For example; when looked at extraordinary combination of vegetable-fruit-bird, pre-school children see the components of the figure such as carrot, pear, cherry not only bird figure like adults (Figure 2.3).

According to many academic studies, Piaget stated that the characteristic of the space have a great impact on the development of spatial perception in children's different age periods.

Visual perception is the ability to understand that people see. The use of colour in the space plays an important role on the formation of children's space perception. Vibrations in the air of warm colours are stronger than cool colours. This shows children primarily perceive warm colours. The Surrey Baby Lab was founded in 2000, and also has done researches about colour perception in early childhood and psychological effects of colours on children. According to the findings of conducted researches, child can perceive, classify the main colours after the fourth week. According to children, red, blue, purple, and orange colours are more remarkable than green, yellow, pink, and brown colours.

2.2.3.2 The Development of Spatial Awareness and Perception in Children

Perception and spatial awareness complete each other in a cyclical process. Children are exceedingly sensitive to space; they respond to many kinds: big spaces, open spaces, small spaces, cosy spaces, and especially hidden private spaces. The right kind of space creates activity, imagination, and educational opportunities (David & Wright, 1974). Research documents that children remember places far better than they remember people and things; thus, every design detail within a space is essential (Olds, 2001). Designers play an integral role in the development of successful early

childhood environment facilities that foster learning and stimulate their most important user—the child.

Philosophers like Siagel and Piaget proposed a system that explains how environmental cognition occurs in children. According to this system, children first determine their own position thanks to the marks in the space; then, establish the connection between the marks. In the final stage, integrate all these links (Altman, Chemers, 1980).

In Figure 2.3, mental and spatial relationships in children's perception are shown. Spatial perception in children begins to establish relationships between objects at the age of 1. Thus, in the child's mind, formations for space begin to occur (Altman, Chemers, 1980).
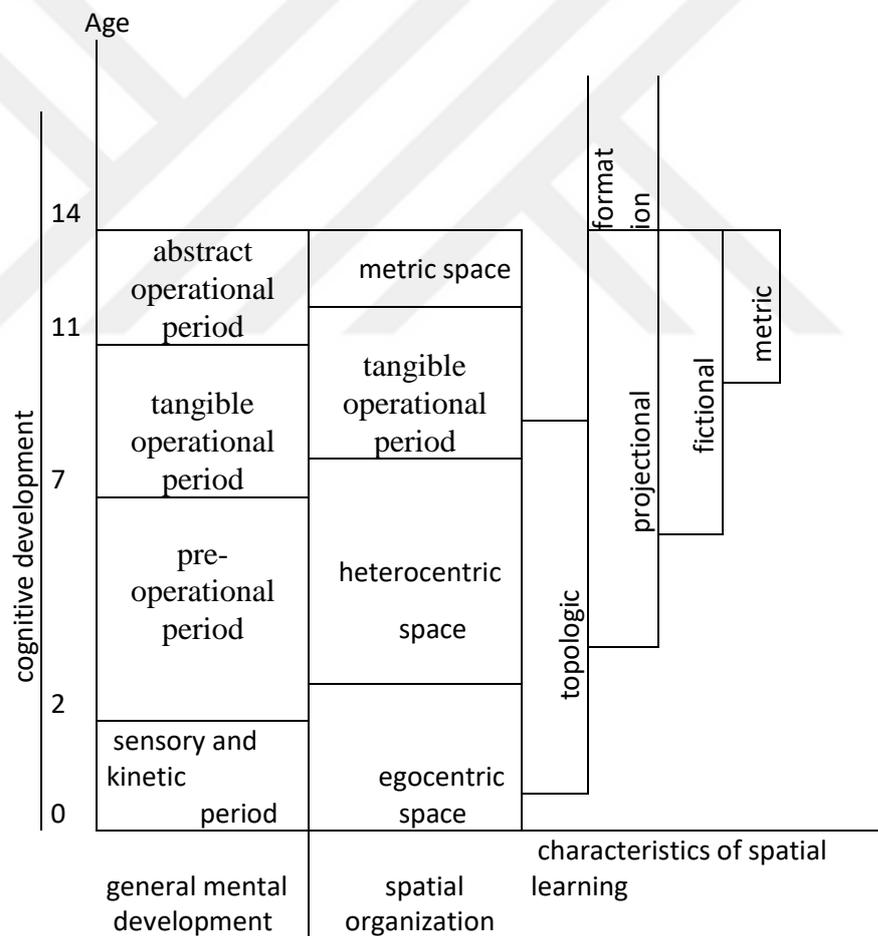
Figure 2.4 Mental and Spatial Relationships in Children's Perception (Ünlü, Çakır, 2002).

After the age of 2, the child can realize relationships in the space such as proximity, disconnection, continuity. These relations can be created in the mind. Children begin to explain this perception in their paintings. Children can express these relationships within the rules of their own perspective, as they perceive distance between objects. Piaget called this stage as projective period. Metric space period follows projective period. In this stage, children place objects into a fixed layout (Akarsu, 1984).

Human beings need to know and understand the environment in order to keep on their life. Cognition and understanding of the environment is the result of the process beginning with perception experience (Erturk, 1984).

2.3 COLOUR

In nature, with the bump and reflection of light rays, each of sensations that occur in eyes is called colour. Colours could be shown clearly in the figure below.
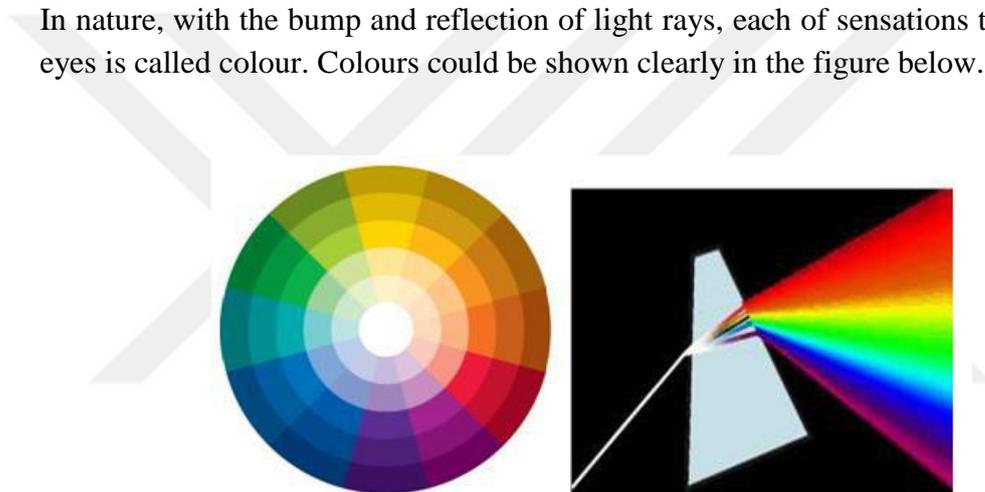
Figure 2.5 Colour Scale

Every person has different colour preference. The factors that affect colour preference are mentioned below:

- Seeing comfortably
- The suitability of colour for the context
- Fashion, style, social judgement
- The level of culture, age, and sexuality
- Space, texture, and form
- Habits and early experiences

2.3.1 The Psychological Effect of Colours

Colour is also effective in providing psycho-social needs. Therefore, colour is necessary to examine in terms of psychology as much as structural (Çetinbaş, 2012).

It is widely recognised that colour has psychological significance and can even, to some degree, influence physical reactions in human beings (Pile, 1997). Designers should understand and accept the psychological effects of colour on users. There has been extensive research in this area in an attempt to reduce various beliefs and random observations to some reliable findings that can be put to practical use. Studies fall into a number of different types with findings that only relate to a limited degree. Colour is experienced in widely varied context, so that what may seem a clear finding in one set of circumstances has little applicability under different conditions. The studies that are brought to the attention of designers fall into a number of different groups. The best known include the following:

Studies of aesthetic preference - Which colours are "liked" most; what combinations of colours are found most pleasing to a panel of informants in various contents.

Physiological studies - These attempt to relate colour experience to physical reactions such as pulse rate, blood pressure, and body temperature.

Studies of environmental colour and emotions - These include efforts to relate environmental colour to states of mind and emotional reactions such as stimulation, calm or depression.

Studies relating environmental colour to health effects - These include research on the incidence of various illnesses, levels of energy or exhaustion, and the role of colour in treatment of physical and mental illnesses.

Studies relating to commercial purposes - These studies are concerned with colour reaction such as attraction to a commercial facility (such as a store or restaurant), possible impact on inclination to make purchases, or level of satisfaction with services provided within a particular facility.

Work making use of colour reactions or preferences as an element in psychological testing - The role of colour cards in the Rorschach personality test is well known. In the Lowenfeld Mosaic test, the subject is asked to make an arrangement of small, colourful tiles in a frame. The choice and use of colour is a major factor in the test interpretation. The Luscher Colour Test is based on a theory that colour preferences can be the basis for a full understanding of personality traits.

Aside from such scientifically based investigation, there is extensive literature of theory having no basis other than opinion on observation and widely expressed thoughts about colour. From all such material, it is possible to extract some information that seems to be trustworthy and that has some practical use.

As for the influence of the colours, Arnheim states that the colour red is heavier than blue and bright colours are heavier than dark ones. For example, a black area must be made larger than a white one to counterbalance it; this is due in part to irradiance, which makes a bright surface look relatively larger.

2.3.2 Warm, Cool, and Neutral Colours

Before moving to discussion of the impact of specific colour hues, some more general observations can be noted that are so widely accepted as to seem fully factual in their content. If colours are considered as falling into the general families of *warm, cool, and neutral*, it is possible to summarize the implications of each group in a way that seems virtually obvious.

Warm colours - These are generally associated with the impact that is suggested by the use of the word warm with other meanings. We speak of a warm greeting, a warm friendship, or a warm atmosphere. In colour terms, the hues on the warm side of the colour circle (red, orange, and yellow) and their related tints and shades are generally understood as comfortable, cosy, homelike, and pleasant. There is an association with physical warmth and the resultant sense of contentment. Researchers have shown that interiors designed for children with primarily warm colour schemes will prove comfortable to occupants with actual air temperatures lower than required to achieve similar comfort in identical spaces using cooler colours.

Cool colours - These colours fall on the green-blue-violet side of the colour circle. They are, not surprisingly, associated with calm, relaxation, and more contemplative experience. Cool colours tend to lower the sense of actual air temperature and so are often preferred in situations where excessive heat (climatic or artificial) can be anticipated. At an extreme, cool colours may become depressive and negative in psychological impact.

Neutral colours - White, black, gray, and chromatic colours desaturated with a high content of neutrals are in this category. They fall between warm and cool, having a less intense psychological impact, which, in its extreme form, may be thought of as bland or boring. In its more positive uses, neutral colour may suggest businesslike, practical, and utilitarian atmospheres with a minimum of emotional content.

Combinations of tones from the three main colour families - These are regularly used to put together a mix of emotional colour reactions leading to a balance of sensation appropriate to a particular context.

Advancing and receding colour - A generally observable effect comes from a combination of optical and psychological effects. Warm colours tend to appear closer to an observer than their actual distance, while cool colours tend to appear farther away than they actually are. These effects of advancing and receding vary in intensity in proportion to the intensity of the colour in question. Similarly, dark colours will usually appear closer than light tones of similar hues. Spaces can be made to seem larger or smaller than they actually are through choice of colour, and shapes of spaces can, to some degree, be modified by colour choices. A long, narrow space, for example, can be made to seem less long and less narrow through the use of warm colour tones on the distant ends together with light and/or cool tones on the surfaces of the too-close sides. A high ceiling will appear lower in a dark tone, while

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a low ceiling will appear less oppressive in a light, cool tone. Designers can make practical use of these effects in obvious ways. Lighting systems and the use of colour create the illusion in the human eye. For instance, even if red colour covers a small area, it will be able to become prominent among the other colours. So, colour is used not only as an aesthetic feature but also as energizing element.

2.3.3 Impact of Specific Hues

Such generalisations can be supplemented by the most accepted findings about the implications of specific colour hues. Each of the six spectrum hues and several neutrals and other named colours deserve mention. A summary of the associations most often thought of as relating to each major colour fallows.

Red - As the colour of fire and blood, red has a primary implication of excitement, heat, intensity, and force. Also, represents vitality. It is in a sense the strongest of colours. The association with fire leads to an association with danger and warnings against danger. When reduced to a tint, red become pink and loses some of its psychological intensity. Pink is commonly associated with femininity, with milder warmth, with charm, and delicacy. When reduced to a shade, red becomes a warm brown. Red is in the foreground as perceptual. This allows us to perceive ahead dimensionally, and objects representing red have highlighter feature.

Figure 2.6 Jerusalem's David Citadel Hotel New Kid's Playroom

Orange - Orange is the colour of adventure and social communication. The colour orange radiates warmth and happiness, combining the physical energy and stimulation of red with the cheerfulness of yellow. The colour orange relates to social communication, stimulating two way conversations. A warm and inviting colour, it is both physically and mentally stimulating, so it gets people thinking and talking. At the same time, orange is also stimulating to the appetite. Especially for kids, this colour will keep them talking around the table and eating for a long time. Many restaurants use pastel versions of orange, such as apricot or peach or deeper versions such as terracotta, for their decor, yet still increase the appetite and promote conversation and social interaction.

Figure 2.7 Kindergarten at the 2nd Parkovaya Street: swimming pool
http://archi.ru/en/news_current.html?nid=44657

Yellow - This colour relates to acquired knowledge. It is the colour which resonates with the left or logic side of the brain stimulating our mental faculties and creating mental agility and perception. Yellow has a strong place in interior design as the colour of cheer, activity, and mild stimulation. Yellow is creative from a mental aspect, the colour of new ideas, helping us to find new ways of doing things. It is the practical thinker, not the dreamer. Being the lightest hue of the spectrum, the colour psychology of yellow is uplifting and illuminating, offering hope, happiness, cheerfulness and fun. Yellow is the best colour to create enthusiasm for life and can awaken greater confidence and optimism.

Figure 2.8 Sjötorget Kindergarten by Rotstein Aritekter
http://www.urdesign.it/index.php/2013/10/21/sjotorget-kindergarten-by-rotstein-arkitekter/

Green - "*This is a secondary falling between yellow and blue and is the warmest of the cool colours. Its content of yellow gives it some of the pleasant characteristic associated with yellow, while its blue content makes it seem calmer. Green has associations with the natural colours of grass, trees, and other vegetation and so is thought of as the most natural colour, calming and restful to the eyes. Associations with health and well-being connect to green*" (Pile, 1997, p.144).

Figure 2.9 Sjötorget Kindergarten by Rotstein Aritekter
http://www.urdesign.it/index.php/2013/10/21/sjotorget-kindergarten-by-rotstein-arkitekter/

Blue - This is the coolest of the cool colours having no content of warm tones. It has associations with calm that can border on depression, but also with simplicity, purity, truth, and dignity. It can lower body temperature, pulse rate, and blood pressure and thus stands as a full opposite to red in its physical effects. As the colour of the sky and ocean, blue suggests openness and spaciousness. It is a colour often associated with officialdom and authority.

Figure 2.10 Sjötorget Kindergarten by Rotstein Aritekter
http://www.urdesign.it/index.php/2013/10/21/sjotorget-kindergarten-by-rotstein-arkitekter/

Violet - Violet, falling between red and blue in the colour circle, incorporates the conflicting values of warmth and coolness, of liveliness and calm. At the same time violet is often viewed as the colour of subtlety, sensitivity, and artistic expression. Pale tints of violet or lavender are thought of as being light, playful, and magical. Deeper violets and purples are dignified, mystical, and, in many context, threatening. Use of violets and purples must be approached with caution because of their possibly disturbing or troubling connotations.

Figure 2.11 the Kindergarten by Bonnard Woeffray Architects

Brown - Browns are all warm colours and have implications related to their parent tones. They tend to appear as warm and comforting, but have an unfortunate relationship to thoughts of dirt and soil. Browns lack the energetic implications of red, orange and yellow but retain some of their qualities of warmth and comfort. When used with other warm tones, browns are favourite colours for expression of a combination of dignity and subdued comfort. There is always concern that browns may become depressive and drab if not used with other tones that have a more chromatic and lively implication.

Figure 2.12 Loop Kindergarten

http://www.urdesign.it/index.php/2013/05/02/loop-kindergarten-sako-architects/

White - Often defined as a non -colour, white has a controversial place among colour tones. Its lack of chromaticism makes it pure and therefore symbolic of purity, cleanliness, simplicity, and clarity. It can also suggest emptiness, blankness, and boredom. The extensive use of white in design of the modern movement has made it something of a symbol of modernism to be favoured or attacked in accordance with opinion of the value of modernism's stated principles.

Figure 2.13 Loop Kindergarten by SAKO Architects

Black - This is the noncolour opposite to white, by definition a total absence of all chromatic colours, reflecting, in a perfect example, no light whatsoever. Black is a strong colour with powerful implications of strength, seriousness, dignity, and formality. Black in its more threatening aspects also has associations of a negative nature relating to depression, fear, and death. Black and white together forms an extreme contrast of nonchromatic colour that can be powerful and sharp, but can also be stern and forbidding.

Grey - Colours that result from the mixture of black and white or from mixtures of complementaries are neutrals that can range from light to dark and from totally neutral tones to warmer or cooler tones, which result from the mixture of chromatic tone with white and black, or from the balance between the complementaries that have been mixed to form the gray in question. Grays in lighter ranges do not project strong associative implications. Dark gray can be authoritative or ominous and depressive. Light greys, particularly in warm-toned versions, are useful background tones, bland in themselves, but serving as effective foils for more chromatic colour tones.

2.3.4 Colour in Interiors

In a typical interior, it is possible to see colour in every object such as; walls, floor and ceiling objects, furniture, accessories, artworks, upholstery fabrics, curtains or other window treatments. Windows may introduce areas of outdoor colour or may appear as dark reflecting surface at night. Lamps or light fixtures may appear as areas of intense colour, actually sources of light. Sunlight or lamps may create bright areas of light which can reflect the colours of the surfaces they fall on to other surfaces and objects. Brightness can vary widely from floor to ceiling and in various parts of a space according to proximity to windows or artificial light sources. Objects cast shadows, forming areas of colour that appear darker than the same colours receiving strong light. Like these effects make the selection of colour more complex for interiors. It is an important element in the skills of the interior designer to be able to visualize such complexities in a way that makes it possible to make good decisions about colours. These decisions can be applied in an office or studio that will turn out to be a satisfying finished project.

2.3.5 Choosing Right Colour for Children

"Spaces *for children often make use of bright colours, because, according to a common belief, their attention is grabbed by these colours primarily. It has been found that bright colours are responded by infants, thanks to toys and small areas, so that more quiet colours could be preferred for walls and floors. Older children may prefer some areas of bright colour or may define their choice as adults* "(Pile, 1997, p.161).

Additionally, in the classrooms and lecture halls, colours are used as a comfort provider as their attention moves from the desktop to teacher, lecturer to white board. According to climate and orientation, warmer or cooler tones may be suggested. For the front wall, strong colour could be preferred with colour related to or contrasting with the tones of the writing board (Pile, 1997).

Pile explained the use of colour in classrooms for young children that: *" Stronger colour may be used, usually in warm tones, although the use of intense primaries, which is sometimes suggested for nursery-age rooms, is not considered desirable. Gymnasiums, auditoriums, and large lunch rooms are best in lighter tones, warm to neutral, possibly with some bright colour accents in small areas. Stairways and corridors can use some areas of bright colour- ends of corridors and doors, for example- to provide variety and stimulation while passing between other spaces "* (Pile, 1997, p.174).

Overly bright colours create unrest; dark colours give the feeling of sadness. When pastel beige reminds peace of the nature, pastel blue reminds the sky. Open green colour should not be forgotten in interior spaces for children, since in the children's

development process, this colour has a positive effect on them. In these spaces, the colours to be used should be soft to calm children down. For instance, a melodiously arranged room makes a positive impact on child development, and helps them to develop the feeling of colour and shape at an early age.

Colours have physiological and psychological impact on children and adults. Besides, colour alters children's behaviour to a particular extent. Children's colour preference is interesting and courageous. Colour choice could vary according to particular age groups, but red is generally favourite colour of every age periods (Table 2.1)

Age Groups	Favourable Colours	Unfavourable Colours
5-8 Age Groups	Pink, red, lilac, lemon yellow	Black, white, grey, dark brown
9-10 Age Groups	Red, pink, turquoise, orange, brown	Grey, dark brown, black, pastel green, pastel blue
11-12 Age Groups	Green, light blue, red, pink	Olive green, pastel green, purple, lilac
13-14 Age Groups	Light blue, red, blue, green, orange, dark orange	Pastel green, brown, dark brown

Table 2.1 Children's Colour Preference According to Friedling (Tavsan, 1995; Gur, 2002)

Studies about children's colour choice in the period of pre-school and primary school show colour preferences in these periods. According to this information, children commonly like red colour, but in this period, this preference transform into blue colour like adults. While bright colours are preferred in the early childhood periods, this preference is changed into grey and pastel tonnes in this period (Sagsoz et al., 1996).

Children like blue, red, green, yellow, purple, pastel grey, white, black, brown colour in the primary school period. When children start to become adult, they unintentionally separate colours as feminine or masculine (Tavsan, 1995).

2.3.6 Colour in Kindergarten Design

"It is obvious that colour is a key aspect of successful work in interior design. A space that presents a pleasant and appropriate impression through the use of colour generates an almost inevitable favourable reaction "(Pile, 1997, p.11). Especially for kids, colourful interior spaces attract their attention as soon as possible in the period that their perception is open. Conversely, even a space that is well planned and equipped but drab and indifferent or unpleasant in colour terms will be depressing and disappointing. Although work with colour is almost universally found to be interesting and enjoyable; there is a certain tendency to be hesitant in dealing with this matter, which is thought to rely so much on taste, or, even more intimidating, good taste. In design schools, it is often noted that students avoid colour and material selection, preferring to work with the planning aspects of design and with constructional details while putting off colour planning until the last minute when there is no time to make wise and thoughtful decisions. Similarly, those without design training who face decisions relating to their own home environment will often hang back from decisions and ask advice of salespeople (who may be totally unqualified to give such advice) in preference to trusting their own judgement.

In order to trust one's judgement in colour matters, whether one is a design professional, a student, or a design amateur, it is helpful to develop experience through work with colour in abstract exercises and in planning schemes that are strictly experimental. In such desktop colour planning, there are no risks. No money is spent on items and work that may turn out badly. Instead, colour may be tried out, alternatives considered, changes made at no cost and with hardly any effort.

Advance planning of colour relationships is essential to successful colour use. No one would undertake construction of a building without having plans on paper. Even music is most often composed and written out on paper before performance is attempted. Improvisation is, of course, possible in music, and in colour scheming as well, but improvisation is generally only successful when the improviser has developed skills that are based on planned and organised methodology.

2.3.7 The Relationship between Colour and Users

Designers aim to give some messages to users by means of colours encoded in the environment. Users' experience with the space in line with designers' expectations primarily depend on users' understanding of these messages. Hence, designers should take perceptual and cognitive dimensions into consideration when encoding messages in space. Users communicate with the environment through perception, and colours give messages in this way (Çetinbaş, 2012).

2.3.8 The Role of Colour in Space Perception

Max. K. Agoston indicated that colour is one of the main factors forming the visual relationship between people and space. Used colour selection in the space creates differentiations in the visual perceptions. If we look to the language of the colours in nature, bees and snakes with yellow-black lines are poisonous. Nowadays, people perceive that yellow is danger, and red is ban. Another indicator is society's customs and traditions. For example, in Western civilization, black symbolizes death and mourning, whereas in the Far East it is used in the marriage and symbolizes rebirth and purity.

Colour plays an important role in visual memories. Strong memories of colour can develop for a wide range of objects or events through learning associations between visual features presented together within the environment (Hansen, Olkkonen, Walter, & Gegenfurtner, 2006; Hering, 1920; Pérez-Carpinell, de Fez, Baldoví, & Soriano, 1998).

Designers could meet basic needs in spaces by means of using right colour on right surface. They can give the desired impact for different aims by conveying true message.

Considering physiological and psychological effects of colours, the importance in the perception of space arises. Colour factor should be examined seriously when designing a space (Çukur, Delice, 2011). Warm colours create a stimulating effect; provide the perception of the time spent in the space shorter, while cool colours are calming, and suitable for tasks that require attention and concentration. Based on this information, colours provide multi-purpose usage for spaces such as; distinguishing between functions, highlighting the scale, mobility, navigation, creating an identity and a symbolic meaning (Güller, 2007).
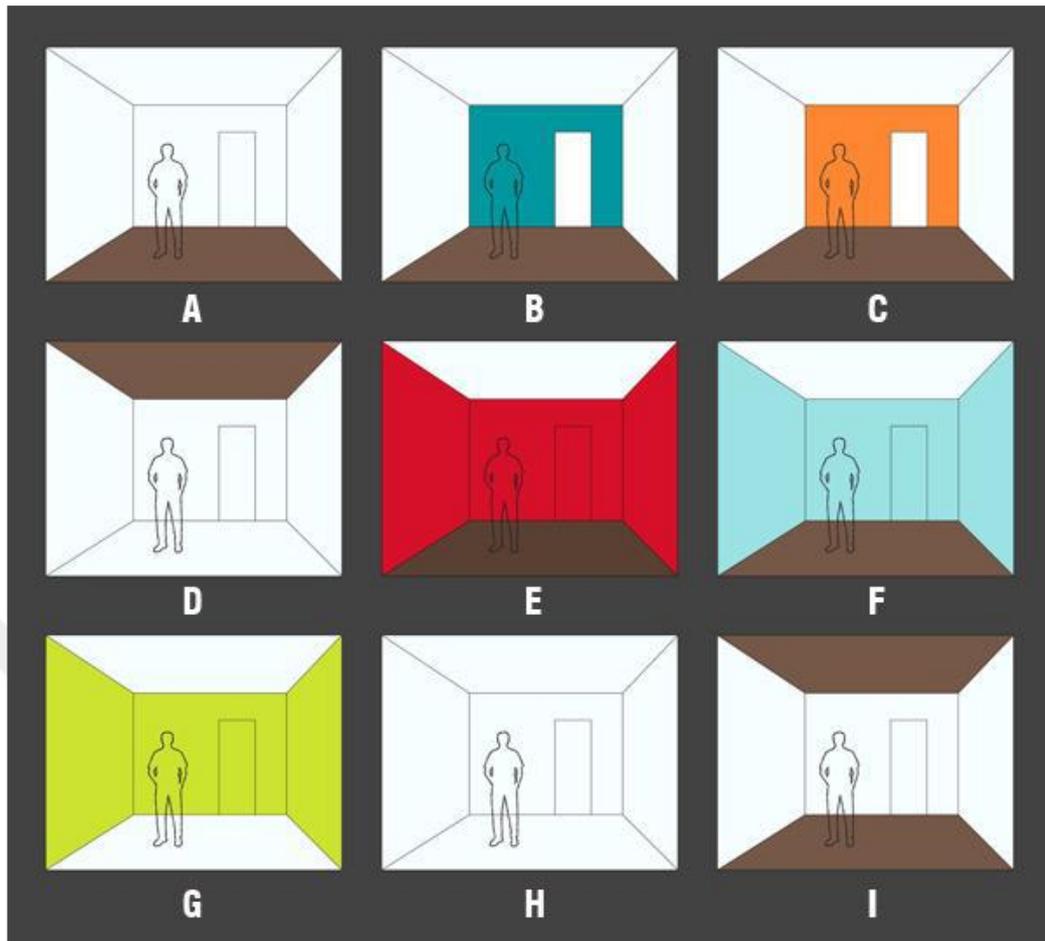
Figure 2.14 The Role of Colour in the Space Perception

Source: http://www.123rf.com/photo_9881448_home-decoration-interior-design-basics-color-scheme-and-space-perception.html

A - White walls make the room look larger and spacious.

B - Cool colours make the wall look further.

C - Warm colours make the wall look closer.

D - Ceiling darker than floor seems lower, and can cause psychological discomfort and sense of instability and oppression.

E - Dark warm colours make the room look smaller, but more intimate.

F - Pale cool colours make the room look larger and spacious.

G - Floor lighter than walls can cause psychological discomfort and sense of instability.

H - A total white interior can have a slightly disorienting effect.

I - A combination of a dark floor and ceiling reduce the apparent height, and can cause sense of oppression.
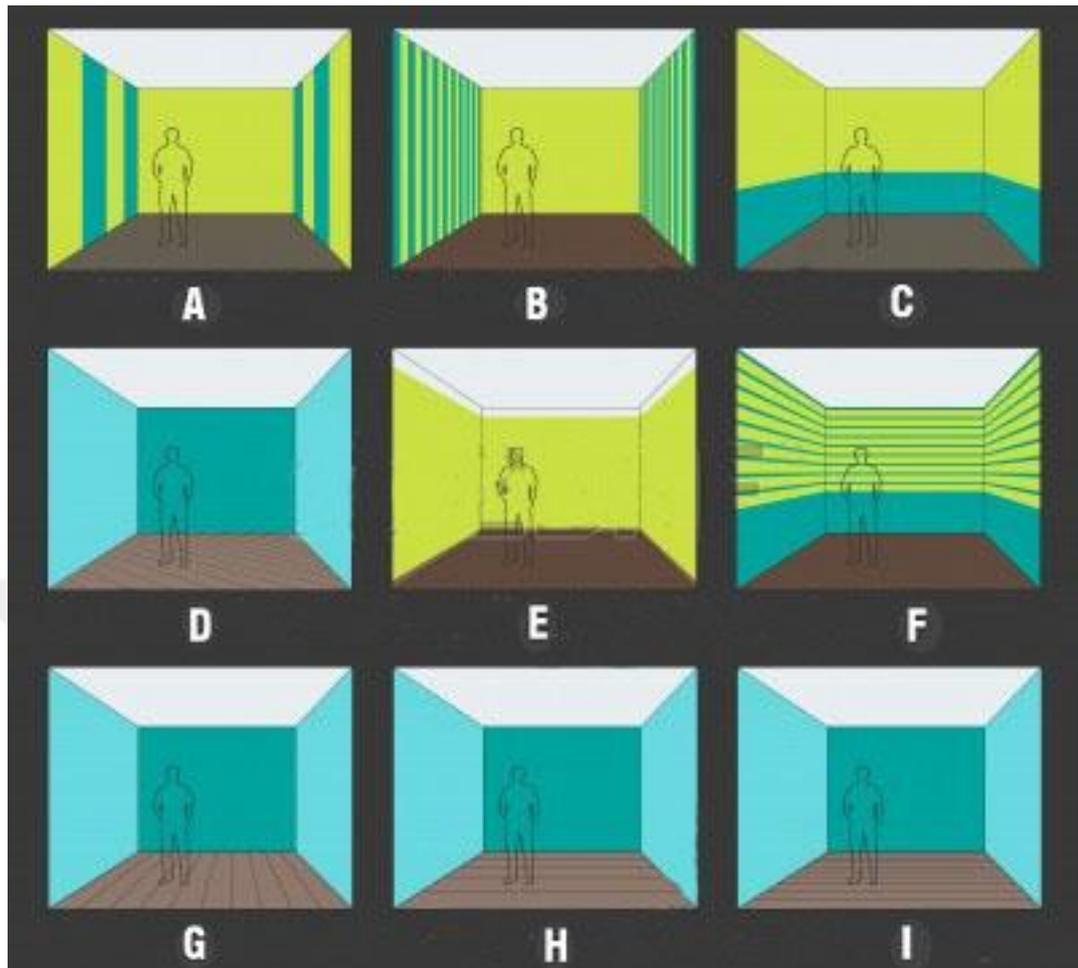
Figure 2.15 Stripes and Colours

A - Vertical stripes make the ceiling look higher, large stripes make the back wall closer.

B - Vertical stripes make the ceiling look higher. Many narrow stripes make the back wall look further.

C - Horizontal stripes on the walls make the room appear larger, and the ceiling lower.

D - Diagonally installed floor makes the room appear larger, but can be confusing (and it is a bit outdated).

E - The same colour of the ceiling on the top of the walls makes the room larger and the ceiling lower. The same colour of the floor on the skirting board makes the room larger (a bit outdated).

F - Horizontal stripes on the walls make the room appear larger, and the ceiling lower, but many thin stripes may create extra height.

G - Vertically installed floor makes the room appear deeper, and less wide.

H - Horizontally installed floor makes the room appear wider, and less deep.

I - Horizontally installed floor makes the room appear wider, and less deep. The use of narrower elements can increase the perceived depth.

2.4 PLANTS

People who live in urbanised areas are faced with many problems such as traffic, hard work conditions, the lack of green areas. Plants play a vital role in terms of carrying the nature to interiors. Thus, plants are important elements in design. They can undertake many functions, and support the design. The perception of the space is visually affected by the physical features of plants. These features also create the psychological effect on the users. The appropriateness of the plants for the design increases the success of the design. The designer can provide this success by following indoor plant design process. A successful interior plant design increases the quality of the space, provides the user comfort, and also the space is used densely.

Firstly, it should be accepted that there are both open and indoor spaces in the nature of education. School gardens give an opportunity for physical activity and they are also play area for the majority of students. Therefore, in the near feature, in terms of obesity in school age and inactive lifestyle, these spaces are an important issue to be dealt with.

Research shows that students' math, science, grammar, and other skills are integrated with the environment by using all five sense. So, they could learn better (Lieberman and Hoody, 1998).

Children find playing in natural areas more attractive and interesting. Natural areas contribute to children's learning and cognitive development positively (Fjørtoft and Sageie, 2000).

Studies on plants are generally about species, features, and the use of plants as an individual or a group. However, in terms of plant composition, the features of space and users and the functional and aesthetic features of plants should be considered.

While arranging plants, age groups, children's needs, what kind of plants children like should be taken into consideration. Small hills and green elements in playgrounds give children an opportunity to play and develop their imagination.

2.4.1 Indoor Plants

Living, renewing itself, always changing and natural materials have an important game value. These materials stimulate the imagination.

Biotic (living things) areas stimulate children to set up an imaginary and enjoyable world (Moore, 2008). As Moore stated, especially during childhood if the development of the game, imagination and creativity is considered, natural areas and elements offer many opportunities for children.

Besides, gaining nature experience is necessary and essential for children's healthy development (Kellert, 2002).

There are many advantageous to have indoor plants in kindergarten. First of all, according to NASA's two-year research into sustainable methods of indoor atmospheric cleansing in space stations revealed that many common houseplants and blooming potted plants help fight pollution indoors making the air safer for humans. Secondly, another study found that even limitedly visible plants in the classroom had an immediately significant influence on the students' feelings of preference, comfort, and friendliness (Han, 2009).

2.4.2 The Role of Indoor Plants in Space Perception

There is growing evidence to support the notion that contact with nature is helpful for emotional states, attention, mental fatigue, behaviour, and personal health. Children do not see how crops grow up, how animals complete their cycle of life. These limitations are barriers to experiencing the wonders of the natural world, its changes and conversations.

The role of plants in the arrangement of playground is vital in terms of children. Every landscape design gains a particular identity with user's perception. Through user's request and designer's request, planning the space and supporting the design with plants have an essential role in terms of perceiving that space accurately.

Without exposure to a range of activities in the natural world, children's play and learning experiences are restricted. Interaction with plant and animal materials such as smooth stones, rough bark, wet fur, fuzzy leaves, and soft feathers provide sensory experiences different from those offered by a manufactured tricycle or metal slide. People-built elements are a part of our culture and represent ways that humans solve complex problems. By jumping on this water-squirting piston, a child can explore a people-made object. To learn about, to value, and to ultimately protect their world, children need to experience it fully in both its natural and built forms, where process is interwoven with product.

Indoors where children use are the spaces they first met with life, play games, sleep, and grow in. In addition, these spaces could impact on their personality. Therefore, in the process of child development, it is very crucial that they have interiors which are responsive to their needs, healthy, and easy to move freely. Especially, designing

living spaces properly for babies ready to open their eyes to life is one of the most important factors to be considered for their peaceful and healthful growth.

2.4.3 Outdoor Plants

Exterior spaces, which respond the needs of children, are very important in schools. However, while these issues are generally handled by medicine, sports and health disciplines, they are often ignored in terms of design discipline.

Creating outdoor environments for children and youth is essential since exteriors constitute a large part of pre-school education. Unfortunately, in some kindergarten, children might not have a friendship with nature and play in environmentally friendly spaces. The outside environment for the children was always of primary importance to the educational program. Yet, this need could not be met effectively because of some reasons such as project costs, lack of space etc. In order to solve this problem, children's school building should be evaluated in terms of transitional spaces, places where the outside yard met the inside classroom. Moreover, designers need to think about cultural differences and must not be afraid to get involved with them.

However, in especially kindergarten yard, as well as general characteristics of plants, aesthetic and technical principles of the plants, other dendrologic characteristics have to be known during the use of plant material in landscape design. Fast-growing, durable, evergreen trees and shrubs are suitable for the yard.

A correct applied plant design can provide noise control, visual masking. Organized areas with short shrub species are both visible and sheltered (Ergen, 2000). Using flowering and fruit trees in the field attract children's attention, especially colourful flowers are admired. Also, large trees provide shaded area for children. Besides, in children's play grounds, poisonous seeds and leaves plants should not be preferred such as *Taxus, Nerium*. Such as Cotonaster and Berberis, thorny plants should not be used.

In order to reduce injuries, rubber, compressed bark or grass surface should be preferred as flooring material. In the majority of kindergartens, especially in the old urban fabric, parking space and playing area are used together. This is a negative feature in terms of child safety. Parking area should be separated from the playing area with plantal or structural elements.

In previous designs, rough textured trees were preferred more than thin textured trees in terms of foliaceous trees. In terms of leaf colour in coniferous trees, red colour was preferred more commonly. Then, blue, yellow, and green were chosen in order. In terms of flower colour in foliaceous trees, white colour was preferred most. After that, purple, pink, dark red, orange, yellow, and red were chosen in order. In terms of fruit colour in foliaceous trees, children preferred red colour most. After that, green, yellow, and orange were chosen in order. In terms of form in coniferous trees,

column-shaped was preferred most. Pendulous form was preferred most. After that round, pyramid, and conical shaped were preferred in order. In terms of form in foliceous trees, umbrella-shaped was preferred most. Then, pendulous, round, scattered, and column shaped were chosen in order.

2.4.4 The Role of Outdoor Plants in the Needs of Play and the Development of Children

The garden in which green areas are intensively and actively used is designed as an adventure playground in a supportive feature for the physical, mental, emotional and social development of children. This garden which is used in the natural form of the land provides the children to recognize the real natural environment and to gain experience within this environment (Figure 2.16).

Figure 2.16 Kiga Kindergarten – Adventure Playground

Besides, the features of physical environment affect children's play behaviour, the usage density of playground, the quality of the relationship between children and adults. The use of green elements, instead of solid floor in the arrangement of the space causes that children get more benefit from the opportunities of playground, play more creatively, participate in the play more actively. Moreover, the relationship between children and adults is stronger. Since this relationship teach children the skills of social communication and reasoning, the importance of playground design which has appropriate physical environment conditions cannot be discussed (Pollowy, 1977).

Natural areas and elements have an important impact on childhood. According to Francis' research, people generally define favourite places in their childhood as places where there are lakes, huts, shrubs, trees, vegetables and fruits. Children can swing in the branches of trees, they can hide under trees. Moreover, playing hide and seek among shrubs or climbing rocks provides muscle activities for children.

In Denmark, in the Dragen Children's House where landscape design is also considered as important studies were carried out for a correct and conscious landscaping. Deciduous trees located on the south facade facilitate the entrance of sunlight as trees which are always green being located in the north facade provide protection from the cold winter wind (Figure 2.16). Intense use of grass area and sand pool supports children to play and realize their education in a more appropriate garden.

Figure 4.17 Dragen Children's House – Landscape Design

The Bernts Have Daycare Center has a green roof up to the building plan. This green roof covered with soil and grass reduces the building temperature in summer and increases the cooling effect. In Denmark, on exterior surfaces windows extending from ground to ceiling have been used. The reason for this is to provide maximum benefit from daylight even at the shortest angle of daylight. The windows are double glass and solar filtered in order to prevent heat loss. Large playground areas surrounding the building are integrated with the natural state of the land. In this way, the garden containing small hills has become much more enjoyable. Fruit trees located in the garden and other fragrant plants create sheltered areas which give the opportunity for children to learn more about nature together with the adventurous spirit they add to their games.

Creating green roof covered with grass is another criterion which is frequently preferred in environment-friendly kindergartens in terms of regaining lost ground. The pre-school years are the most appropriate years to provide environmental awareness and to carry those to future years, to prevent adverse senses and attitudes about nature and to develop natural-balance protecting habits throughout life (Dincer, 2007). It has been highlighted that the created environment and environmental education contribute to cognitive developments such as questioning and discovering when the development characteristics of children at early stages are taken into consideration. In the light of the results of research, it is clearly emphasized how important the environment to be prepared for children and their education on environmental awareness is. Nature and natural life is the best means of response to children's willingness and desire towards curiosity and exploration in adherence to developmental characteristics of pre-school children (Dincer, 2007).

In other words, it is possible to increase the awareness and knowledge of children about environment by means of environmental-friendly buildings. With these structures, children experience many new experiences by easily discovering real objects in their surroundings. The child who relates its own existence with the experiences gained in the lived environment does not forget the importance of respect for nature.

Gardens that open to the sky at the Benetton Day Care Center symbolize the elements air, earth, water and fire. Spaces created between walls serve as secret and special areas for children. Backyards at intersections of plain walls and curved walls are very noteworthy (Figure 4.18).

Figure 4.18 Benetton Day Care Center, Italy, 2008

Using natural lighting very efficiently has at the same time helped to increase the physiological, psychological and visual communication comfort of children. In order to make children live a real urban experience by creating an intense transparency and colour harmony. Terraces and roof gardens were closed in order to create open space areas for children also in winter.

Young people, especially children have an instinctive interaction with the environment. In addition to this, a study conducted in recent years has shown that outdoor games establish a strong relationship between social skills and increase creativity (Miller et al., 2009). Open space activities are very important in terms of being an integral part of teaching program (Learning through Landscapes, 2008).

Moreover, gardening such as; breeding, irrigating, fertilizing has a healing function for children. If children make an effort with garden and soil, it is psychologically beneficial for children's muscle development, hand-eye coordination, behaving more confident, the feel of achieving.

2.5 DESIGN

Visual design elements are point, line, surface, texture, form, and colour and these elements have a vital role on designs (Sayan, 2009).

While designing the environment, four elements; time, communication, meaning, and space should be constructed in a good way (Rapoport, 1990).

Children learn in motion and relate to the world through their bodies and senses (Olds, 2001). Therefore, designers can not overlook nor underestimate the spatial requirements relevant to the successful development of a child.

Designs are sensitive to environmental issues which provide necessary comfort and health conditions in order to increase the life satisfaction and happiness of the child.

In the past times, children lived in a big family, and played in the street and garden for their healthy development by creating their toys or transforming the environment in their minds to benefit from the natural elements. Whereas rural regions still have these facts, traditions, today's cities have not this chance and deprive from this benefit (Ozgen, 1991).

Generally, kindergartens are stuck in old buildings which could not respond to child education. To overcome unfavourable conditions, a noticeable entrance, live, safe child-scaled spaces should be designed in interior and exterior space organisation of an ideal kindergarten. Researches about children's learning process indicate that environmental conditions are more important than children's character. When children encounter environmental stimuli, previous experiences influence their understanding forms and reactions (Salkind, 1990).

Thanks to the positive impact of play and playground on children, these spaces contribute to increase the number of qualified adults in the future. The design of playground affects children's social skills and abilities.

In the therapy garden, children should be able to use the senses of seeing, hearing, touching, and smelling. Special design for the development of these senses is called sensory garden.

Figure 4.19 Alderman Jackson School Sensory Garden

For the sense of sight, flowers with red, orange, yellow colours are perceived faster than ones with blue and pink colours. For the sense of hearing, fountain, pool as a design element; bamboo, grass and *Populus tremula* as plants which make sound with the wind should be preferred. For the sense of touching, plants which have textured leaves and bodies; wooden, pebble, sand materials should be used. Especially for disabled people, borderline should be defined with texture differences in the floor. The sense of smelling, aromatic and odorous plants should be preferred.

Especially for disabled children, the opportunity of playing with the others should be given. This is the requirement for contemporary cities. Moreover, design objects such as; colourful pennants, wind bell, butterfly symbols which help children to discover their artistic skills should be used in design. Children like bright colours, very big or small stripes or extraordinary forms. While designing kindergarten, choosing the type, colour, form of plants should be considered. Fast growing, durable species should be preferred. Thorny and poisonous plants should not be preferred such as *Eleagnus angustifolia*, *Mahonia aquifolium.*

The control of microclimate is very essential for children, elderly, and disabled people. Plants should be used to decrease the negative effect of features such as wind, humidity, temperature, and reflection. Also, unwanted sound and noisy could be decreased with plants.

Proportion and form of design elements in playground should be harmonious with the features of children. These design elements should be different, designed with organic, natural, and living materials to attract children's attentions. Plants should be used as architectural elements so that children's development, creativity, and the world of imagination could be contributed.

Figure 4.20 Natural elements for playground

Pendulous plants and materials such as natural pebbles and tree chips give play opportunities for encouraging creativity. For the development of perception skills, plants should be used as a living artistic object. Prunable, evergreen plants are suitable for this aim. Children should play with other age groups for their psychological and social development. Therefore, playgrounds should be divided according to different age groups.

Figure 4.21 Effect of plants as a living sculpture and variable, living playground according to seasonal differences

Figure 4.22 Playground designed with natural materials for disabled children
http:// playgrounddesigns.blogspot.com

Accessibility for toys and playgrounds is very important. Leaving distance between playing equipments is required for safety. In children's play area, some important requirements such as security, entertainment, learning, discovery, sharing, joint participation should be provided. For this purpose, structural and plant design in kindergarten playgrounds should be arranged according to universal design principles by considering children who have different physical and mental features. In the end of the research, structural details, sensory gardens and efficient landscape design meeting children's play requirement was tried to be shown.

Game is so vital activity as essential as nutrition, health, sheltering and education for children (Heseltine, and Holborn, 1987).

Nature plays an important role on children's physical and psychological development. Natural elements should be included in interiors as well as in exteriors. According to *"Biophilia"* hypothesis defended by Edward Wilson, there is the love of nature and the willingness to be in the nature in human's genotype. So, there is an innate and instinctive tendency to living creatures, systems, and organisms in human genes. This love keeps people alive and ensures the continuity of life (Wilson, 1984).

Natural areas also play an important role in the development of children's creativity. Scandinavian researchers have found that children who play in playgrounds designed with natural elements and the diversity of topography and vegetation have a higher level of concentration, social activities, the ability to focus, and motor skills. In the period of designing kindergarten, the involvement of children, educators, parents, decision-makers, experts is significant.

Sunlight has retrieved inside by roof windows and windows have insured the use of natural lighting at maximum level (Figure 4.23). Natural light being actively used throughout the day has reduced the use of artificial lighting. Therefore, using sunlight in interiors is beneficial in terms of less energy consumption, children's health, indoor plants, and seeing the colours better.

Figure 4.23 The use of sunlight in one of the kindergarten in Austria

At the same time, the natural ventilation being resolved by virtue of these construction elements has increased the comfort conditions for children by ensuring an indoor air quality. Materials such as gravel, tree trunks, etc., which are parts of natural life provide children the opportunity to interact with the natural environment even in cold climate conditions. The use of natural elements in design ensures an increase in children's creativity and performances.

In order to support the development of sensory and motor skills of children in the simple plan of Dragen Children's House, circulation areas in the ground floor and first floor are provided by means of stairs and ramps. At the same time, niches designed inside of windows provide children special places offering a solution element in the point of adventure and entertainment requirements.

Figure 4.24 Multi-purpose activity areas in Kindergarten Terenten, Italy

The building scale proportioned with surrounding settlement structures and catching children in a perspective angle clearly shows the importance given to compliance with the environment. At the same time, traditional architectural elements being reinterpreted with a contemporary form has provided the Terenten Kindergarten to have a successful form. The Kindergarten Terenten is a unique and special structure that interacts problem free with surrounding structures. When looked at from the urban perspective it is observed that Terenten has provided a new identity to the defined area as a concept and that it is integrated with the environment in harmony without creating a contrast.

Figure 4.25 Kindergarten Terenten – Harmony with the Environment

Figure 4.26 Sunrise School Kindergarten, Indonesia,2002

Daylight gives children the opportunity to discover the cycle of natural life through observation. Research done by White and Stoecklin, "Children's Play & Learning Environments: Returning to Nature" shows that children could communicate with the environment in a better way (White, Stoecklin, 2011).

2.5.1 Factors to Be Considered in Kindergarten Design

The zoning of activity areas is also important; the location of the art centre near a sink and the library away from water and paint is crucial for an effective classroom layout. Moving towards a classroom flexible in its design is a current trend within the design of

early childhood educational facilities. Rooms should be arranged to accommodate individual, small group, and large group activities (Munro & Paciorek, 2004). Preschool children have a tendency to work and play in clusters or small groups fewer than five (Kruse & McGowan, 2004). Therefore, designating spaces for classroom work such as reading and writing should be implemented. Children in a preschool setting spend much time alone as well, either actively engaged or passively uninvolved; therefore, the need for small, quiet, and individual work spaces is essential (Day, 1983). Children's play episodes and engagement with other children are also longer when they play in small spaces (Brewer, 2001).

A designer can create a physical space which is highly successful in fostering early childhood development and learning by focusing on the arrangement of the classroom into learning areas, creating a child-sized environment, and designing a setting which is safe, supportive to their emotional well-being and challenging to the children's skills.

It is important for a classroom to have a high degree of spatial differentiation. Activity areas may be separated by physical objects such as moveable partitions and cabinets or intuitive visual cues. Using visual cues such as contrasting flooring materials, wall colours, and changes in lighting and ceiling or floor height also produces effective and appropriate spatial differentiation. Clear pathways and ample space for egress and circulation must be provided (Kruse & McGowan, 2004). Such distinct and well-defined boundaries and clear circulation paths support social interaction, encourage exploratory behaviour, and prevent interruption of ongoing play (National, 2000).

2.5.1.1 Materials and Furnishings

The early childhood classroom and its furnishings should be scaled and targeted towards the child. According to White (2004), research shows the more child-scaled the environmental space, the higher the quality and complexity of a child's play will be and the longer he/she will be preoccupied in the play. Thus the more he/she will learn. Child-sized environments increase concentration and interest (White, 2004). Selecting child-size furniture; varying ceiling heights; placing windows at a child's eye-level; and mounting sinks, toilets, and water fountains at appropriate heights for children are just a few ways to effectively design an early childhood environment classroom.

Using furniture scaled specifically for children increases healthy muscle and bone development, comfort, productivity, creativity, and learning. Using materials, furnishings, and architectural elements appropriate for a child's level of manual dexterity, muscle capability, and level of intelligence is also essential to the successful design of early childhood centres and classrooms (Vaughan, 2007). Ergonomics is important to consider in a preschool and kindergarten setting as a designer should take into account children's physical sizes and abilities such as height, grip, reach, and field of vision so tasks can be performed with minimum stress and maximum efficiency and safety.

Storage, for both the child and the teacher, is an issue often overlooked when designing an educational space. Ample storage is needed to accommodate the increasing amount of equipment and materials used in instructional and extracurricular programs (Kowalski, 1989).

Open shelving rather than enclosed cabinets should be used as children have high visual-perceptual orientation; what they see is more attractive than what they are told might exist. Therefore, low shelves should be used instead of large bookshelves (Day, 1983). Materials should also be organized and uncluttered as children often pass by without notice if the activity area is disordered.

Material selection within an early childhood classroom and facility is an important component of design. Materials need to be durable and easy to clean and maintain. Using materials and finishes that can be sanitized is extremely important as furniture and surfaces get extremely dirty very quickly (White, 2004). Institutional, unnatural finishes and textures should also be avoided. Rather, natural finishes emphasizing a "hand-made" appearance are suggested (Vaughan, 2007). Wall surfaces should have a smooth finish and be painted a low sheen. Toilet walls in particular should be impervious and easily cleanable as well. High gloss paint and/or ceramic tiles should be considered for areas at risk (Building, 2007). The acoustical environment should also be considered. Unlike adults, a child is cognitively unable to fill in the blanks if he/she cannot hear his/her teacher (Vaughan, 2007). Therefore, soft surfaces such as carpet, fabric and/or perforated ceiling tiles should be used within a classroom to reduce the noise level in a structure built of concrete blocks and tile flooring (Exelby & Isbell, 2001). Flooring materials should also be secured to keep staff and children from tripping and falling (NAEYC, 2007). Colour enhances the visual experience. It has an emotional appeal and should be considered as well as material selection. In classrooms it is best to use deep and neutral tones. Colour should also be used as a mechanism for way finding in facilities geared for the use by a child (White, 2004). Finally, materials and furnishing should age gracefully with use and be extremely resilient to uphold the wear and tear of a child.

Designer should be worked sensitively on topics such as the formation of spatial perception, the intelligibility of space, and usage intensity to create a successful design. Colours used in space complete design. In conducted research, it was determined that although children could perceive single-storey structures better, construct in their minds better, feel safer themselves in these structures, the majority of pre-school education institution applications in Turkey is multi-storey structures (Gur, 2002). These buildings have some problems about interior design. In these buildings, it is often faced with wrong applications about adequate use of natural light and artificial light. Random use of colours causes that colour confusion appeared in structures. Spatial dimensions and scale force to children's perception capacity. In fact, play and reaction areas are not sufficient (Yurekli, 1999).Outdoor spaces should be directly associated with learning spaces both functionally and visually.

All designs for children should support their physical, mental, and cognitive development. First of all, building should be large enough for the number of children. For perceiving easily by children, minimizing the risk of accidents, moving comfortably, providing better control, these structures should be designed as a single-storey (Durmuş, 2006). It is difficult to perceive multi-storey structures for children due to incomplete cognitive development. This is another phenomenon as a result of researches that high ceilings make children more active and dynamic, whereas low ceilings make them calm. The use of light and colour in the design is very important in terms of forming and distinguishing space, the relationship with users. Through the use of colour effects, qualification and perceptual scale of space become different. Certain rules for the use of colours should be obeyed and the colour of light should be chosen consciously (Verdil, 2007).

3.METHODOLOGY

First, previous studies were investigated to compare with current ones to determine the problems and then solutions were offered through the eye of design. In this study, the appropriate environmental conditions for needs of children were examined and the space organizations and environmental conditions for different age groups were researched. Additionally, the definition, the importance and the necessity of pre-school education were explained. The history of pre-school education and the development of pre-school education were examined. Physical and functional characteristics of early childhood environments and indoor-outdoor space organizations were explained. Furthermore, samples from international pre-school education buildings, which promote children's development, were examined. Child and perception, colour perception, plants for children, and kindergarten design were explained in different chapters. Kindergartens in Turkey and London were visited and photographed. After that through pictures shown under different titles, visual survey was applied. Visual survey is consist of seven sections; sleeping room, play room, dining room, learning room, entrance, toilets, and garden. Every category includes firstly soft colours, secondly bright colours, and finally perceptual colours. Visual survey was prepared on Photoshop and presented to the kindergarten teachers. Also, teachers were asked for interviews. Selecting was to find out the most important perceived components (physical and architectural) by the kindergarten teachers. In this research, 0-6 years old children and interior and exterior design of pre-school education institutions where children spend most of their times were determined to investigate. The kindergarten teachers were interviewed to find out their perceptions towards a suitable learning environment. Teachers would also have bright and cooperative ideas in order to improve kindergarten architecture. Their close interaction with children and also their experiences through the years make this research more accurate. In the light of this, design suggestions were offered by using colours as a visual design element and integrating vegetation in the classroom to be closer to the nature and develop children's visual perception.

In order to accomplish the objectives of this study, a descriptive analysis was performed. Further, the analysis included graphic to examine the extent to which selected kindergarten environment facilities influenced students' academic achievements and learning skills. Also, this analysis helps the suitable interior design for children. Descriptive analysis was used to discuss the results of the socioeconomic profile of the teachers. Teachers were asked the entire demographic factors related to this study such as gender, age.

As a conclusion, obtaining data about appropriate environmental conditions and space organizations for the perception levels of 0-6 years old children in the pre-school education is aimed to provide a suitable interior design for early childhood environments. Perceptional experience helps children's learning (Demirci, 2010). For this reason, space perception is tried to be strengthen with the help of colours and plants in the sample design.

4. RESULTS

There was a significant relationship between the use of colour and plants in kindergarten indoor spaces and children's visual perception, learning skills, and academic achievement. The results showed that most of the teachers believed that the successful use of plants and the better quality of colours had a higher impact on the children's perceiving and learning ability. In teacher's view, additionally, the teacher's lighting in the classrooms also affected child's learning behaviour positively. The safety issue was the most influential factor on the learning environment. The results of this study indicated the relationship between the visual design elements of early childhood environments and the perceptual development and learning capacity of children. It is clearly seen how important is the spatial quality of pre-school education institutions where children spent most of their times. The purpose of this study is to evaluate the effects of interior and exterior design of these institutions. Evaluating the findings in the light of the planning and designing principles of kindergartens, various suggestions have been developed.
However, none of the schools visited were observed to have spatial gardens which could provide an important contribution to the awareness of environment and nature. Moreover, analyzing the elements in school gardens there are bins, benches, lighting elements, but they are not found to be convenient ergonomically in terms of materials used. These elements were found insufficient, neglected, and inharmonic with the environment.

Plants in school gardens should serve as a toy as well as they provide shadow areas. Therefore, the features of plants such as prickly, toxic and allergic should be taken into consideration. Plant design in the schools was applied randomly and landscape design criteria were not considered.

During the period (especially autumn and winter) the weather is not warm enough for the students to have outdoor activities. Therefore, they spend most of their time inside the classrooms or in indoor sport clubs. Thus, the teachers emphasized more on interior architecture and designs in kindergartens. In contrary with Tanner and Andersen (2002), no relationship was found between colour and academic performance.

The graphic gives a visual quick view of the selected pictures and the use of plants and right colours of the early childhood environments which show the highest importance among the rest. The kindergarten is an important start to lifetime learning; therefore, it is vital to have a safe environment in order to build a personal foundation for the children. In the light of these findings, sample kindergarten design was tried to be designed with the right use of colour and plants for contribution to children's visual perception.

4.1 Visual Survey

I also went to different types of kindergartens to talk to staff and to investigate the colours used in them. Then, I made designs on Photoshop with different colour sets by recolouring the pictures. I have taken and took people's opinions to know how they perceive these designs. In general, redesigned spaces with plants were preferred since they symbolize the nature, and have an aesthetic view. In terms of colour effect, for example blue colour was perceived as calming and relaxing, especially for sleeping rooms. For common play area, colourful designs were preferred.

| Soft Colours | Bright Colours | Perceptual Colours |

Figure 4.27 Visual Survey on Sleeping Room(Url - 9)
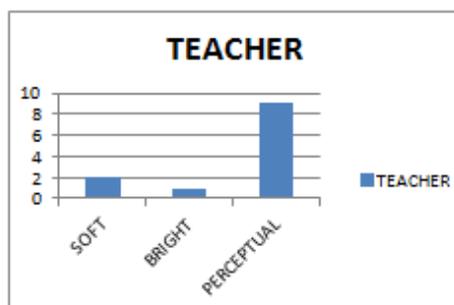
SLEEPING ROOM	TEACHER
SOFT COLOURS	2
BRIGHT COLOURS	1
PERCEPTUAL COLOURS	9

Table 4.1 Graphics for Sleeping Room

Among selected sleeping rooms, the first is perceptual colour (75%), the second is soft colour (16.7%) and the third is bright colour (8.3%).

Soft Colours   Bright Colours   Perceptual Colours

Figure 4.28 Visual Survey on Entrance(Url - 9)

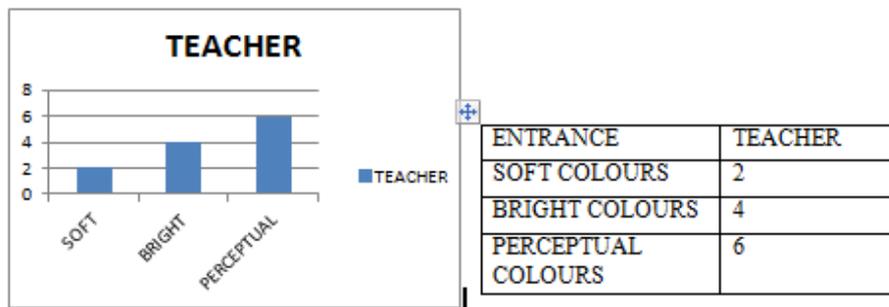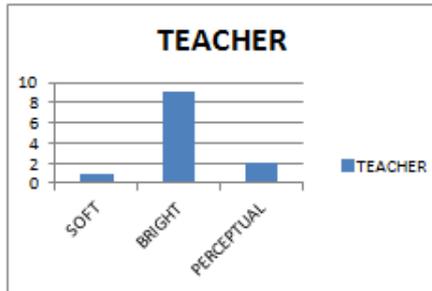| ENTRANCE	TEACHER
SOFT COLOURS	2
BRIGHT COLOURS	4
PERCEPTUAL COLOURS	6

Table 4.2 Graphics for Entrance

Among selected entrances, the first is perceptual colour (50%), the second is bright colour (33.3%) and the third is soft colour (16.6%).

Soft Colours   Bright Colours   Perceptual Colours

Figure 4.29 Visual Survey on Learning Room(Url - 9)

LEARNING ROOM	TEACHER
SOFT COLOURS	1
BRIGHT COLOURS	9
PERCEPTUAL COLOURS	2

Table 4.3 Graphics for Learning Room

Among selected learning rooms, the first is bright colour (75%), the second is perceptual colour (33.3%) and the third is soft colour (8.3%).

Soft Colours   Bright Colours   Perceptual Colours

Figure 4.30 Visual Survey on Toilets(Url - 9)
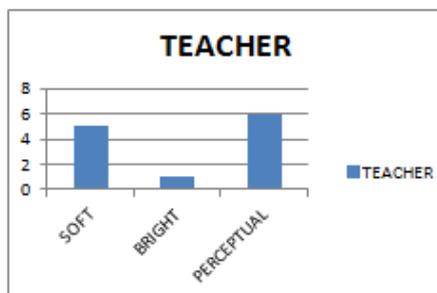
TOILET	TEACHER
SOFT COLOURS	5
BRIGHT COLOURS	1
PERCEPTUAL COLOURS	6

Table 4.4 Graphics for Toilet

Among selected toilets, the first is perceptual colour (50%), the second is soft colour (41.6%) and the third is bright colour (8.3%).

Soft Colours   Bright Colours   Perceptual Colours

Figure 4.31 Visual Survey on Dining Room(Url - 9)
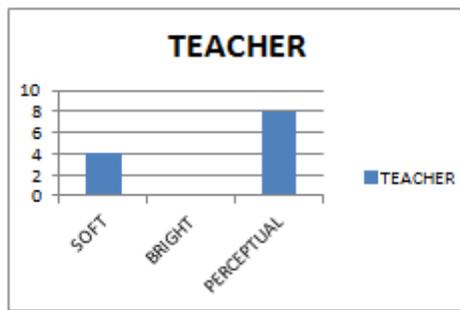
DINING ROOM	TEACHER
SOFT COLOURS	4
BRIGHT COLOURS	0
PERCEPTUAL COLOURS	8

Table 4.5 Graphics for Dining Room

Among selected dining rooms, the first is perceptual colour (66.6%), the second is soft colour (33.3%) and the third is bright colour (0%).

Soft Colours   Bright Colours   Perceptual Colours

Figure 4.32 Visual Survey on Play Room(Url - 9)
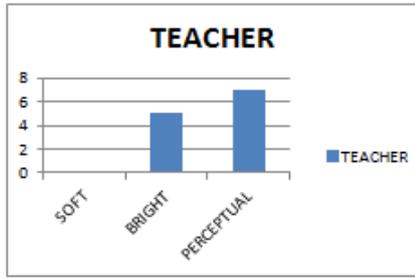
PLAY ROOM	TEACHER
SOFT COLOURS	0
BRIGHT COLOURS	5
PERCEPTUAL COLOURS	7

Table 4.6 Graphics for Play Room

Among selected play rooms, the first is perceptual colour (58.3%), the second is bright colour (41.6%) and the third is soft colour (0%).

Without Plants   False Planting   True Planting

Figure 4.33 Visual Survey on Play Ground(Url - 9)

PLAY GROUND	TEACHER
WITHOUT PLANTS	0
FALSE PLANTING	0
TRUE PLANTING	12

Table 4.7 Graphics for Play Ground

Among selected play grounds, the first is true planting (100%), false planting and without plants are (0%).

4.3 Interviews

Interview-1 at Hazelwood Children Centre
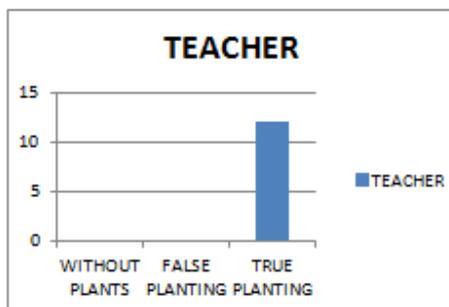There are approximately 20 children in different groups between 0-5 years old. Three people work as staff and two people work as manager in the centre. They did not benefit from the opinion and experience of an interior designer, but they considered some vital points: first, children's health and security; and then, durability and longevity. Other factors should be noted in the design process; for example, sharp corners, soft surfaces, and edges, round tables etc.

Figure 4.34 Hazelwood Children Centre

Interview-2 (Teensy Wonders) There are 12 children (0-3 years) and 4 members of staff in this children centre. Their teacher pays attention to use recycling objects in the design. For their children's healthy development in terms of every aspect, they tend to bring into play environmentally-friendly materials.

Figure 4.35 Teensy Wonders

Interview-3 (Nursery on the campus of Middlesex University)
Middlesex University provides a full Day Care & Education for children aged 6 weeks to 5 years. They have three alternative playgrounds for different age groups. They are careful about children's security and health by using true materials. For example, there is a black material under the slide in the garden which is called "Tarmac". It is soft, healthy and safe material for children.

Figure 4.36 Nursery on the campus of Middlesex University

Interview-4 (Cemal Ererdi Kindergarten)

There are approximately 200 children in different groups between 3-5 years old. Nine people work as staff and three people work as manager in the centre. They did not benefit from the opinion and experience of an interior designer, but they considered some vital points: first, children's health and security; and then, durability and longevity. Other factors should be noted in the design process; for example, sharp corners, soft surfaces and edges, non-slip surfaces, easy to clean, immobilization of the objects to the walls, round tables etc. Educators/Teachers reported that girls like pink and purple, while boys like green and blue colours in general. Yet, there is one exception in the head of teacher's career that one of the female student likes colour black.

Figure 4.37 Cemal Ererdi Kindergarten

Interview-5 (Private Belekliler Nursery and Day Care Centre)

There are approximately 70 children in different age groups between 2 and 5. Five female teachers work in this centre. In this centre, a skilled interior designer worked in designing process. Teachers reported that girls like pink and purple, while boys like blue coloursin general. Teachers apply some activities such as collecting the leaves and sea shells on the beach, growing plants to children for the love of nature. They are really lucky to have this school near the beach in a touristic city. So, most of the students are from abroad. This gives a chance to learn foreign language better.

Figure 4.38 Private Belekliler Nursery and Day Care Centre

Interview-6 (Lale Bahcesi)

There are approximately 120 children in different age groups between 3 and 6. Eight female teachers work in this centre. In this centre, a skilled interior designer worked in designing process. Teachers reported that girls like light yellow, pink and purple, while boys like dark blue colours in general.

Figure 4.39 Lale Bahcesi

Interview-7 (Toros Akdeniz Kindergarten)

There are approximately 130 children in different age groups between 3 and 6. Eighteen female teachers and one physical education teacher work in this centre. In this centre, a skilled interior designer worked in designing process. Teachers reported that girls like light pink, while boys like blue colours in general. Due to the field conditions, designer had to plan this building as a multi-storey structure.

Figure 4.40 Toros Akdeniz Kindergarten

4.4 Interview Questions

How many children and teachers are there?
Is the use of indoor plants enough?
What kind of activities do you do to give children the love of nature?
Single-floor, multi-floor?
What type of plants should there be in kindergarten design and which colours should children be used for their visual perception development?
What kind of features in interior design for children do you prefer to contribute to education?
What disturbs you most when you look around the environment?
Which school would you prefer to be yours? Why? In which school garden is playing more enjoyable? Why?
Why do you prefer to use mixed colour in learning colour?
Which colours do girls prefer? Which colours do boys prefer?

4.5 Design Sample

To emphasize sensory design, with the exception of some materials applied in interior and exterior design of kindergarten, there is no other colour other than perceptual colours in model. Redesign is made on computer. Auto CAD is used to draw floor plan. The psychological effects of colours were tried to be shown in the model.

A path paved with pebble lies in entrance to the garden, in association with an exterior gate to learning area. The path prepares children for learning, and, it is clearance ceremony for children from tiring activities to relaxation and recreation. For example; blue colour was preferred for sleeping room since it has a relaxing and calming effect.
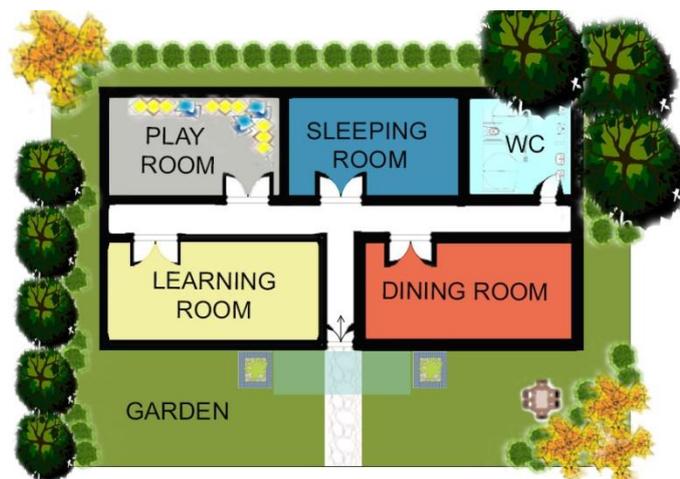

Figure 4.41 Basic Plan

Colour is a universal, nonverbal language. Colouring walls is not just a matter of aesthetics. It is a tool that can be leveraged to affect emotions and behaviour. At first, the primary function of each room should be considered and predominant colours should be picked. So, perceptual colours were determined as a result of researches. Then, colour schemes were served teachers to choose for early childhood environments. Although preferences change from person to person, perceptual colours were more preferred in the end. Application of perceptual colours for each kindergarten interiors is shown in the model (Figure 4.42). For instance; blue tones are convenient for children's sleeping rooms since blues are calming, relaxing and helpful for sleeping. For children's bathroom, turquoise blue, light blue, and white colours evokes cleanliness. Most people feel comfortable with blues and greens and turquoises because these colours give a sense of being clean and fresh and calm. In this space, bright colours should not be preferred since they make children more active and impatient. In the dining room, red, orange, and yellow combinations were applied to increase children's appetite, eliminate the challenges while eating. Therefore, the restaurant industry has long recognized the appetite-stimulating power of red decor. Learning room should be painted in warm tones. Bright reds tend to increase blood pressure and heart rate and stimulate activity so children may not pay attention to their teachers. In the play room, just toys should be the most attractive and the brightest to direct children's attention to toys. Light and warm tones have a calming effect and extent the length of time spent in the children's play area. In addition, early childhood interiors were decorated with indoor plants to gain the love of nature and aesthetic perspective.

Figure 4.42 Images from the model

5. CONCLUSION

The teachers are not the only responsible people in the children's academic achievements. There is a need of collaboration of teachers, architects, children psychologists and policy makers (from the government and private sectors) to identify a strategy plan for maximum utilization of kindergartens and pre-learning spaces in relation to students' academic achievements. Meanwhile, the parents should be careful in choosing a suitable kindergarten for their children in order to motivate and encourage their children's talents.

Why is kindergarten interior design so important for us? Because recent studies have shown that the western nations spend almost 90% of our time inside a house/building, either at home or at work. That is why it is easy to understand that the most important environment in relation to our health is the indoor environment. During the breakthrough of modern hygiene, from mid-19th century, indoor environmental issues received a lot of attention. Attention that is understandable and an attention that should have come much earlier. It is very important that we try to make the true design with colours and plants which contribute to children's visual perception inside kindergartens as good as possible for the sake of children, because they are the future.

This study adopts an experimental approach to investigate the effects of indoor plants and colours on children's psychology, physiology, and behaviour. In this report, it is aimed to research how children perceive their indoor and outdoor environment, and in order to determine what the requirements are in pre-school institutions in terms of interior design. It is intended to present the use of colour and indoor plants to enhance children's visual perception and develop designs of kindergarten interiors and landscapes for learning. Also, the impacts of physical environment on children's perception are discussed. In this context, Photoshop works and interviews were conducted.

In addition to the formal compliance offered with physical and architectural designs in kindergartens which are the oldest and most widely units of pre-school educational institutions, it is important to update and organize them in accordance with children's development characteristics, comfort and health needs and according to changing conditions of life. Integrating natural materials to buildings will meet the development needs, comfort and health requirements of children. Particularly natural grass was selected as the ground material for the garden. The purpose is to benefit from the cooling effect of grass against the impact of the sun.

It has been determined that the gains of the kindergarten child in terms of social awareness, learning to protect nature and natural resources within the created physical environment by virtue of environment-friendly kindergarten structures, are at a high level. In addition, it has been observed that the mental development and happiness of

kindergarten children is enhanced in environmentally friendly kindergarten structures which allow them to gain knowledge through living and experiencing.

Especially for children who have different abilities and skills, design criteria should be investigated in common playgrounds.

Nowadays these last few decades, especially city kids live a life divorced from nature. Children need to share their endless energy with nature, light, fresh air by bouncing, jumping, and swimming. Behavioural disorders and learning difficulties are experienced due to the wrong use of materials in the design. Additionally, concrete buildings caused lung diseases by poor air quality; breathing problems occur. To solve this problem, these concrete structures should be supported with indoor plants. In this study, it is aimed to design a space as an example that is supported with the effect of colour and the use of plants. If a classroom can provide more opportunities for contact with nature, a more harmonious atmosphere, and adequate space for students, it might help students develop a healthy body and a healthy mind through situational education. In so doing, educational goals might be more easily reached.

A life continued in surroundings full of greenness with no air pollution, where daylight is used most efficiently will ensure the development of healthy-living, healthy-thinking individuals who experience comfort and happiness at the highest levels.

Visual perception skills develop fast in early childhood period (Akaroğlu, 2012; Dereli, 2012). While experiencing the environment, children move, touch, think and improve their ability by using their senses psychologically. For this reason, in order to support and complete their multi-dimensional development and also, meet their various requirements, convenient places should be designed to contribute their visual perception (Cukur, 2011; Guller Delice, 2011).

Designs that need the requirements will make children obtain an important experience by seeing colours which have psychological effects from the very early ages. By this way, they will have aesthetic view, see the environment from a different angle, and explore the beauties in detail.

"Child and architecture" studies have become important to transfer general information to children about architecture. In studies realized under the leadership of teachers, information such as critical thinking, creativity, becoming responsible citizens, social interest and awareness of environmental issues is transferred. For this reason, activities related to architecture, primarily kindergarten education, should be integrated easily with the curriculum. Thanks to designs created with the psychological effect of colours, being in interaction with the environment and space perception is getting easier for children (Gokmen, 2010).

By virtue of these kindergartens designed with social and environmental responsibility

transition to natural life will return man to his origin as it will also help to gain a healthy lifestyle as well as to increase the welfare level of society and the economy. The selection of natural-friendly physical environment, building form, use of natural materials, ensuring adequate indoor air quality, within the structure makes up a chain within the design process of structures.

Using natural materials in design in order to maximize user comfort, offering future generations the right to benefit from these materials, creating a healthy environment by giving the least damage to the nature are the issues to be handled. Moreover, through improving school gardens, the needs of students are met as well as the city's open green spaces are improved.

The connection between existing environment and the nature is crucial for children. Experts claim that this has a positive contribution to their healthy development. The use of plants in the interior space is one of the big issues for designers and developers because according to ecological approach, we feel the lack of the nature which is destructed by us and we miss it. So, environmentally-friendly designs make us feel better and more comfortable.

Furthermore, detailed features of the vegetation, such as shape, canopy width, colour, texture, height, flower, fruit, and fragrance can be explored to determine which combinations of these factors can specifically meet different human needs, for example with respect to age, gender, occupation, in terms of emotion, physiology, cognition, behaviour, or health. While designing pre-school education buildings, psychological needs which provide the spiritual and emotional comfort are as important as physical features such as; spaces, relationships between spaces, functions of building (Durmuş, 2006).

Kindergarten is the first educational and social place that children experience. It makes children more creative thus influencing their behaviours. Therefore, this physical learning environment should be more inspirational, challenging, thought provoking and uplifting. The places that are relevant for children's learning should include an appropriate environment to improve their physical, mental and social growth. This is possible by utilising suitable architectural elements and designing a place that children use to learn. Architectural forms originate from special and specific elements. Thus, the best place for children must be colourful, absorbing, systematic and mirthful, besides being comfortable and safe. Designer, to ensure children's participant use, must be able to fully understand their needs, emotional reactions and behaviour. Then, design planning, activities that will take place in space, user's needs and expectation and external factors that can affect the design must be addressed collectively (Nielson, 1990). As a result of social changes and technological developments, the requests and expectations that vary according to the users' social and economic situation have to be met. While a designer is envisaging a particular use, (s) he should consider physical, social and psychological aspects of the children.

The demands and needs of children are completely different from the arranged environment because, the meaning and interpretation of same space is different for children and adults. They understand, perceive, feel, and react in a different way. These differences should be detected; appropriate spaces should be created as a result of perception-behaviour process.

Obviously, designers play an imperative role in the effectiveness of a child's development; more than any other building type, early childhood educational facilities have a profound impact on their users (Day, 1983). The design of the environment should be greatly considered as preschools and childhood development centres are a child's first formal learning experience and his/her first exposure away from home (Kruse & McGowan, 2004).

With better materials and more skilled people in construction and planning good interior design in kindergartens, with better demands we almost cannot go wrong. So, my opinion is that we are on the right way to success in creating better interior designs for children. There is always one question that every client asks? What does it cost, it is a good question and it has an answer. The answer is the perfect interior design is more expensive than the "ok" interior design but is the cost of your children's development not worth more.

In conclusion, I would like to use indoor plants and colours to influence children's perceptions of kindergarten in this study. Later, ideas for plant design in the play garden were suggested. In conclusion of the research, colours have been proposed separately for each use of space in kindergarten buildings with collected data and have been presented with the model.

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The Name of the School :

The Name of the Educator :

Gender : F /M , Age :

THE STUDY OF VISUAL SURVEY

	Soft Colours	**Bright Colours**	**Perceptual Colours**
1			
2			
3			
4			
5			
6			

	Without Plants	**False Planting**	**True Planting**
7			