(MASTER THESIS)

ANALYSIS OF THE EFFECTS OF SUSTAINABLE DESIGN IN KINDERGARTENS

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Department of Interior Architecture

Bornova – İZMİR
2012

YASAR UNIVERSITY
GRADUATE SCHOOL OF NATURAL AND APPLIED SCIENCE

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This study titled “ANALYSIS OF THE EFFECTS OF SUSTAINABLE DESIGN IN KINDERGARTENS” and presented as Master Thesis by Belma YÜKSEL has been evaluated in compliance with the relevant provisions of Y.U Graduate Education and Training Regulation and Y.U Institute of Science Education and Training Direction and jury members written below have decided for the defense of this thesis and it has been declared by consensus / majority of votes that the candidate has succeeded in thesis defense examination dated 29.02.2012.

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TEXT OF OATH

I hereby certify with honor that this MSc/Ph.D. thesis titled **"ANALYSIS OF THE EFFECTS OF SUSTAINABLE DESIGN IN KINDERGARTENS"** was written by me, without aid that would not comply with scientific ethics and academic traditions, that the bibliography I have used is that indicated in this thesis and that appropriate reference has been given whenever necessary.

29 / 02 / 2012

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YÜKSEL, Belma

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Okul öncesi eğitim birimleri içerisinde yer alan anaokulu eğitimi, eğitim sürekliliğinin temelini oluşturan önemli bir aşamadır. 3-6 yaş arası çocukların eğitimini kapsayan bu dönem, teknolojik ve bilimsel gelişmelerin hızla artışı, annenin aktif çalışma hayatına başlaması ve içinde bulunduğumuz bilgi ve iletişim çağına adaptasyon ile birlikte temel eğitimin bir parçası haline gelmiştir. Çocuk gelişiminin en kritik evresi olan 3-6 yaş aralığında yapıcı, yaratıcı, sorgulayıcı ve duyarlı kişilik özelliklerinin kazanılması anaokulu eğitiminin amaçları arasında yer almaktadır. Bu amacı gerçekleştirmek; çocuğun fizyolojik ve psikolojik gelişimine katkıda bulunacak ve bu gelişimi sayesinde kazandığı davranışları uygulayabilecek eğitim yapıları ile mümkündür.

Çevre kirliliğinin hızla artışı ve doğal kaynakların azalmasına bağlı olarak yaşam alanlarının tehdit altına girmesi sonucunda hem kullanıcı konforu ve yaşam memnuniyeti, hem de çevre koruma bilinci adına önemi artan çevre dostu yapı tasarımlarının anaokulu yapılarına entegre olması 3-6 yaş çocukların çevre koruma bilincini kazanabilmeleri ve uzaklaştıkları çevre dostu mekânlar ile tanışabilmeleri için önemli bir gelişmedir. Bu tez kapsamında çocuğun aileden sonra sosyal çevre ile tanıştığı ve sosyal çevreyi anlamaya başladığı anaokulu eğitim yapıları, dünya ülkeleri üzerinde çevre koruma bilincine duyarlı tasarlanmış anaokulu örnekleri ışığında incelenmiş ve elde edilen bulgular derlenmiştir.

Çalışmanın amacı, anaokulu yapılarını fiziksel çevre verileri, yapısal form, peyzaj tasarımı, etkili iç mekân hava kalitesinin sağlanması, gün ışığından etkin yararlanma, verimli su ve enerji tasarımı başlıkları adı altında toplanan çevre dostu tasarım kriterleri doğrultusunda örnekler üzerinden incelemek, 5-6 yaş grubu öğrenciler ile anketler yaparak bu kriterlere uygun tasarlanmış yapıları tercih edip etmediklerini tespit etmek ve elde edilen bulgulara göre çevre dostu anaokulu yapılarının tasarım kriterlerini genel bir çerçeve içerisinde sunmaktır. Bu çalışma Türkiye'de örneğine rastlamadığımız çevre dostu anaokulu yapılarının tasarımı için ışık tutan bir kaynak niteliğinde olacaktır. Bundan sonra tasarlanacak anaokulu yapılarına da katkıda bulunacaktır.

Anahtar Kelimeler: Okul Öncesi Eğitim, 3-6 Yaş, Çevre Dostu Yapı Tasarımı, Çevre Dostu Anaokulu Tasarım Kriterleri

ABSTRACT

ANALYSIS OF THE EFFECTS OF SUSTAINABLE DESIGN IN KINDERGARTENS

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Kindergarten education which includes pre-school education units is an important phase that underlies continuing education. This period, including 3-6 year old children's education involves a rapid improvement in technological and scientific developments, mothers attending active work life and adaptation to the current information and communication age, has become a part of fundamental education. Gaining constructive, creative, questioning skills and awareness of personality feature in the 3-6 age period, which is the most critical phase in child development and is among the aims of kindergarten education. Achieving these goals will be helpful for a child's development in terms of psychological and physiological development and thanks to this development a child's behavior benefits by designed education buildings.

Connected with a rapid rise of environmental pollution and decrease in natural sources, living spaces are coming under threat and as a result, both the user's comfort and life satisfaction, and environment-friendly building designs being integrated to kindergarten building is becoming more important for environment protection consciousness. These are important improvements for 3- 6 years old children's gaining environment protection consciousness and their meeting with environment-friendly spaces that may be distant from them. Within the scope of this thesis, kindergarten education buildings in which the child meets and understands social environment after his/her family, are analyzed in the light

of preschools designed with awareness of environment protection consciousness in countries worldwide and the findings obtained are compiled here.

The aim of this study is to analyze kindergartens through examples according to environment-friendly design criteria which determined under the name of; physical environment data's, structural form, efficient landscape designs, provision of efficient indoor air quality, efficient daylight saving, efficient energy usage and water efficient design. By making surveys on environment-friendly buildings, within 5-6 years old kindergarten students' group; and to present structural design criteria considered in environment-friendly kindergarten buildings with a general view. This study will serve as a source that sheds light on environment- friendly kindergarten buildings design, examples of which have not been seen in Turkey. This will contribute to kindergarten buildings that will be designed from now on.

Key Words: Pre-School Education, 3-6 Ages, Environment-FriendlyBuilding Design, Environment-Friendly Kindergarten Structures

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1. INTRODUCTION

Education is a phenomenon and a process that must continue throughout the life of human beings. On the other hand, the pre-school education period is the basis of this continuity (Tos, 2001). This period which covers the education of children from age 0-6 is divided into three divisions according to the age group of children. Crèches provide care for children aged between 0-2, nursery schools care for children between ages 2-4 and kindergartens care for children from age of 3-6 (Uysal, 2006). These institutions which undertake the responsibility for the education of children aged 0-6 should provide healthy and regular physical environmental conditions according to the age group of the children. They should also develop individuals effectively in a social and cultural setting and should contribute to the development of a robust personality, social sensitivity and creative intelligence (Karaküçük, 2008). Today, the rapid increase in technological and scientific developments, the mother's return to an active working life due to economic imperatives and the need to capture the information and communication era in which we live in increases the demand and importance of pre-school education institutions. Conducted researches clearly underline the impact of pre-school education on people's future life. If exemplified by the studies carried out by Bloom, 50% of the child's mental development is completed by the age of 4, 30% by the age of eight and 20% during the process from eight to seventeen (Yıldırım, 2008). In other words, the education given at an age of 0-6 which is also known as the "sensitive period" plays an important role in the development of the child's personality and capabilities (Uysal, 2006).

The pre-school period is a process in which the child preliminarily meets and questions the social environment after the family. In this process, which is the most critical stage in child development, gaining constructive, creative, inquisitive and sensitive personality characteristics is the aim (Çetinkaya, 2006). The physical environment and the entire stimulus it contains are crucial for the development of the child.

Unlike adults, children cannot choose or create the environments which they live in. Therefore, the behavior tendencies they develop within the environment in which they were born are passive and dependent on adults (Karaküçük, 2008). Maintaining children's development in a healthy environment during the pre-school age, also known as the play and learning age, and being active in environment-behavior relations is possible through the conformity of created physical environmental conditions with children's development levels and learning lives. In this context, while designed places respond to the requirements, physical, physic-motor, mental, social and emotional developments and self-care capabilities of children, it is possible by using today's design approaches to environmental-friendly designed buildings (GSA Public Buildings Service Office of Child Care, 2003).

1.1 Aim of the Study

The aim of this study is to emphasize design and application criteria's of environment-friendly buildings by examples of which environment-friendly kindergartens designed globally and shows the perspectives of 5-6 year old kindergarten children on environment-friendly buildings. In this study environment-friendly design criteria are determined under the name of; Physical environment data's, structural form, efficient landscape designs, provision of efficient indoor air quality, efficient daylight saving, efficient energy usage and water efficient design. Environment-friendly kindergartens appropriate for these criteria are preferred or not, by making surveys on environment-friendly buildings, in 5-6 years old kindergarten student groups. Consequently, in the light of information obtained, building design criteria considered in environment-friendly kindergarten buildings are presented with a general outline.

1.2 Problem Situation

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. Alan Ford has harshly expressed this situation in his book "Designing the Sustainable School" in a sentence by stating that they were "prisons rather than schools" (Ford, 2007). As a result of conducted preliminary studies, the importance given to the development of pre-school education in Europe at the end of World War I is clearly observed (Koçyiğit, 2007). The rapid development of pre-school education in Europe has also brought along the development of pre-school structures. In Turkey it is seen that the physical environment is designed in an extremely limited manner as pre-school education is not a part of compulsory education and also due to lack of awareness. Most buildings designed as kindergartens are located in apartment buildings or restored two story housing. It is clearly evident those buildings are physically of little value and that they are unable to adequately respond to the developmental requirements of children (Uysal, 2006).

"Environment-friendly" building designs attracting the individual's attention as a result of increased awareness of architectural design and gaining importance due to the current environmental threat have played an important role in the structural change of building designs. A growing population, rapid urbanization and natural resources being under threat have been the most important environmental problems today. It is accepted that construction has also played an important role in the emergence of environmental problems. Educational buildings are also included in such structuring. It is indicated in the report published by the "World Watch Institute" in 1995 that annually 40% of stone, gravel and sand, worldwide 25% of natural wood, 16% of water and 40% of energy is used in the construction sector (Esin and Yüksek, 2009). The natural balance is deteriorating as a result of air and water pollution, degradation of vegetation, destruction of forest areas and loss of biodiversity and the resulting global warming threat has negatively affected human life. For this reason today, the integration of environmental protection awareness into every area of life

through behaviors has become important. The most important and effective step in spreading this awareness is to choose behavioral learning through education.

In a general definition environment is a physical, biological, social, economic and cultural climate in which people and other living creatures continue their communication throughout life (Taşkın, 2010). In other words, it is the condition in which the organism exists or the relation of the system with the environment. Increasing pollution in the world and its adverse effect on human life has made the development of environmental awareness essential. For this purpose, environmental education has started to be provided starting especially from kindergartens.

In environmental education within the scope of kindergartens the target audience is the child at an age of 3-6. The aim here is to develop positive attitudes and behaviors in the field of environmental protection by increasing environmental awareness. As the basis of environmental education is to teach protection of nature and natural resources, planting trees, recognizing animate and inanimate beings in nature and similar activities as well as protecting renewable energy resources which include environment-friendly life. Information including the eco-system and environmental friendly life should be explained. The environment and environmental issues should be explained to children with events, by providing materials and environments in which they can freely use their senses rather than theoretical expressions. For this purpose, it is important that the physical environment is prepared in accordance with this objective and that it is filled with rich stimulus. The fact that experiences and habits acquired by children during these years will light their path in later years of their lives makes the events to be performed in a physical environment even more important (Sarı, 2005).

The acquisition of environmental awareness by child individuals in the first stages of life and being introduced to environment-friendly structures is also important in terms of continuing their physical, psycho-motor, social, emotional and cognitive development in a healthy manner (Mooney, 2000). These

environment-friendly surroundings prepared by means of social consciousness teach children to be sensitive to environmental awareness through experience. The child actively questioning the environment it is living in depending on its physical and mental development, starting to use space and object organizations will start at an age of 3-6 orientates its development also in future years (Burdurlu et al, 2004). For this reason, enabling the child to have an education in a correctly designed environment enriched with stimulus during this period in which abilities and awareness are rapidly developing, enabling experience gained through living and experiencing, accelerates mental development and increases the happiness of children.

1.3 Scope and Limits of the Study

The fact that habits and experiences, which will be used by the individual throughout life, are intensively gained at an age of 3-6 clearly indicates the necessity to provide more environmental surroundings in kindergartens. For this reason, it is important for the metropolitan child, having very little interaction with nature, to recognize, live and experience the natural environment. Based on this purpose, the request of the construction sector to develop itself against environmental issues and the desire to make the life of the child more comfortable and healthy has provided the development of the idea of environment-friendly kindergarten design.

The scope of this study is collected under headings; childhood and pre-school education, environmental awareness and environmental-friendly building design, environmental-friendly kindergarten buildings and case study. The significance of “childhood and pre-school education” chapter help to understood clearly pre-school education and kindergarten user’s profile. Importance of protect to environment and construction details of environmental-friendly buildings are described “environmental awareness and environmental-friendly building design” chapter. “Environmental-friendly kindergarten buildings” chapter shows all details to environmental-friendly design criteria’s with 9 environment-friendly examples kindergarten designed globally. And case study examines the

perspective of 5-6 year old kindergarten children on environment-friendly buildings.

This study is limited with 9 environment-friendly kindergarten designs which includes physical environment data's, structural form, efficient landscape designs, provision of efficient indoor air quality, efficient daylight saving, efficient energy usage and water efficient design. Another limit of the study is survey participants. The study was carried out with 85 participants at an age of 5-6 from four kindergartens of different socio-economics levels located in Mavişehir, Evka 6 and Menemen districts within the province of İzmir.

1.4 Method of the Study

In order to authenticate the purpose of the study, written thesis, books, articles, web sites, magazines, photographs, technical drawings as well as correspondence with architecture companies have been used. In respect to environment-friendly building design implementations in countries across the world related to pre-school education, child development at an age of 3-6, kindergarten places and environment-friendly building designs, have provided the development of the study by creating theoretical information and examining those in accordance with sub-titles. Collected documents were arranged according to the content of sub-titles and text integrity. All the data obtained were turned into a thesis study as a written text upon executing necessary editing.

In the first chapter, the objective of the study, its importance and method type to realize this objective, scope of study and limitations and the technique to be used during the data collection process are explained.

In the second chapter, concepts of "the child and pre-school education", which forms the center of the study, are discussed. After the concept of child is defined within a general framework, researches were carried out on the definition on "pre-school education" established to meet the needs of education, the historical development of this education awareness in countries across the world and in Turkey, the objectives of pre-school education, and what kind of spaces are

available and how they are classified in order to meet these objectives. As kindergartens, which are the basic part of pre-school education, are determined as the study area, the physical and motor, psycho-social and cognitive development of the child at an age of 3-6 was examined so that the designed physical environment could be better understood and analyzed.

In the third chapter, under the heading “Environmental Awareness and Environment-Friendly Building Design”, the definition of environment, today’s environmental problems and requirements in the field of education and architecture in order to minimize these problems were discussed under which headings environment-friendly buildings can be defined as “environment-friendly” in terms of architecture.

In the fourth chapter, environment-friendly kindergarten examples designed in countries across the world were collected upon personal interviews with architecture companies and were examined in the context of physical environment data’s, structural form, efficient landscape designs, provision of efficient indoor air quality, efficient daylight saving, efficient energy usage and water efficient design.

In the fifth chapter, in order to highlight the lack of kindergarten structures designed and which can be exemplified as environment-friendly in Turkey, a study was made with children under the heading “Our Environment and Us”. Environmental awareness, environment-friendly life, an information study including environment-friendly building design titles, illustrated activity sheet questionnaires and focus interviews compose the basis of this study. In order to examine environmental awareness and environmental-friendly buildings from the point of view of children, illustrated activity sheet questionnaires and focus interviews were applied in combination after the “Our Environment and Us” event which continued for a month. This was conducted with 85 children aged 5-6 who are receiving kindergarten education in the Province of Izmir, Mavişehir, Evka 6 and Menemen districts. For a month before the questionnaire, the children were informed about “environment-friendly life, eco-system, natural resources and

environment-friendly buildings". In order to learn the consciousness and learning level of children after this information, 4 questions supported with illustrated explanations were asked. The questions were designated in order to receive information on building location, efficient water use, natural lighting and garden arrangements (Appendix 2; Figure 1, Figure 2, Figure 3, Figure 4).

The questionnaire survey supporting the study was completed upon one-to-one interviews based on four illustrated questions directed to children under illustrated questionnaire sheets. Children's names were written on the questionnaire sheets in order to determine the gender and the section including the answer corresponding to the relevant question was marked with a note related to the reason. Throughout the questionnaire, interviews were carried out with academic psychologists, educators, child development specialists and kindergarten owners, and illustrations and questions to be directed were discussed in detail. The study, including all phases, was based on and structured on a qualitative research technique.

2. CHILDHOOD AND PRE-SCHOOL EDUCATION

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

2.1 Definition of Childhood

Although that people below the age of eighteen are described as a "child" according to articles prepared within the framework of laws, the meaning of the concept of children has not been clearly explained. Law specialists working on the subject have made child descriptions from time to time depending on age, puberty and the crime being committed (Çelik, 2005).

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).

"In the Great Turkish Dictionary of the Turkish Language Institution, the concept of children is defined as "young boy or girl, young boy or girl in the development period between infancy and adolescence, a person with lack of experience and ability on a certain work" (Türk Dik Kurumu Genel Türkçe Sözlük 1, 1988)".

According to Bilgiç, although objective concepts of children free from prejudices and feelings are made, children are not dough that can be kneaded as required. They 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).

As children want their expectations to be met immediately, they are defined as "egocentric". As they approach events in "egocentricity" they evaluate all events as if they were composing in their own circles. They think concretely as

they cannot comprehend abstract thinking. Animate-Inanimate concepts are not distinctive for children during the game process. All objects making up their environment are alive according to children. They display all of their emotions by playing and talking with objects. They live with their emotions in a variable manner and their reactions are sharp and stable. They begin to gain personality by imitating individuals who they see as a role model (Bilgiç, 2005).

In addition to child characteristics described by generalizations in mind, it is a fact that there are characteristics that distinguish the child distinctly from others. Notwithstanding that every child has its own character, behavior, 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.

2.2 Pre-School Education

The most basic public service that should be provided by the social state to all individuals within the framework of equal opportunities is education. Training qualified manpower is also the most important objective of education (Sevinç, 2003). In developing social welfare and raising living standards, in rapid advancement of scientific and technological developments, in provision of economic and social developments, bringing and executing the individual's education right to modern standards are among the objectives of education. For this reason, preparing a quality education environment for children in compliance with the principles of the Convention on Children rights and studies in order to correctly meet the gradually growing demand for pre-school education have gained importance (Sevinç, 2003).

2.2.1 Definition of pre-school education

Pre-school education is an education chain which includes childhood years from birth to the beginning of compulsory education in which the family is excluded from this planned and supervised development process (Çetinkaya,

2006). The importance of pre-school education is better understood when considered that the age of 0-6 is the period in which the child is most convenient and open for shape and learning. The basic education process which aims to prepare the child for school and living in terms of mental and social development by providing physical environment facilities filled with rich stimulus in compliance with children's development characteristics, has been accepted as "pre-school" (Çetinkaya, 2006).

The pre-school education process can also be defined as a learning process of requested behavior changes on children in compliance with social and cultural values. Conducted researches have revealed that experiences gained between the ages of 0-6 have an impact on the development process. In research by Gardner on experiences during childhood years, the tendency is highlighted of the child to behave in a certain direction depends on previous experiences and life and that experiences gained during the childhood process were more effective than experiences gained in later years (Biçer, 1994).

Pre-school education is given in the family and at institutions. Notwithstanding that the family and environment is efficient in the first degree and in the initial development of the child, the family and 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 also helps the child to recognize its own body structure, to meet its personal care needs and to effectively use the body. Within the stimulant environment prepared in accordance with the personal development level, interest and need of the child, pre-school education institutions play an important role in terms of showing performance in a group, building healthy relations, applying the necessities and rules of daily life and in terms of acquiring and developing social responsibility. In addition to these, they 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.

As a result, pre-school educational institutions support the healthy development of children in offered educational environments full with healthy and orderly physical conditions and rich stimulants and makes their adaptation to environment and future life easier.

2.2.2 Development of pre-school education in western civilization

Information related to pre-school education is found in the 4th century BC. The works of Socrates and Plato, who are among the ancient philosophers, reflect 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 the literature of Plato named "Protagoras", many basis related to child upbringing are included and the necessity to train families in terms of child education is explained (Çetinkaya, 2006). 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 (Üstünova, 1998).

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 make up the first of kindergarten samples, the alphabet was taught, religion was taught and children were assigned daily home work (Tos, 2001).

In 1776, cleric Jean Friedrich Oberlin, has founded pre-school educational institutions under the French name "sale d'asile", meaning "shelter house", for children whose mothers and fathers were working in fields (Tos, 2001). Besides meeting the shelter, education and care needs of children in these schools, mental

activity-developing games were played and trips were organized (Çetinkaya, 2006).

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 (Uysal, 2006). Together with the "Emile" work, schools allocated to provide pre-school education began to be opened in France in 1779 (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, protection and care needs of children whose fathers and mothers were working until late hours as a result of the industrial revolution (Tos, 2001).

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 (Yörükoğlu, 1983). 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).

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).

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 behavior of the child by withdrawing (Tos, 2001).

2.2.3 Development of pre-school education in Turkey

The edict issued by Sultan Mahmut 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 "neighborhood school", "stone school" or as "youth school" (Çetinkaya, 2006). These schools are also referred as "Sıbyan Schools". Children learned to read the Koran, arithmetic and writing in these schools (Onur, 2006).

The "Temporary Law on Primary Education", issued in 1913 took a decision on the opening of kindergartens and pre-school classes, provided that they remain linked to primary education. The "pre-school statute" prepared on March 15, 1915 (the main schools charter) remained valid until January 4, 1956. Within the statute, opening a kindergarten as the first primary schools was proposed and a one-year training period teacher's school was opened in order to train teachers for kindergartens. This school, which was opened in Istanbul, suspended its activities after a few years (Ensari, 1997).

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 (Çetinkaya, 2006).

The Primary Education Act No. 222 issued in 1961 has brought pre-school education again on the agenda. The 6th article of the act explained that pre-school educational institutions were included among primary education institutions and the 13th article described that children having not reached their compulsory education age could be educated in these institutions.

The definition of pre-school education were with the 19th article of the regulation on National Education Basic Law, issued in the official gazette dated June 24, 1973, as it objectives and tasks were described with the 20th article (T.C. Resmi Gazete, 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 Atatürk, the country, the nation and flag as well as behaviors such as love, respect, tolerance, solidarity and sharing behavior, 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 (T.C. Resmi Gazete, 2004).

2.2.4 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 characteristics into consideration. In this way, foundations necessary for the child are healthily created. 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 (T.C. Resmi Gazete, 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

Improve socialization by ensuring the child to be together with its own peers and environment, look at the children of working mothers and 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 making the child gain behaviors accepted in society (color, sound, aesthetic, social rules, etc).

Support the child's natural development and 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.

2.2.5 Pre-school education units

Pre-school is a period during which children at an age of 0-6 are in an intensive learning process, in which basic habits are acquired and cognitive abilities rapidly develop and take shape. Pre-school educational institutions are optional education venues which aim to spend this period, during which personality and development takes shape, within a healthy and given order.

Depending on age, pre-school education places are divided into 3 groups according to the physical, emotional and cognitive development of children. These are crèches, nursery schools and kindergartens.

2.2.5.1 Crèche

These are pre-school educational institutions referred as “Baby Care House” which provide care and services for children between the ages of 0-2. Generally, children or working mothers, orphans and children in need of care are involved in this group. It is still difficult to separate the child from the mother at this age. Therefore, the mother is asked to spend time with the child at least twice a day. In this period, during which the child’s breastfeeding is still continuing, crèches are usually opened in factories, schools and business centers where the mother is located.

During the first years of life, in order that the emotional and mental development of the crèche child can develop in the best way, it is important that the child is under a loving, warm and hygienic environment. The physical environment created in crèches and from all personnel should make the child feel the warmness of a family.

Gür and Zorlu (2002) in their books named “Children’s Places”, describe the objectives and characteristics of crèches in this sentence “The purpose of crèches, which emerged as a result of the increased working-women population all over the world and due to improved working conditions, is to provide children the care and compassion they need in hours when the mother is not available” (p.39).

2.2.5.2 Nursery school

Nursery schools which are the second step of pre-school educational institutions are buildings established and managed to meet the care, education and game needs of children between ages 2 - 4.

Nursery schools help the children gain and develop basic skills and knowledge by means of a created physical environment full of rich stimulants.

The child between ages of 2-4 begins to acquire a place within the social environment by means of these institutions. It learns to play, share and to take responsibility together with its friends and educators.

2.2.5.3 Kindergarten

Kindergartens, also expressed as “Child Garden” in the expression of German Frobel, are education institutions which provide care and protection for children between ages 3-6 who have not reached the age of compulsory education as they also give importance to the social and mental development of the child.

The admission age to kindergartens is 3. The reason for this is the child’s ability to perform self-care skills independently such as going to the toilet and eating without any help. During this process, in which the child is prepared for compulsory education, the quality of administrators, teachers and other personnel, the quality of nutrition and food as well as the quality of the building is of great importance so that the psychology of the child can develop in the healthiest manner. It is important that places, in which the child at an age of 3-6 has completed its awareness process related to its own health protection, is walking, sitting and eating are in compliance with hygiene rules and that places are functionally and properly equipped.

According to Uysal, one of the important objectives of kindergartens is to raise the interest in the 3-6 year old child’s learning level. During this process, the child is enabled to enhance existing capabilities by self-discovery rather than narrating information to the child. Reading and writing is not taught to children in these institutions but children may gain reading - writing maturity and awareness (Uysal, 2006).

The most accurate realization of these targeted objectives is possible when the physical environment responds to the physical, psycho-motor, social, emotional and cognitive development of the 3-6 year old child. Therefore, what is needed to know before is the development chart of the 3-6 year old child (Kandır, 2001).

Three-Six Age of Child Development: Development is defined as a process which initiates with fertilization and continues throughout life until being ended through death (MEGEP, 2007).

In other words, the continuous progress phase of the organism upon fertilization in physical, mental, emotional and social aspects is called as "development". Child development on the other hand, is created upon the complete relation occurring between maturation and learning processes. This development is a "periodic" process. In other words, the development growth does not have a regular speed. The realization is sometimes fast, sometimes the realization is slow. In the planning process of kindergarten buildings which target children at an age of 3-6, to know the age and development characteristics of children is the most important detail.

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. Thus, to know levels of development is one of the basic issues.

In order to better comprehend the subject within the scope of this study and in order to be able to justify the accuracy of designed sample kindergarten buildings, the development of the 3-6 year old child was examined under three main headings. These are;

- Physical and Motor Development
- Psycho-Social Development
- Perceptual Development

Physical and Motor Development: Child's growth, awareness progress on its movements, mind, senses and sexuality explain the physical development process (Bilgiç, 2005).

According to Brotherson physical development provides children the ability to explore their environment and interact with the world. Physical growth begins first with the use of muscles and continues with strengthening muscle coordination. The development of muscle control is the first step to be taken in this process (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.

Bilgiç describes the characteristics of a 6 year-old child as the following: the child can ride a wheeled-bike, climb a tree, leaves prattle talking style by improving its language, knows and distinguishes right-left, yesterday-today concept, set rules in games by creating its own games (Bilgiç, 2005).

Psycho-Social Development: The development process that contains cognitive, emotional and moral developments is called as the "psycho-social development" process. These concepts largely compose simultaneously and operate in mutual communication with each other.

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. For example; they respond to the question "can a toy soldier work?" as "no, because it has false legs" (Özkaya, unknown date). This indicates that awareness resulting from questioning is raised.

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 (Bilgiç, 2005).

This mental process which covers mental activities such as perception, concept formation, language acquisition, memory, symbolization, categorization, thinking, problem solving and creation including at the same time the learning process which helps us to acquire and use the information to understand and recognize our world (MEGEP, 2007).

During this period, a three-year old child has the ability to recognize and match colors, to identify an object it sees, to identify three-piece objects and to complete a missing human picture, etc. (MEGEP, 2007).

Abilities such as completing four-eight piece objects, drawing a human figure in a state including 6-pieces, sequencing a event in order of occurrence, distinguishing spatial positions with expressions in the at the beginning, in the middle and at the end, ability to respond the question "why?", 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).

A six year old child can identify 10-25 piece objects, group objects and explain how it performs matching, grouping, sequencing and relation-establishing actions and reason-cause relations (MEGEP, 2007).

As stated above, to know the physical and motor, psycho-social and perceptual development characteristics of a 3-6 year-old child and o prepare designed kindergartens in accordance with these development capabilities will cause the child to use is its capacities in a healthy and conscious way and at the highest possible level.

3. ENVIRONMENTAL AWERENESS & ENVIRONMENTAL-FRIENDLY BUILDING DESIGN

In the third chapter of the study, the importance, problems, education of environment and environmental protection awareness as well as its relation with the child are explained. The third part is concluded by emphasizing the importance of environment-friendly buildings upon examining them in the light of design criteria determined within the context of architecture.

3.1 Definition of Environment

Environment is defined as the surroundings where all living and non-living beings continue their relationships. People, plants, animals and micro-organisms are the living elements of the environment as air, water, soil, landscape, buildings, bridges, etc, are the non-living elements of the environment. The surroundings in which the living being continues its biological, social, cultural and economic activities with non-living elements can be referred to as "environment" (Sevinç, 2003).

According to Bozdoğan, the statements "All natural and artificial elements that facilitate the life of the individual", "Universal set of values", "Natural, cultural and artificial surroundings in which man is continuously engaged in production and consumption activities in order to meet the needs of people and to continue its generation, also help to define the "environment" concept (Bozdoğan, 2003).

3.2 Environmental Issues

The industrial revolution, which started in the second half of the 18th century, and rapidly growing industrialization activities in relation to the results of the industrial revolution, started the process of environmental pollution which then would lead to deterioration in the human-nature balance over time. Rapid increase in technological developments along with industrialization within the 20th

century has brought also along the natural changes in the natural life. As industrialization and technological advances caused environmental problems which were never addressed, destructions in the natural environment have rapidly increased (Alkın and İlkin, 1991).

Humans, who provided new information and techniques by means of possibilities afforded by science, technology and industrialization, have seen themselves as the owners of nature with the power received from nature-processing as they have disrupted the natural balance of their environment by using nature according to their wishes. Rapid increase in unconscious resource use and serious damages in nature have clearly demonstrated the necessity to investigate environmental issues.

Especially due to urban air pollution, drinking water pollution, noise and chaos created by heavy traffic, cultivation of unhealthy food, increase in concrete jungles, decrease in green areas by each passing day has caused man to live under unhealthy conditions which play an active role in heart and vascular diseases threatening human health and increasing infectious diseases and cancer (Göksu, 1999).

The observed rapid increase in natural habitats is disposing the living right of human beings in healthy environmental conditions. Studies related to environmental protection and dissolving environmental issues, which is on the agenda of the entire world, should not only be based on today's life but should also take into consideration the requirements of future generations.

3.3 Environmental Awareness and Education

Gören describes volunteer involvement in improving environmental awareness in all social layers of society, introducing problems and providing positive behavioral changes towards these problems and in protection natural, historical, cultural and socio-aesthetic values as "environmental education" (Gören, 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 behaviors 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).

3.4 Environment, Architecture and Children

“Child and architecture” studies have become important to transfer general information to children about architecture, to understand with which point of view they look to the surroundings they live in and in order to help them to understand the designed environment and for accurate perception. 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. During the transfer process of information, in order to obtain the most accurate result and to improve the feature of the environment designed for the child, including the education phenomenon is the main objective. Along with the interaction of designed environment with accurate education, the child will increase the value towards structured environment, improve quality of life

and will become a sophisticated citizen having social sensitivity and responsibility. For this reason, activities related to architecture, primarily kindergarten education, should be integrated easily with the curriculum. The main objective of this study is to create awareness in children, to establish urban and designed environment consciousness, to make children being in interaction with the environment and to help them to improve their space perception (Gökmen, 2010).

The International Union of Architects (UIA), based on the principle that built environment in the future will be determined by today's children, has aimed to give messages to children by virtue of their homes, schools, immediate vicinities and social lives. Explaining to children how architectural design and organized environment is shaped and making them understand, as well as providing them with an active role in the creation process of a high-quality, humane, sustainable and respectful architecture are among the objectives.

The objectives prepared by The International Union of Architects, Built Environment Education Architecture and Children's Working Group are sequenced as following:

- To ensure perceptional awareness related to the places in which they move and live – to ensure public/private, internal/external distinctions
- To ensure awareness about roles, rights and responsibilities during the process of formation of the build environment
- To provide understanding of architectural heritage and value of modern architecture
- To ensure an understanding within the context of sustainability and quality of life by means of the relationship between build and natural environment
- To teach the concepts with which they can discuss the quality of places and buildings which they will require to relate with social life.
- To ensure gaining experience related to the analytic methods of the design process and problem solving methods.
- To improve capacities related to team work, observation, problem identification and finding creative solutions
- To provide the opportunity to experience construction techniques, forms and materials
- To offer the opportunity to experience sensitivity, imagination, aesthetic pleasure and critical thinking

- To ensure the discovery that architecture is a creative, intellectual research and designing action having an impact on humanity, culture, cultural heritage, nature and society (UIA Built Environment Education Network, ud).

3.5 Importance of Environment-Friendly Living

Population growth, rapid urbanization, industrial development, rapid exhausting of natural resources, air pollution, lifestyle that is accelerating and becoming artificial within a gradually increasing frenetic life style are the main reasons of today's environmental issues. Due to the fact that environmental issues threaten the life of all living beings in such a way, the search for solutions has increased both in national and international areas. Hope has been raised that humans will return to nature over time under the leadership of technology in order to benefit from all natural life (Berktan, 2006).

As a result of man's increasing involvement in harmful activities, nature has started to fall victim to its own renewal efforts which it had continued until the beginning of the 20th century. The basis for the so called "environmental pollution" phenomenon which affects the life of humans today lies in the ecological equilibrium. The threat having reached serious dimensions has rapidly increased the searches to protect the ecosystem (Eryılmaz, ud). When considered the fact that annually 40% of worldwide stone, gravel and sand, 25% of natural wood, 16% of water and 40% of energy is used in the construction sector, the integration of studies to return to natural life within the building sector is extremely inevitable. The contribution of the architecture science steps taken for the protection effort of the ecosystem is possible with "environment-friendly", in other words "sustainable" or "ecological" architecture. By virtue of these buildings 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, active use of renewable

natural resources within the structure makes up a chain within the design process of structures.

3.6 Environment-Friendly Buildings

In essence, environment-friendly buildings contain the principles of reduce, reuse, recycle, protect nature, eliminate toxics, life-cycle costing and quality (Kibert, 2005). These buildings designed and constructed by taking into consideration their characteristics in terms of environmental sustainability are called as environment-friendly buildings.

The energy consumption after the building is in operation, the pollution created during the construction and minimization of waste, taking into account the recycling of materials when the life cycle of the building is completed, controlled use of water, ensuring clean air quality to the people held within the building, benefiting from daylight, analysis of natural ventilation systems and taking into consideration issues that may contribute in terms of health are important to name a building environment-friendly.

In addition to environment-friendly building technique to increase environmental awareness and to increase resource protection responsibility by loading ethical and practical responsibility, it increases the life comfort and happiness of individuals as it enables interaction with the environment in a spiritual and mental aspect.

Using natural resources efficiently in order both to maximize user comfort and to minimize environmental issues, offering future generations the right to benefit from these resources, creating a healthy environment by giving the least damage to natural cycles are the most important characteristics of environment-friendly building design.

A life continued in surroundings full of greenness with no air-water 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.

3.7 Environment-Friendly Buildings Design Criteria's

Designs sensitive to environmental issues which protect the ecological balance and ecosystem and which provide necessary comfort and health conditions in order to increase the life satisfaction and happiness of the child are examples of environment-friendly buildings.

Methods named as environment-friendly building criteria include designs which are in compliance with:

- Physical Environment Data,
- Structural Form,
- Efficient Landscape Designs,
- Provision of Efficient Indoor Air Quality,
- Efficient Daylight Saving,
- Efficient Energy Usage,
- Water Efficient Design. (Alparslan et al, 2009).

3.7.1 Physical environment data

Location-direction selection, topography layout and flora-fauna diversity as well as climate parameters include the physical environment data which have an influence on the formation of a structure.

3.8.1.1 Location - direction selection

The basis of location-direction selection is to take maximum advantage of daylight. Benefiting most efficiently from daylight in winter, protection against

over-sunlight in summer plays an important role in the construction of environment-friendly buildings (Alparslan et al, 2009).

Depending on the rise and trajectory of summer and winter sun, locating the building with the most sun in the winter and with least radiation in summer is important. For this, the Roman architect M. Vitruvius (1st century B.C.), stated in his work of art of "10 Books on Architecture" that buildings to be constructed in northern countries should be located at south facades in order to protect the buildings from the cold climate and buildings in southern countries should be directed to north or northeast directions in order to protect the buildings from the hot climate (Vitruvius, 2005).

At the same time, directing the building towards sun rays affects the comfort of indoor heat and provides to achieve the desired temperatures. In this way, the amount of electricity to be used during the warming process would also be reduced.

In addition to daylight, wind is also another important issue in the location-direction selection process. Determining correctly the direction and speed of the dominant wind provided advantages in cooling and ventilation actions. As comfort conditions are naturally ensured in this way additional sources of energy would also be decreased.

3.8.1.2 Topography layout and biological diversity

To know topography and biological diversity is the basic requirement to properly select the ground on which the building will sit. The fault line of the land structure, underground cracks being full of spaces or mineral layers affects human health adversely.

Another striking issue according to Tönük is to know above ground and underground riches and to locate the building in a state causing damage to existing layout as least as possible are among the criteria of environment-friendly building designs (Tönük, 2001).

3.8.1.3 Climate

Climate, protecting environmental balance provides a benefit in terms of fulfilling necessary comfort and health conditions for human life and in terms of energy saving. Climatic data identifying the climate characteristics of a certain area or region, in other words, climatic data such as temperature, humidity, rainfall amount, wind direction and speed, sunshine duration are described as “macro climate”. Another climate efficient on the building is “micro climate”. Neighboring buildings around the building, location of rivers, valleys or hills on the land are elements that affect the micro climate. Considering micro and macro climate conditions during the construction process will make buildings more livable and healthy.

3.8.2 Structural form

Variants such as shape, building height, roof type, and structure shell are known as “structural form”. These variants, depending on shape and organization have a direct relation related to the decrease of losses on building and increase in savings.

3.8.2.1 Simply planned structures

Form is very important according to Esin and Yüksek. For this reason, places should be designed as square or rectangular plan types in order to accelerate energy saving and interaction between buildings (Esin and Yüksek, 2009).

Building designs which play an important role especially in terms of energy saving should be designed in a state for minimum heat gain in summer and maximum heat gain in winter. In this way, compact-designed building forms are able to minimize heat transfer, to use actively natural lighting and natural ventilation and to keep heat gain at maximum level by virtue of the interaction with the shell of the building.

In addition to efficient energy use, natural ventilation and lighting, simple-shape buildings reduce the production process and the use of energy and resources. Another point that supports resource-saving is the position of indoor places being at a size to meet the demands of the user. As the heating and lighting requirement of frequently used places is high, they should be located on the south façade. Places such as corridors, bathroom and which need less daylight and places such as kitchen where indoor heating gain is high should be directed to the north façade (Esin and Yüksek, 2009).

3.8.2.2 Building shell design

All structural elements such as wall, floor, window and door which separate inner and outer places from each other are defined as building shell. The building shell, with these embodied elements will provide energy use at minimum level and will prevent environmental problems.

The most important objective of the building shell is to provide thermal comfort. For this, the space between the building and the shell is recommended to be limited by 40% in the environment-friendly building design. The purpose of this is to prevent heated air inside the building in winter being expelled and to prevent the entrance of hot air from outside in summer (Alparslan et al, 2009).

Provision of thermal comfort is also closely related with the choice of materials used in the shell of the building. The climate region and the derivative of the local material located within the region in which the building will be included during the material selection process is efficient in increasing thermal comfort performance and energy saving.

3.8.3 Efficient landscape design

Planning, designing, managing, protecting and repairing a natural or man-made environment are defined as the “art of landscape design”. Concerns related to global warming and climate change and improving the quality of environment-ambient are among the objectives of landscape design (Atik and Karagüzel, ud).

The correct and conscious landscape design is based on the organization of all living and non-living elements. Preventing pollution by establishing a relation between living elements such as flora and fauna and man-made non-living elements such as buildings and roads, conserving natural resources, maintenance of ecological balance, improving environmental quality, creation of visual and functional ambient have become the priorities in landscape design.

By virtue of efficient landscape design, it is possible to reduce energy loads to be spent during the summer and winter process by a rate of 30%. For this, the selection of trees among plant species and their right positioning is important (Esin and Yüksek, 2009).

Using trees and shrubs on western and northwestern facades will help to prevent the entrance of unwanted evening sun into the building. Positioning deciduous plants to the southern front and plants that are green all the time to the northern front will ensure maximum benefit from the winter sun and protection from cold winter winds. The ideal product for garden flooring is grass. Because grass has a good cooling effect by means of moisture dispersal, unlike material such as asphalt which continue to spread heat even after the effect of the sun. (Alparslan et al, 2009).

3.8.3.1 Green roofs

Green roofs are roof membranes consisting of soil and plants. To reduce the building temperature, to reduce the burden of waste water systems by holding rainwater, to reduce air pollution, to store carbon and to protect the material under the roof top cover against the harmful effects of the sun are among the most important objectives of green roofs (Alparslan et al, 2009).

Green roofs offer a more aesthetic appearance compared to traditional roofs provide at the same time a natural habitat for birds and for other creatures (Aksoy and İçmek, 2010).

Besides that, green roofs reduce the effect of environmental pollution and urban heat island and rainwater flow effect, they provide benefit in issues such as thermal and sound performance at the scale of the building (Özdemir and Altun, 2010).

As buildings with green roofs provide a green area to the world at least at a size they cover, they play an important role among environment-friendly design criteria.

3.8.4 Provision of efficient indoor air quality

In order that physical, mental and emotional development, health and performance levels of users can be at desired levels, it is necessary to provide adequate indoor comfort conditions in buildings where they spent a large part of their lives.

In cases where appropriate comfort conditions cannot be provided, the indoor air pollution rate is increased, which directly affects the life of human beings giving rise to various health problems, which also reduces their performance in daily life.

One of the important objectives of environment-friendly buildings is to provide appropriate ambient and comfort conditions for human health. Adhesives used in the construction of the building, paints used within the building, floor coverings, furniture material selection, heating-cooling and humidity systems can be sequenced as various elements causing inadequate air quality. In all phases from the production process of the building until the final inspection process, being sensitive in material selection will reduce indoor air pollution which will also help to increase the indoor air quality (Chiras, 2004).

Due to the fact that human beings spend 90% of their time in indoor places, to provide healthy indoor air quality in living surroundings will ensure physical and psychological comfort satisfaction as well as to an increase in life satisfaction and productivity depending on this comfort (Çilingiroğlu, 2010).

3.8.4.1 Natural ventilation

One of the most important conditions to provide efficient indoor air quality is the provision of adequate natural ventilation.

By virtue of windows opening on frontal surfaces and roofs, interior air circulation into indoor places will be provided in a correct manner. The most important criteria of these spaces to be opened on frontals and roofs are to know the direction of the dominant wind. Window spaces opening in the direction of the dominant wind, the ventilation system will be efficiently dissolved by means of natural methods enabling a constant fresh air circulation into the building (Aktuna, 2007).

3.8.5 Efficient daylight saving

The need for maximum benefit from daylight in building formation has played an important role. However, fulfilling lighting requirements with electrical energy by virtue of technological developments has gradually decreased the need for daylight. Rapid development in environmental protection consciousness, the fact of using energy resources effectively has been accepted by everyone. For this reason, efforts to reduce electrical energy consumption required for lighting and to efficiently use daylight are included among the important building design criteria of today's environment-friendly building designs.

Effective use of daylight in addition to providing the physiological and psychological comfort for the individual, providing proper natural lighting as much as possible, ensuring glare control by protection of direct daylight, establishing visual relation with the outside environment, artificial lighting, reducing heating and cooling loads play also an important role. Windows and light sources are building elements that provide daylight entrance within the building and which ensure the visual communication of the individual (Yener, 2007).

3.8.6 Efficient Energy Usage

The correct use of electrical energy in the building, which is an indispensable energy source of today are also included among the environment-friendly building design criteria.

These systems which aim to benefit passively from current energies instead of consuming natural resources are renewable energy systems. Conducting proper design and selecting proper material in order to minimize the energy requirement of a building is important in efficient energy use. Systems integrated to the building will contribute to the production of energy required by the building (Aykal et al, 2009).

3.8.6.1 Usage of solar energy with photovoltaic panels

The fact of rapidly increasing energy prices, depleted fossil fuel reserves and the fact that energy is an indispensable requirement over the world for growth, rapidly increase the idea to benefit from solar energy which is among the natural resources (Berktan, 2006).

Solar energy, which is the oldest and primary energy resource known, is increasingly becoming important for being clean, renewable and available on each side of the world. It is possible to convert solar energy directly to electrical energy inside the building by using photovoltaic (solar) panels. By virtue of this energy, hot water, space heating and cooling requirements can be easily achieved inside the building.

Photovoltaic panels are semi-conductive materials which produce directly electrical energy from sunlight. The fact as a result of conducted researches that 50% of total annual energy is used in buildings has increased the importance of the use of photovoltaic panels in the construction sector.

It is possible to meet all the electrical energy of the building by means of photovoltaic panels. Producing the energy where required retrieved from a

renewable source by mean of these panels reduces both transmission costs and losses and increases the sensitivity towards the environment.

According to Altın, the most important characteristics of photovoltaic panels in terms of environmental responsibility and architecture is that they convert buildings from consuming structural forms to a producing structural form (Altın, 2006).

3.8.6.2 Usage of solar energy for low consumption costs

Using solar energy for heating and cooling the buildings, obtaining hot water and using it controllably in electricity producing brings along many other advantages.

Besides solar energy's being renewable and a free energy source, its application locally, not being foreign dependent and not needing complexes technology increased users desire to use solar energy. By this way, user's financial obligations will decrease without needing additional electrical energy, and they will acquire how much they need in their buildings (Varınca and Gönüllü, ud).

3.8.7 Water efficient design

Shortage of water potential makes it necessary to immediately use water resources actively by means of new technologies. Based on this purpose, technologies developed with the aim to reduce water consumption also make buildings more environment-friendly.

Methods such as protection of water-levels, re-evaluation of waste water, reuse of collected rain water, design water saving in landscape irrigation, reuse of domestic type waste water by purifying and selection of facilities which use water more efficiently help buildings to use water more effectively (Alparslan et al, 2009).

3.8.7.1 Rainwater collection

Rapid consumption and pollution of existing freshwater resources bring the use of rainwater as an alternative resource onto the agenda. By means of systems that will be installed particularly on roof areas, reuse of rainwater after simple purification processes are among the measures that can be taken on behalf of water saving in buildings.

The oldest and most efficient method known in the collection of rainwater is the establishment of cistern systems. The most simple cistern system is installed in four phases. The first phase is to collect rainwater by means of ducts installed on the roof or ground. Then, the collected water in ducts is moved to grooves. The water carried to grooves is accumulated in cisterns. Finally, rainwater collected in cisterns is purified and used in the building (Şahin and Manioğlu, 2011).

3.8.7.2 Usage of grey water

Water that comes from basin, shower, bathroom sink, washing machine and taps is called grey water (Kantaroğlu, 2011). In other words, it is the general name of drain water except for toilet water.

In the study done by Grishan and Fleming in 1989, it is seen that 45 % of water usage in structures is consumed in toilets. In 1987, in a research done on California- Irvine Ranch Water Area, it is assigned that 75 - 80% of water used in trading areas and offices, is consumed in toilets and this reality lays emphasize on the importance of reusing grey water (Büyükkamacı, ud).

Grey water can be reused in landscape practices or in toilets as flush tank water, following the process of refining done after it is gathered in reservoirs that has the minimum pollution (Kantaroğlu, 2011). So that, natural water resources will be protected as water amount that used to be waste, will be regained and it will decrease the usage of high quality drinking water.

4. ENVIRONMENT-FRIENDLY KINDERGARTEN BUILDINGS

In the fourth chapter of the study, 9 kindergartens selected among environment-friendly kindergarten examples collected as a result of interviews carried out with architecture companies in internationally are discussed under main topics of physical environment data, structural form, efficient landscape design, provision of effective indoor air quality, efficient daylight saving, efficient energy saving and water efficient design.

4.1 Environment-Friendly Kindergarten Buildings

It is a known fact that the construction industry plays an important role in the emergence and growth of environmental issues.

Especially the natural resources used during the production and use process of the building and non-renewal of energy, production of harmful emissions and waste and leaving those to the environment, green spaces rapidly transformed into multi-story reinforced concrete buildings clearly shows the damage to the environment by the construction sector. In order to minimize this damage designers, under the leadership of technological development and by taking advantage of motion in nature, have recorded new developments in the construction sector with the hope to reuse natural resources.

These developments are referred to in environment-friendly, ecological and sustainable terms. Environment-friendly buildings make a contribution in the prevention of environmental issues and on behalf of increasing user comfort.

By virtue of the methods determined under methods named environment-friendly, ecological and sustainable construction criteria, the environmental and social responsibility of the building is met. These methods start from the land selection of the building and are classified up to;

- The existing topography of the region,
- Climate data,
- Building physics,
- Material selection,
- Material production place and form,
- Construction site organization of the building,
- Production process of the building,
- Indoor air quality,
- Acoustic quality of the building,
- Efficient landscape design,
- Daylight saving,
- Efficient energy and water use.

Buildings designed according to these classified criteria minimize negative impacts that cause environmental issue and maximize the living comfort of users.

Introducing children, who will shape our future to environment-friendly buildings and making those a part of their lives is very important in terms of living in a more healthy and happy environment. Today, where pre-school education has gained much importance, designing kindergarten buildings at which children start their education adventure as environment-friendly makes children more sensitive towards the environment when they become adults based on experiences, and plays an active role in the creation of awareness related to environment-friendly buildings.

When looked at globally, it is observed that interest and importance of environment-friendly kindergarten designs is gradually increasing. In chapter four entitled “Environment-Friendly Kindergarten Building Examples”, environment-friendly kindergarten examples designed in Austria, Italy, Spain, Denmark and Croatia are described with written and visual expressions. The common feature of selected 9 environment-friendly kindergartens include most of the criteria determined in the 3rd chapter under the heading “Environment-Friendly Building Design Criteria”.

- Physical environment data,
- Structural form,
- Efficient landscape design,
- Provision of efficient indoor air quality,
- Effective daylight saving,
- Efficient energy usage,
- Water efficient design criteria.

4.1.1 Kiga kindergarten

The Kiga Kindergarten constructed by the company AllesWirdGut Architektur in the Sank Antom am Alberg town of Austria, famous for mountain tourism, provides 3-6 year old children with 625 square meters since 2004 (Figure 4.1). The town being covered with high mountains and forested areas clearly shows how dense the clean air quality is.

Figure 4.1 Kiga Kindergarten – General View

Architect: AllesWirdGut

Location: Sank Antom am Arlberg, Austria

Customer: Gemeinde

Project Start Date: 09/2002

Project End Date: 09/2004

Planning and Control: AllesWirdGut Architektur ZT GmbH Karl Gitterle

Project Area: 625 m^2

Environment-Friendly Building Criteria: Location-Direction Selection, Structural Form, Efficient Landscape Design, Provision of Efficient Indoor Air Quality, Efficient Daylight Saving

Photographs: AllesWirdGut & Herha Hurnaus

The Kiga Kindergarten is located at the top north region of the Sank Antom am Arlberg town. An additional second floor raised from the northern corner of the ground floor has enabled the building to interact with surrounding structures and provide more imposing view from the building. The lower space of the raised floor is turned into a foyer area and has become the start of the axis in order to provide the continuity of the mini garden. This area, which is also evaluated as a parking area has dissolved the complexity, which may be experienced during the school entering and exiting process of children, personnel and parents, at the entrance of the building. The foyer area which also covers the top part of the entrance area has become also an efficient measure against seasonal conditions during entries and exits (Figure 4.2).

Figure 4.2 Kiga Kindergarten – Plan

The foyer area formed by being raised from northern direction makes up the main axis of the building (Figure 4.3). Classrooms and common use areas are located in south-east direction along this axis. In addition that this axis is a link it also serves for administrative units. Raising window dimensions to wall dimensions has provided and efficient use of daylight as well as an impression of being a part of the garden area.

Figure 4.3 Kiga Kindergarten – Foyer Area

The structure plan being designed in the light of square and rectangular forms ensures acceleration in the interaction between buildings as well as in increasing the energy saving of the building. In this way, the building spreads the collected energy in equal distributions.

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 4.4).

Figure 4.4 Kiga Kindergarten – Adventure Playground

Sunlight retrieved inside by roof windows and windows has insured the use of natural lighting at maximum level (Figure 4.5). Natural light being actively used throughout the day has reduced the use of artificial lighting which makes a contribution to less energy consumption. 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, carried inside and which are parts of natural life provide children the opportunity to interact with the natural environment even in cold climate conditions ensuring an increase in their creativity and performances.

Figure 4.5 Kiga Kindergarten – Interior

4.1.2 Barbapapà kindergarten

The Barbapapà Kindergarten designed by CCDSTUDIO for a competition by the Vignola Municipality organized in 2006 has served to 3-6 year old children within the framework of a Kindergarten since 2009 (Figure 4.6).

Figure 4.6 Barbapapà Kindergarten – General View

Architect: CCDSTUDIO

Location: Vignola, Modena, Italy

Customer: Consorzio Vignolazerosei

Project Start Date: 03/2008

Project End Date: 08/2009

Project Team: Nicole Balassone, Dario Di Francesco, Alessandro Di Remigio, Fabiana Petrella

Project Area: Gross land area 5600 m^2

Environment-Friendly Building Criteria: Location-Direction Selection, Structural Form, Efficient Landscape Design, Provision of Efficient Indoor Air Quality, Efficient Daylight Saving, Efficient Energy Use, Water-Efficient Design

Photographs: Fabio Mantovani

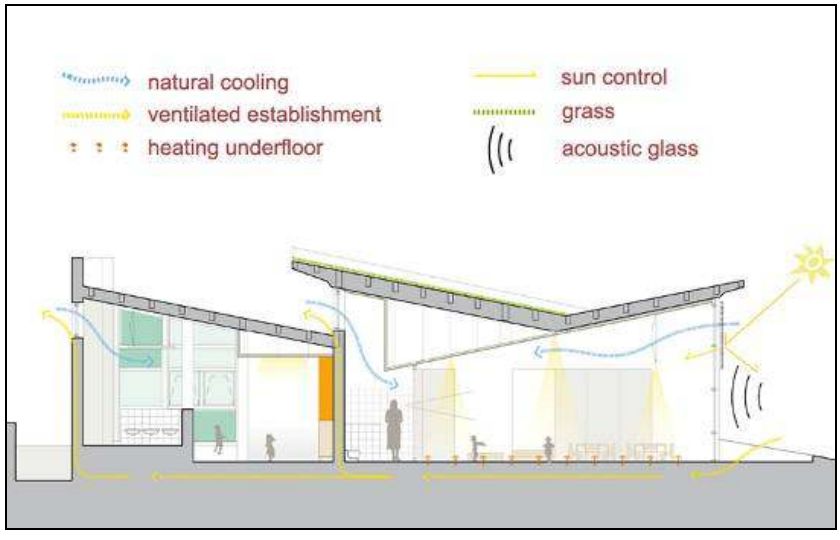
A request for 4 classrooms for 60 children was given under the competition program. For the project area, a location which is overlooking residential areas and which is not very far from the historic center was selected at the city's border. Preserving the natural environment of the Romagna Region on which the building is designed was also among the project limitations. The objective of the project is to express sustainable themes with an architectural language and to provide environment-friendly awareness. For the purpose of sustainability, all links of the building with the surrounding were determined. The architectural process started at this process which aimed to transfer all details within the framework of sustainable principles to young users. The Barbapapà Kindergarten designed by CCDSTUDIO is one of the important examples showing how a building can be responsible towards the environment.

Details under the heading of environment-friendly design, including principles such as location-direction selection, topography layout, biological diversity and climate parameters have been helpful in determining the physical environment data of the Barbapapà Kindergarten. Upon the completion of the physical environment, the building was positioned in the west-south direction (Figure 4.7).

Figure 4.7 Barbapapà Kindergarten – Location

It's simply planned structure helps to ensure proper heat saving in hot and cold days. The building form designed in compact state has also enabled active use of natural lighting and natural ventilation by means of included building shell variables. The complete length of the facade was designed to enable efficient use of daylight and natural ventilation at different times of a day (Figure 4.8).

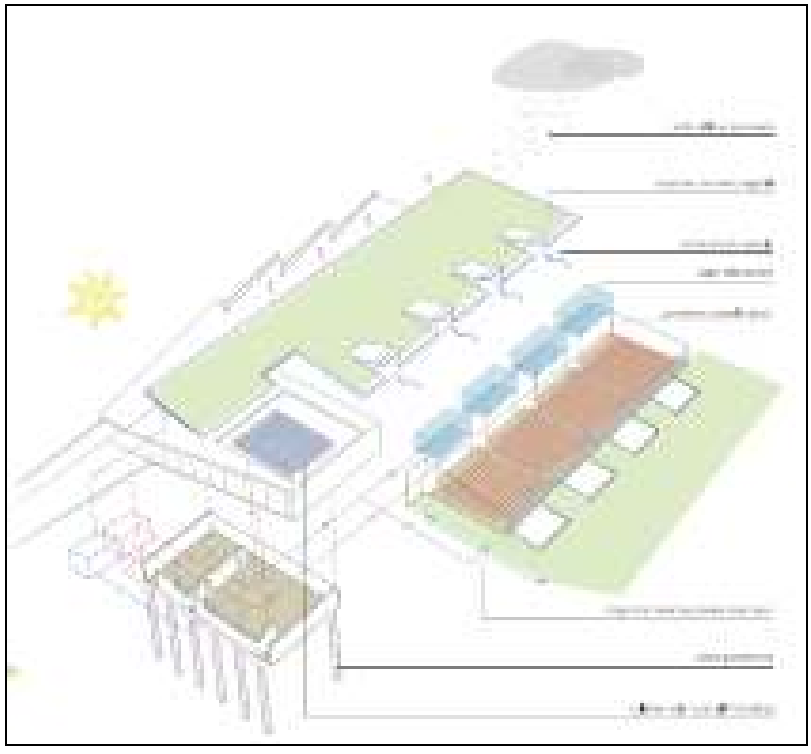
Figure 4.8 Barbapapà Kindergarten – Efficient Daylight and Natural Ventilation



Children's daily life performances were ensured to increase by keeping comfort conditions at maximum level in the Barbapapà Kindergarten in which the indoor air pollution rate is minimized via natural ventilation and natural light.

Rainwater being reused within the building once more proves the sensitivity of the Barbapapà Kindergarten towards the environment. Rainwater is collected in a specially-prepared tank by means of ducts formed on the roof surface and are reused in garden watering (Figure 4.9).

Figure 4.9 Barbapapà Kindergarten – Efficient Water Use



Photovoltaic panels installed on the metal roof produce electricity by means of energy retrieved from sunlight and contributes to meet the electricity needs. The Barbapapa Kindergarten which provided re-gain to nature at least half of the area covered gives also support to environment-friendly life with its green roof. In addition to the aesthetic appearance provided for the building, the heat and sound performance of the building is balanced with its green roof. In addition, this green roof protects the material under the roof cover against the harmful influence of the sun (Figure 4.10).

Figure 4.10 Barbapapà Kindergarten – Photovoltaic Panels & Green Roof

4.1.3 Oliver kindergarten

Oliver Kindergarten was constructed on passive cavities determined by the Zaragoza City Council's Neighborhood Plan on the Antonia Levya Street in Zaragoza (Figure 4.11).

Figure 4.11 Oliver Kindergarten – General View

Architect: Santiago Carroquino, Hans Finner

Location: Zaragoza, Spain

Customer: Ayuntamiento de Zaragoza, Suelo y Vivienda de Aragón

Project Start Date: 2005

Project End Date: 2007

Municipality: Mª José Iturralde Navarro

Construction Company: UTE EASA-Ebrosa

Environment-Friendly Building Criteria: Structural Form, Efficient Landscape Design, Efficient Daylight Saving, Efficient Energy Use

Photographs: Jesus Granada & Roland Halbe

The land area for the Oliver Kindergarten proposed by the Zaragoza City Council's Neighborhood Plan is surrounded with typical 8 floor residential structures (Figure 4.12). In order make the kindergarten distinguishing within the dominant urban tissue and to make it a point of focus, the kindergarten was designed as a single floor. In addition to making the school distinguishing and a focus point, designing the school as single floor has realized the basic plan building type principle of environment-friendly building design.

Figure 4.12 Oliver Kindergarten – Urban Materials

The depression caused by high floor buildings in the surrounding of the building has been balanced by virtue of the volumetric-contrast plan of the Oliver Kindergarten. The single floor building is immediately distinguished among multi-floor structures. In addition, by virtue of the green roof cover, the largest surface in volume enables perception of complete green. Besides that the slope green roof is lowering the temperature of the building, it supports a compatible topography with the adjacent parking area. By virtue of the green roof of the Oliver Kindergarten, it is defined as “a green surface splashed from black ground”.

The construction volume of the Oliver Kindergarten consists of 4 modular elements resembled with the shape of a comb (Figure 4.13). The spaces in comb shape have been transformed into open play grounds. These playgrounds covered with grass extent like a strip and link with the service and storage areas at the rear section. Being resolved in simple rectangular forms has also facilitated the interaction between venues.

Figure 4.13 Oliver Kindergarten – Plan

Direct contact of daylight by covering inner garden top surfaces with wooden grills provided to establish a relationship with the environment (Figure

4.14). At the same time, the daylight floating through the grills highlights the volume of playgrounds. In the interior, classrooms are divided by separator panels. These separator panels which offer a flexible space organization have also been moved to sleeping rooms and dressing rooms. In this way, they can be removed when desired enabling single area use of the place.

Figure 4.14 Oliver Kindergarten – Daylight – Interior

In order to reduce the construction period of the project and to minimize the cost and even the failure rate, prefabricated components were used in the construction of the Oliver Kindergarten (Figure 4.15). Covering was conducted by installing 30 cm grills between the facade and windows. This space created between the building and shell has provided to live thermal comfort at maximum level.

Figure 4.15 Oliver Kindergarten – Construction Process

The Oliver Kindergarten has applied an isolation system from external to inner walls in order to ensure efficient energy isolation. The space of 8 cm left between prefabricated concrete panels, which make up the wall construction, have been filled with isolation pads, waterproof membranes and high-quality concrete blocks respectively and were covered with gypsum plaster. This isolation process conducted on the building shell has prevented the increase of environmental problems by supporting the use of energy at minimum level.

In addition to the building shell, solar panels are placed onto the roof in order to reduce energy consumption which provides a part of the electricity for the ventilation system from the solar energy produced by the panels.

Despite the fact that opening windows used at facade intervals are less in number compared to the building, indoor air quality is easily provided by virtue of high-isolation frames and low emission glasses used in windows. Keeping indoor air quality at high levels also supports the children to be happier and in increasing their productivity.

Children have been central to the design process of the Oliver Kindergarten. For this reason, each point during the design process has been designed with the objective to create for them lighter, quieter, more peaceful and more comfortable places.

4.1.4. Dragen children's house

The Dragen Children's House constructed by C. F. Møller Architects in the city of Odense in Denmark has provided a new standard for design by evaluating environment-friendly design in the light of pedagogical approaches (Figure 4.16). The aim of this basic architectural concept is to meet the requirements of children and to keep comfort levels at the highest level.

Figure 4.16 Dragen Children's House – General View

Architect and Landscaping Architect: C. F. Møller

Location: Odense, Denmark

Customer: Odense Municipality

Project Start Date: 2008

Project End Date: 2009

Project Area: 1100 m^2

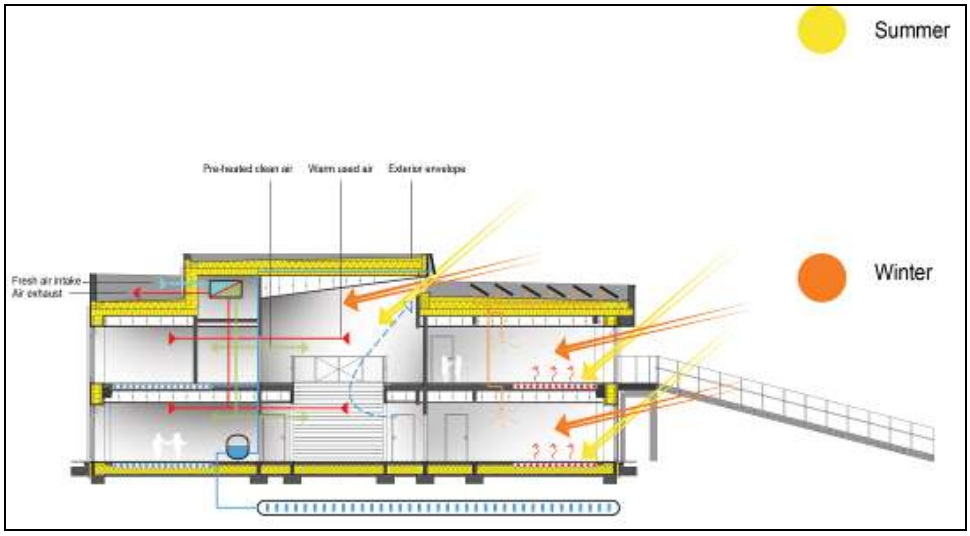
Prize: Odense Municipality Architecture Award, 2010

Environment-Friendly Building Criteria: Location-Direction Selection, Structural Form, Efficient Landscape Design, Provision of Efficient Indoor Air Quality, Efficient Daylight Saving, Efficient Energy Use

Photographs: Uffe Johansen

The incoming angles of the summer and winter sun have played an important role in determining the location and direction of the Dragen Children's House. The building was constructed in a basic and net geometrical form in 2 floors in order to enable children to take advantage from the summer and winter sun in the most efficient way (Figure 4.17).

Figure 4.17 Dragen Children's House – Location/Direction Selection



Depending on the rise angles of the summer and winter sun, the facade that retrieves most sunlight into the building in winter and least in summer is the south facade. Therefore, children's playgrounds and the classrooms of the Dragen Children's House are located on the south facade. The kitchen, offices, toilets and meeting rooms used by employees are planned on the north facade. The building being planned and directed according to the sunlight affects the building's thermal comfort which provides the desired temperature easily.

In order to support the development of sensory and motor skills of children in the simple plan Dragen Children's House, circulation areas in the ground floor and first floor are provided by means of stairs and ramps (Figure 4.18).

Figure 4.18 Dragen Children's House – Interior

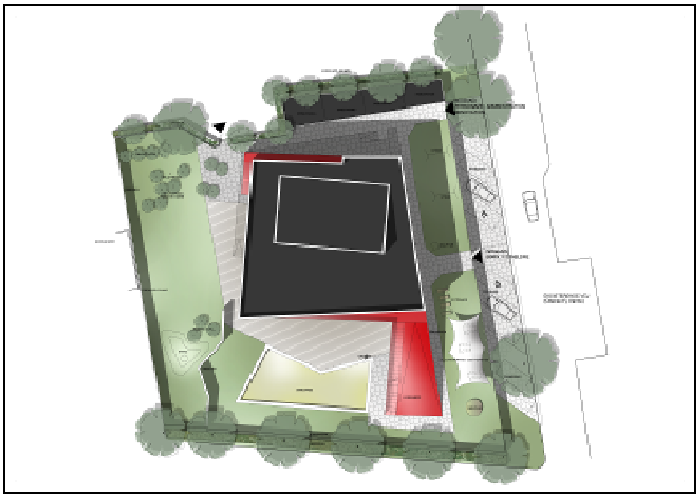
Windows located between the building shell components have played an important role in the design of the Dragen Children's House. In order to use the sunlight effectively in the south facade as best as possible, a large proportion of the facade is covered with windows as the proportion of windows is reduced on east and west facades. Windows are applied on the structure surface in different dimensions in square and rectangular form (Figure 4.19). In this way, the direct incidence angle of sunlight is filtered and made to float into the building as a silhouette.

Figure 4.19 Dragen Children's House – Building Shell / Windows

At the same time, niches designed in the interior of windows provide children special places being a solution element in the point of adventure and entertainment requirements.

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 4.20). Intense use of grass area and sand pool supports children to play and realize their education in a more appropriate garden.

Figure 4.20 Dragen Children's House – Landscape Design



The school which has a total playground area of 414 m^2 in total is serving 88 children. The objective of planning the playground above normal standards is to minimize epidemic diseases resulting from indoor pollution and due to the desire to create new places for different activities. In the Dragen Children's House where it is aimed to provide appropriate ambient and comfort conditions in order to protect the health of children, natural ventilation is efficiently used to increase the quality of indoor air as the material quality of furniture used is selected with care.

With the importance given to energy saving, the Dragen Children's House proves with how much environmental protection consciousness it was designed. High saving prefabricated wooden isolation walls used in the construction of the building provide the building to consume 20% less energy. Wide windows used on the facade ensured both maximum use of natural lighting and passive sun

heating. High isolation that reduced energy consumption has also contributed to the protection against the adverse effects of carbon dioxide gasses.

In this way, a healthier and more comfortable place was created for children and employees. As successful results were obtained related to heat loss as a result of tests performed on air leakage in the Dragen Children's House, it has also been certified by the "German Passive-House Institute".

Due to many components used in Dragen Children's House building it has obtained the "Nordic Swan" eco-label. The "Nordic Swan Eco-label" is a title given to buildings which have the least impact on the environment and which have a good indoor air quality (http://www.nordic-ecolabel.org/about/). In order to win this title buildings are designed with a protection consciousness of environmental factors from the construction process up to the final indoor inspection process. The Dragen Children's House is an important building example in terms of winning the first "Nordic Swan Eco-label" of Denmark.

4.1.5. Bernts have daycare center

The Bernts Have Daycare Center was constructed in the city Holbæk of Denmark in order to develop the physical, mental, emotional and social development characteristics of 56 children aged 0-3 and 80 children aged 3-6 by means of appropriate education (Figure 4.21).

Figure 4.21 Bernts Have Daycare Center – General View

Architect: Henning Larsen

Location: Holbæk, Denmark

Customer: Municipality of Holbæk

Project Start Date: 2007

Project End Date: 2009

Project Area: 1350 m^2

Environment-Friendly Building Criteria: Location-Direction Selection, Structural Form, Efficient Landscape Design, Provision of Efficient Indoor Air Quality, Efficient Daylight Use, Efficient Energy Use

Photographs: Courtesy of Henning Larsen Architects

The long wing of the school having a simple and minimal plan structure is reserved for the education of 3-6 years old children. The part that links the long wing with the short wing and the short wing is reserved for the education areas of 0-3 year old children and for administrative sections (Figure 4.22). The structure planned as a partial rectangle is exemplified among environment-friendly buildings as it at the same time contributes to energy saving. The classrooms and playground of the Bernts Have Daycare Center is positioned on the south facade in order ensure maximum benefit from daylight.

Figure 4.22 Bernts Have Daycare Center – Plan

The Bernts Have Daycare Center has been designed as an Integrated Energy Design (IED) project. The IED Project is an integration of studies developed for the efficient use of energy within the building until the completion moment of the building including the design and production process of the construction. (Integrated Energy Design in Public Buildings, http://www.intendesign.com /oslo/Intend.nsf/id/ABE4AAB2CF6509D9C12572C8003935A3?OpenDocument).

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 (Figure 4.23).

Figure 4.23 Bernts Have Daycare Center – Green Roof

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 (Figure 4.24). In this way, interior heat loss is minimized and contribution is provided to efficient energy saving.

Figure 4.24 Bernts Have Daycare Center – Efficient Energy Saving

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.

The main objective of the Bernts Have Daycare Center design is to create places that will increase the participation and happiness of 0-6 year old children and respond to their different requirements. For this, besides creating special places for each child, the design indicating that all children are a part of the community has been suggested. By creating flexible plan and unifying common areas within the building, the sense of intimacy and community is increased as small rooms are designed for privacy and individual studies.

4.1.6 Benetton Day Care Center

The Benetton Day Care Center the construction of which started in 2008 is located in the city of Treviso in north Italy (Figure 4.25).

Figure 4.25 Benetton Day Care Center – General View

Architect: Alberto Campo Baeza

Location: Ponzano Veneto, Treviso, Italy

Customer: Benetton Group spa

Project Start Date: 2006

Project End Date: 2008

Business Partner: Jesus Donaire

Construction Management: Alberto Campo Baeza, Jesus Donaire, Massimo Benetton

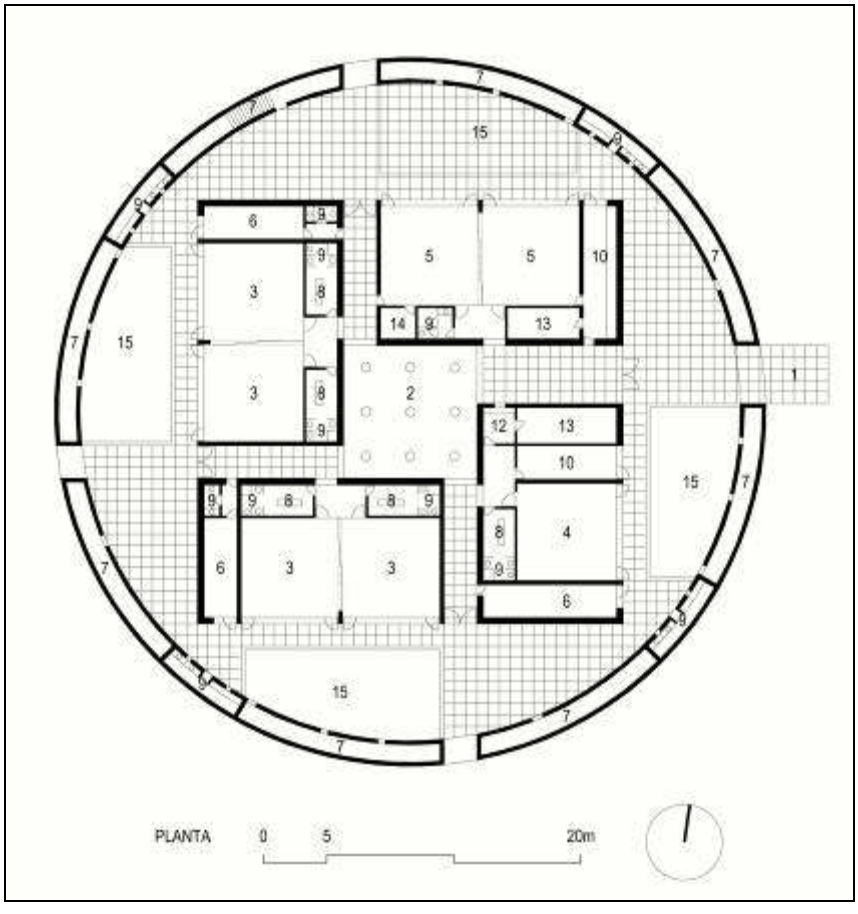
Project Area: 1868 m^2

Environment-Friendly Building Criteria: Structural Form, Efficient Landscape Design, Efficient Daylight Saving

Photographs: Marco Zanta, Hisao Suzuku

The school which has an area of 1868 square meter in total consists of a structure in the form of a double-wall circle surrounding nine small squares (Figure 4.26).

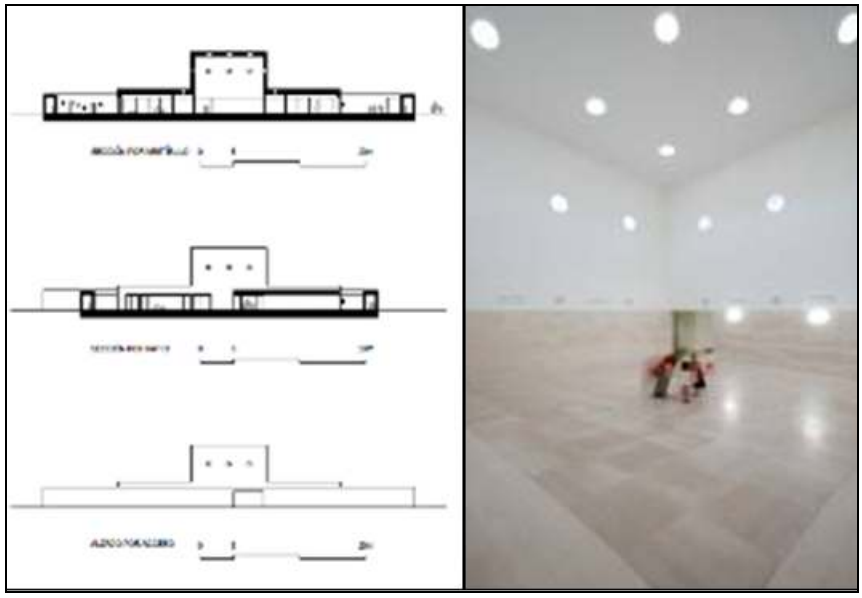
Figure 4.26 Benetton Day Care Center – Plan



The Benetton Day Care Center 1- is designed as the main entrance, 2- entrance hall, 3- conference hall, 4- Crèche Class, 5- Dining Room, 6- Meeting Room, 7- Entertainment Divisions, 8- Dressing Room, 9- Bathroom, 10- Kitchen, 11- Manager's Office, 12- Servant Room, 13- the Cloakroom, 14- Laundry, 15- as the Garden (Figure 4.26).

The central square that is surrounding the entrance hall is constructed higher than the other units in order to enable more daylight intake. The central square, which resembles the ceiling system of a hammam, carries daylight in different angles to the fronts by means of nine holes (Figure 4.27). Classrooms are located in an area surrounding the central square. In this way, maximum benefit is provided from daylight.

Figure 4.27 Benetton Day Care Center – Center Square &Daylight



4 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 4.28).

Figure 4.28 Benetton Day Care Center – Garden

4.1.7 Medo Brundo Kindergarten

The Medo Brundo Kindergarten designed by Njiric+ Arhitekti in Zagreb is a design example that gives the best response to questions arising from bias such as "How can a kindergarten be designed on such small area of land? How much more could it exploit from the daylight? What type of educational place can be considered near such heavy traffic? (Figure 4.29).

Figure 4.29 Medo Brundo Kindergarten – General View

Architect: Njiric+ Arhitekti Doo

Location: Zagreb, Croatia

Customer: Grad Zagreb

Project Start Date: 2006

Project End Date: 2008

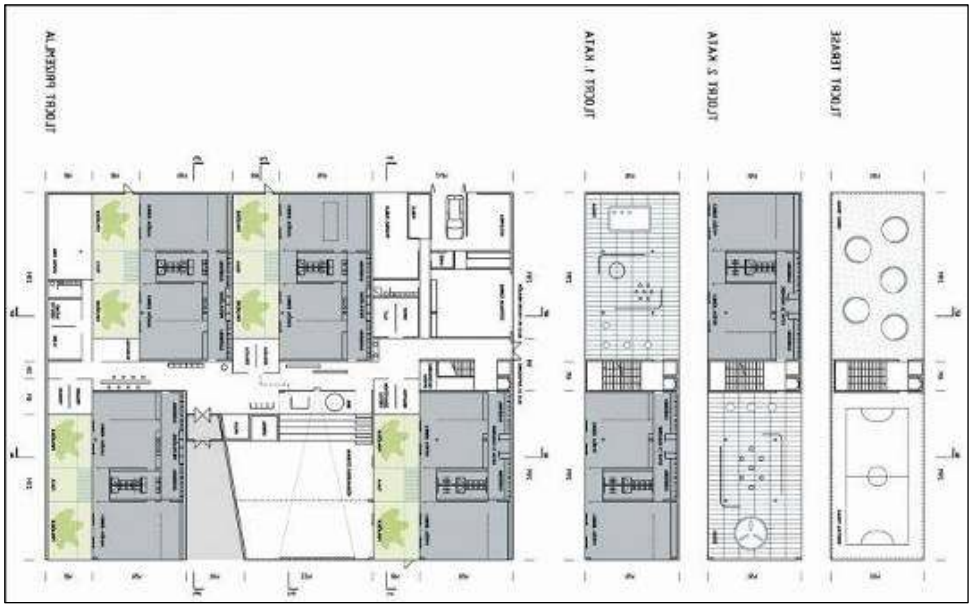
Project Area: 2300 m^2

Environment-Friendly Building Criteria: Location-Direction Selection, Structural Form, Efficient Landscape Design, Provision of Efficient Indoor Air Quality, Efficient Daylight Saving

Photographs: Domagoj Blazevic & Njiric+ Arhitekti

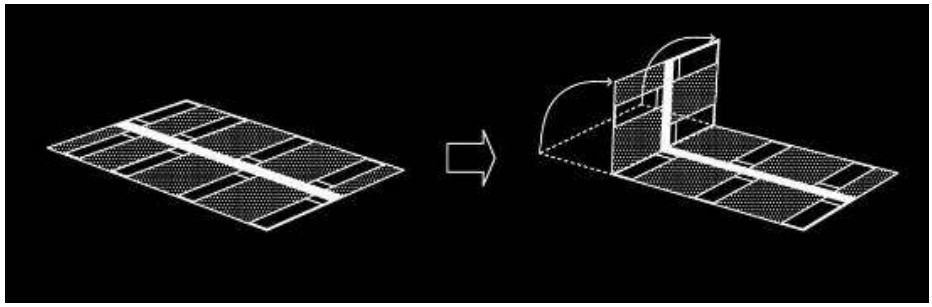
The Medo Brundo Kindergarten offers a special living area for children without neglecting architectural design concepts. In order to make this living area more distinguishing and to enable it respond to kindergarten needs, designers have created entertaining and attractive inner and outer places for children where the play action is considered as the principle basis. While creating places, the traffic that will arise from circulation has been carefully structured (Figure 4.30).

Figure 4.30 Medo Brundo Kindergarten – Plan



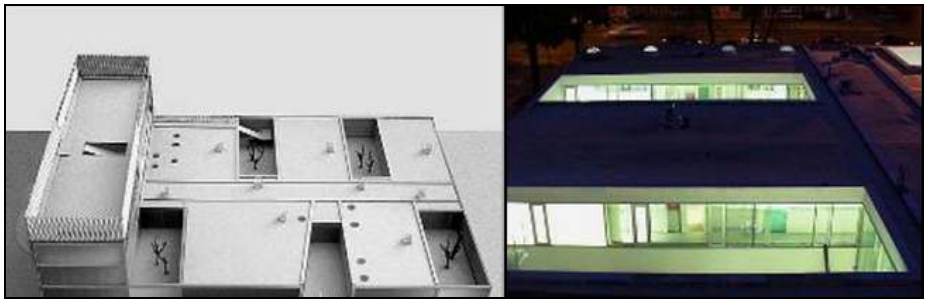
At the beginning the Medo Brundo Kindergarten was designed in the form of a single floor compact and inward-looking rectangle of which the borders are clearly determined. However, the structure is folded upwards from the corner point in order to benefit more from daylight and to be protected from the shadow of the next building (Figure 4.31).

Figure 4.31 Medo Brundo Kindergarten – Diagram



Settlements around the city consist of repeating small-scale and garden structures. Unlike the surrounding structure, the Medo Brundo Kindergarten consists of a structural form that is twisted into a full empty, square appearing vertical plain. Gardens are transformed into terraces as corridors are transformed into stairs (Figure 4.32).

Figure 4.32 Medo Brundo Kindergarten – Form



The main lines of the building resemble continuity and closing at one point. The building plan being resolved by means of a simple rectangle is important in terms of environment-friendly building design criteria realization, accelerating the interaction between areas and energy saving.

In line with the need to benefit at maximum level from sunlight, wide span glass was used on the facades of the Medo Brundo Kindergarten (Figure 4.33). In this way, maximum benefit is provided from daylight as the electricity requirement is minimized through natural lighting. Using natural lighting very efficiently has at the same time helped to increase the physiological, psychological and visual communication comfort of children.

Figure 4.33 Medo Brundo Kindergarten – Natural Lighting

Interiors in the Medo Brundo Kindergarten are organized as children's streets connected to each other. These curved places combined in a large number make up new scenes in order to make children live a real urban experience by creating an intense transparency and color harmony. Terraces and roof gardens were closed in order to create open space areas for children also in winter (Figure 4.34.). In this way, children and employees are completely in interaction with the surroundings. This innovation brings with it a teaching and learning process.

Figure 4.34 Medo Brundo Kindergarten – Garden

The building is full of surprises and responds to needs, and enables children to be involved in natural life by performing actions required in daily life (Figure 4.35).

Figure 4.35 Medo Brundo Kindergarten – Inner Garden

4.1.8 Terenten kindergarten

The Terenten Kindergarten has been constructed by Feld72 in the mountain village Val Pusteria located in South Tyrol of Italy (Figure 4.36). South Tyrol is a border region where three cultures meet and it has transformed this status in to a visual language by means of an architectural design. For this reason the Kindergarten Terenten is mediating between three cultures with its structural design by creating a new context.

Figure 4.36 Kindergarten Terenten – General View

Architect: Feld72

Location: Terenten, South Tyrol, Italy

Project Start Date: 2009

Project End Date: 2010

Building Consultant: Obrist & Partner

Energy Consultant: Energytech gmbh

Project Area: 1045 m^2

Environment-Friendly Building Criteria: Location-Direction Selection, Structural Form, Provision of Efficient Indoor Air Quality, Efficient Daylight Acquisition

Photographs: Herta Hurnaus

Architects have designed a building that is compatible with its surroundings and which can be easily integrated by considering the location of the structure and the topography it is dominating. The Terenten Kindergarten, one side having a net

building surface as if it is splashed from ground, has become a part of the landscape on the other side (Figure 4.37).

Figure 4.37 Kindergarten Terenten – Plan

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 re-interpreted 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 4.38).

Figure 4.38 Kindergarten Terenten – Harmony with the Environment

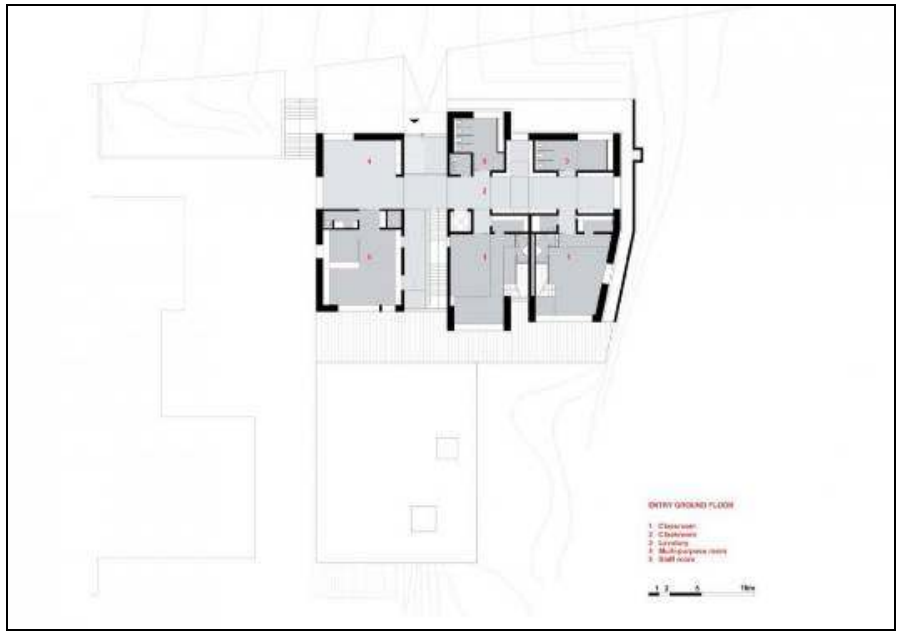
One facade of the Kindergarten is positioned on a public facility on which a miniature golf course is located as the other facade is positioned towards the walking path axis. Together with the Kindergarten, municipal offices, sports areas and the elementary school were centrally combined to create an organic balance. The slope area in the east of the elementary school was used as the ground of the Terenten Kindergarten in order to create this balance.

In this way, only half of the surface required for the volume of the building is seen by those passing on the walking road facade. As a result, the newly created public area remained between the elementary school and kindergarten. The east side of the school is open to this public area.

Three structures, of which the center is slightly shifted, were designed at the walkway level. These three structures having different heights in architectural context are linked to each other in order to benefit from daylight at maximum level. Connection points tied with transparent panels has both allowed an easy entrance of daylight and has created new places. At the same time these three different structures help the children to locate their direction and to be organized as spatially and socially.

The entrance of the Kindergarten was kept away from the walkway and was located between the two structures on the ground floor. In addition to the entrance there are two classrooms, toilets, a cloakroom and two offices for the personnel as well as a multi-purpose hall for parents on the ground floor (Figure 4.39). The cloakroom area which turns the area between the two structures into a corridor also offers an additional activity area.

Figure 4.39 Kindergarten Terenten – Plan



Classes are located on the south frontal. Multi-purpose activity areas are located to north areas on the walkway facade or to the ground floors on the west facade. In this way, classrooms located on the south facade benefit from the daylight at maximum level which increases thermal comfort and visual communication. All created places were designed with the aim to respond to independent activity, orientation, communication, social interaction and the aesthetic needs of children. For example, bridges, galleries and open areas which connect the two classrooms in the ground floor to each other provide children a spatial experience (Figure 4.40).

Figure 4.40 Kindergarten Terenten – Interior

On the roof of the Terenten Kindergarten, different window spans were used on facades and the roof in order to allow the entrance of a mountain view, efficient daylight and heat into the building (Figure 4.41). While half of the classrooms open to the sky in a conical shape, the other half opens to the gardens located on both sides.

Figure 4.41 Kindergarten Terenten – Windows

Roof windows and windows located within wide-spans on facade surface allow the efficient use of daylight and provide an important contribution in reducing the electrical energy required for lighting. At the same time, they contribute in reducing the heating burden expense for the building and to the visual communication of children within the external environment (Figure 4.42).

Figure 4.42 Kindergarten Terenten – Daylight

The structure of the building and daily life has played an active role in material selection. Traditional materials have been re-interpreted within a contemporary approach. While the surface of the building gained an appearance of old material, it was re-interpreted with those provided by global modernity. All external walls of the structure are double-layered as white concrete was used. For mold making wooden material was used. The roof is covered with a material called hybrid pine or larch. A part of the ground floor wall surrounding the window is also covered with larch (Figure 4.43). Reinforced concrete structure was only used in the entrance area. The reason for this is to increase emphasize by depicting the entrance area.

Figure 4.43 Kindergarten Terenten – External Facade Covering

With its compact structure, optimum isolation and material selection as well as hygienic ventilation system the Kindergarten Terenten is a perfect example of energy efficiency and heat recovery. The Kindergarten is connected to a heating system that operates by burning wood cuttings. Under floor heating is provided inside the building which has increased the comfort for the children. At the same time, using recycling-material for heating has shown both the sensitivity towards the environment and has reduced the energy consumption to be spent for heating.

4.1.9 Sunrise School Kindergarten

The Sunrise School Kindergarten Giovanni was constructed by D'Ambrosio in the Denpasar state of Indonesia by being adherent to environment-friendly building design criteria (Figure 4.44). The objective of the Sunrise School, which is one of the best examples in terms of local culture, local architecture and technical material used provides children the feeling of touching and learning with the support of this building.

Figure 4.44 Sunrise School Kindergarten – General View

Architect: Giovanni D'Ambrosio

Location: Denpasar- Bali, Indonesia

Customer: Susanne Roziadi

Project Start Date: 01.02.2002

Project End Date: 01.05.2002

Project Area: 502 m^2

Building Area: 140 m^2

Nominee: 2004 Aga Khan Award for Architecture

Environment-Friendly Building Design Criteria: Structural Form, Efficient Landscape Design, Efficient Daylight Acquisition, Water-Efficient Design

Photographs: Giovanni D'Ambrosio

With the awareness that architectural language is an educator, designer Giovanni D'Ambrosio has aimed at a design with a sense of inspiration for children which will enable constant interaction with the building. For this, the Sunrise School Kindergarten was transformed into an exciting structure which gives children the opportunity to discover the cycle of natural life through observation (Figure 4.45).

Figure 4.45 Sunrise School Kindergarten – Interior

The central beam of the Sunrise School Kindergarten, which took its architectural shape from natural conditions such as the monsoon season and tropical sun, is the most important point of the design. In line with the idea to be protected from Monsoon rains and from the scorching tropical sun a beam was designed at the center of the building. Besides that this cement beam designed in the form of a V-shaped vase shape carries the school room, it provides opportunity for plants to nurture. Fruit trees grow on this vase-beam surface and cover both the roof cover and top parts of learning areas (Figure 4.46). With the green roof it contributes both to natural lighting and catches architectural aesthetics by providing harmony with the environment. Grids designed onto the

roof in 40 cm intervals prevent the mix up of plants and branches enable easy growing.

Figure 4.46 Sunrise School Kindergarten – Central Beam

Within the framework of the budget, three main materials were used at the Sunrise School Kindergarten. Cement, brick and iron were used as main materials in the formation of the architectural structure. Aluminum foil was used to cover the roof with a light material. The structure was built with bengkirai, the local wood of Balin. Another effective issue in material selection is earthquake as the region where Sunrise is located is threatened by earthquakes. Therefore, these three basic materials were selected in order to circumvent the damage as little as possible.

For effective utilization of sunlight, the roof surface was planned in two separate elevations. The short-elevated roof surface carries daylight through plants to the interior via filtering and by means of glass panels. In this way, children are provided with a place in which they can freely play and learn (Figure 4.47).

Figure 4.47 Sunrise School Kindergarten – Daylight

The ducts on the long-elevation roof panel collect rain water for reuse (Figure 4.48). This supports the efficient water use principle of environment-friendly building design criteria.

Figure 4.48 Sunrise School Kindergarten – Efficient Water Use

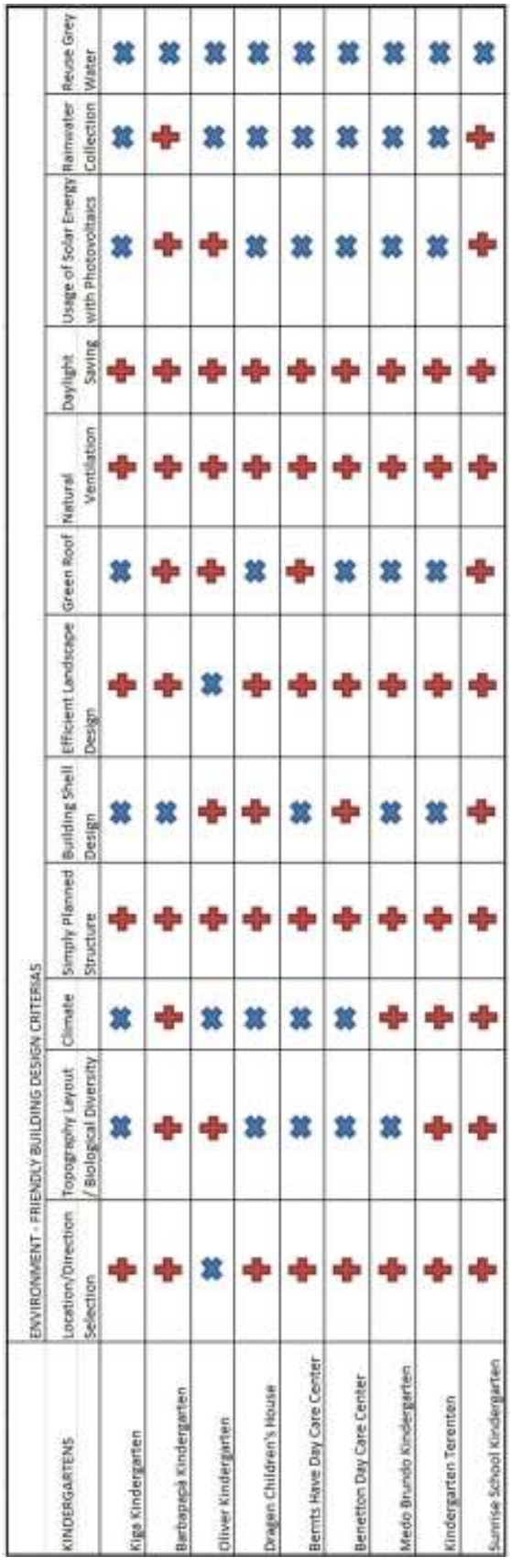
4.1.2 Evaluation result of environment-friendly kindergarten examples of countries across the world

The construction sector contributing adversely to environmental issues has provided a new understanding in terms of finding methods to reduce this problem with a tendency to architectural designs in which architectural developments are expressed in environment-friendly, sustainable or ecological terms. It is clearly observed that this new movement which has developed to reduce environmental issues and to enhance the life satisfaction and comfort of the user by means of healthy structures has also contributed in the improvement of environmental quality.

Planning these environment-friendly buildings, the basic aim of which is to provide the integration of the structure with nature while enhancing the life comfort of users at maximum level, in the context of educational buildings shows those to be a new trend in countries across the world within today's designs. Especially re-understanding of design parameters of kindergarten buildings, which form the foundation of education, by means of environment-friendly design criteria is clearly indicating this situation. It is an indisputable fact that 3-6 year kindergartens which make up the basis for pre-school education provide the child to receive education within these buildings, increase in comfort level and happiness, to develop a sensitivity towards protecting their natural environment, to live a life as a part of the natural environment and to carry these gains to their lives by means of behaviors.

It is observed that environment-friendly kindergarten examples designed in countries across the world are planned under these environment-friendly design criteria (Table 4.1).

Table 4.1 Environment-Friendly Kindergartens Design Criteria's



KINDERGARTENS	ENVIRONMENT - FRIENDLY BUILDING DESIGN CRITERIAS											
	Location/Direction Selection	Topography Layout / Biological Diversity	Climate	Simply Planned Structure	Building Shell Design	Efficient Landscape Design	Green Roof	Natural Ventilation	Daylight Saving	Usage of Solar Energy with Photovoltaics	Rainwater Collection	Reuse Grey Water
Kiga Kindergarten	✚	✖	✖	✚	✖	✚	✖	✚	✚	✖	✖	✖
Barbapapa Kindergarten	✚	✚	✚	✚	✖	✚	✚	✚	✚	✚	✚	✖
Oliver Kindergarten	✖	✚	✖	✚	✚	✖	✚	✚	✚	✚	✖	✖
Draijen Children's House	✚	✖	✖	✚	✚	✚	✖	✚	✚	✖	✖	✖
Bemts Have Day Care Center	✚	✖	✖	✚	✖	✚	✚	✚	✚	✖	✖	✖
Benetton Day Care Center	✚	✖	✖	✚	✚	✚	✖	✚	✚	✖	✖	✖
Medo Brundo Kindergarten	✚	✖	✚	✚	✖	✚	✖	✚	✚	✖	✖	✖
Kindergarten Terenten	✚	✚	✚	✚	✖	✚	✖	✚	✚	✖	✖	✖
Sunrise School Kindergarten	✚	✚	✚	✚	✚	✚	✚	✚	✚	✚	✚	✖

“Table 4.1 Environment-Friendly Kindergarten Design Criteria’s” shows five main design criteria are more popular when designing environment-friendly kindergartens;

1. Building Location / Direction Selection
2. Simply Planned Structure
3. Efficient Landscape Design – Green Roof
4. Natural Ventilation
5. Daylight Saving

It is observed that examples designed in countries across the world are located on the south facade in order to benefit from daylight in the most efficient way in adherence to the location/direction selection. The purpose of this is to balance the in-building temperature in a controlled manner by retrieving most daylight in winter and least daylight in summer.

Simple plans consisting of square or rectangular forms are another design criteria preferred in environment-friendly kindergartens. It is frequently observed in environment-friendly kindergarten examples of countries across the world that basic plans are selected in order to ensure energy saving dependent on heat recovery and distribution, to shorten the production process and to accelerate interaction between places.

Creating green roof covered with grass is another criterion which is frequently preferred in environment-friendly kindergartens in terms of regaining lost ground.

Natural ventilation is ensured by using frontal and roof windows in order to provide efficient indoor air quality. To know the dominant wind direction in locating frontal and roof windows is an important parameter to ensure natural ventilation.

In all environment-friendly kindergartens designed in countries across the world, daylight acquisition is the most important issue in terms of both thermal comfort and visual communication. The effective and proper use of daylight is ensured by means of wide-span windows on facade and roof surfaces.

5. CASE STUDY: PERSPECTIVE OF A 5-6 YEAR OLD CHILD ON ENVIRONMENT-FRIENDLY KINDERGARTENS

In the fifth part of the case study the perspective of the 5-6 year old child on environment-friendly kindergarten buildings was evaluated by means of illustrated activity sheet questionnaires.

5.1 Case Study on Examining the Perspective of a 5-6 Year Old Child on Environment-Friendly Buildings; Mavişehir, Evka 6 and Menemen Districts

Losing the right to live in a healthy environment, which is the most natural right of human beings and the rapid increase in the threat to the environment has triggered individual sensitivity in terms of environmental protection, questioning environmental issues and to find solutions for the problems. Especially the studies carried out by the construction sector in terms of protecting the eco-system in adherence to population growth and rapid urbanization introduce people to environment-friendly buildings. In this way, while the living comfort and satisfaction of users increases, problems related to the building are minimized in terms of environmental improvement.

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 (Dinçer, 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. For example, Wilson in his study carried out in 1996, has indicated that environmental education provided to children in early years helps children to develop a positive approach towards the environment in the future periods of their lives. Similarly, it was proved by the study carried out by Basile in 2000 that environmental awareness and attitude towards environment is shaped during the pre-school period (Taşkın and Şahin,

2008). 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 (Dinçer, 2007). For this, a life intertwined with life is a point of origin in terms of meeting their requests. One of the best products which meet this desire is the life offered within environment-friendly buildings. These buildings provide the opportunity to discover and recognize nature without an intermediary. These buildings which respond to developmental needs of children such as physical, social and self-care abilities, offer at the same time the opportunity to recognize environment-friendly life and to develop the sensitivity of children towards the environment and to enhance their life comfort.

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.

It is observed that environment-friendly buildings developed in the construction sector in terms of environmental protection awareness in countries across the world are rapidly involved in architectural programs of pre-school education places. These buildings in who pre-school children live show that environmental attitudes have rapidly increased and that happiness and comfort are enhanced.

The importance of environment-friendly kindergarten buildings designed in terms of environment and environmental protection awareness, life comfort, experiences of children are exemplified in Part 4 with the environment-friendly

kindergarten buildings designed in countries across the world. Lack of availability of such studies in our country on environment-friendly kindergarten structures is a huge drawback. This study examines the perspectives of 5 and 6 year old kindergarten children on environment-friendly buildings.

5.1.1 Methods of the case study

The study was carried out with 85 participants at an age of 5-6 from four kindergartens of different socio economic levels located in Mavişehir, Evka 6 and Menemen districts within the province of İzmir. The study is based on a qualitative research technique as preliminary information, illustrated activity sheet questionnaires and focus interviews were used in the study.

51% of the study consists of girls and 49% of boys (Table 5.1). The participation was realized upon obtaining permission from the school administration, giving information about the survey and with the presence of a school representative during illustrated activity sheet surveys and focus interviews.

Table 5.1 Information Regarding Participants

KINDERGARTEN	GENDER GIRL	GENDER BOY	DISTRICTS	NUMBER OF PARTICIPANTS
KINDERGARTEN **A**	13	7	MAVİŞEHİR	20
KINDERGARTEN **B**	8	12	EVKA 6	20
KINDERGARTEN **C**	11	11	MENEMEN	22
KINDERGARTEN **D**	11	12	MENEMEN	23
	TOTAL:43	TOTAL:42		TOTAL:85

This study which is based on a qualitative research technique was combined with preliminary information, questionnaires in the form of illustrated activity sheets and focus interviews. In the preliminary information phase which forms the first stage of the study events under the name “Our Environment and Us” were

carried out in 4 different kindergartens for a month (Appendix 1). Once a week, interviews were carried out with school officials and information was obtained related to activities performed so far and about the stages of the study. Illustrated activity sheet questionnaires and focus interview which are the last phase of the study were carried out upon the completion of the preliminary information stage. Illustrated activity sheet questionnaires were offered as illustrated and in A3 format in terms of enhancing the understanding and comprehension of children. They were replicated in the number of participants and illustrated in order to provide equal conditions.

In order to prevent interference from participant schools, the names and ages of children were written in a different color marker during the focus interviews. Focus interviews were carried out in a different classroom for each school. Focus interviews were carried out with the presence of a child development specialist or scholar psychologists, researcher and participant. The questions directed to children related to illustrated activity sheets were marked on activity sheets with their reasons. Illustrated activity sheet questionnaires and focus interviews did not exceed 5 minutes per child.

5.1.2 Preliminary information event; “Our Environment and Us”

The first step of the study included the preliminary information event under the heading “Our Environment and Us”. Before this event which continued for a month, school officials, educators and researcher had conducted common interviews and the headings to be taught to children were determined. According to interview results, the first event was reserved for teaching general definitions (Table 5.2). Under the heading “Environmental Awareness”, children were explained the definition of environment, the operating system of the eco-system and the harmony of our buildings with the environment. Responses were sought under the heading “environment-friendly building” based on the questions - What are environment-friendly buildings (schools)? Why is it important? What are the needs of environment-friendly schools?

Table 5.2 Preliminary Information Event under the Topic "Our Environment and Us" – First Week

TOPICS		
QUESTION NUMBER	ENVIRONMENTAL AWARENESS	ENVİRONMENT-FRIENDLY BUILDING
1	What is environment?	What is an environment-friendly building?
2	How does the eco-system function?	Why is an environment-friendly building important?
3	Are our buildings in harmony with the environment?	What are the needs of an environment-friendly school?

In the second week children started to learn environment-friendly school buildings. Environment-friendly school buildings were explained under certain headings in order to make children better understand. These headings are;

- Where should an environment-friendly building be located?
- What should be the architectural structure of an environment-friendly school? Single-floor, Multi-floor?
- What are the materials required for use in an environment-friendly school? Furniture, Paints, Floor Coverings should be selected from recyclable materials.
- What should the inside air quality be?
- How can we use daylight in our building more efficiently?
- How can rainwater be reused in our building?
- What is the importance of recyclable waste? Why should we reuse?
- What should we do for water and energy saving?

Children who received information on these topics determined throughout the second week were finally given an environment-friendly school model under the name "Cornering Study" and have designed stories with a pictured explanation (Appendix 1).

As it increases mastery on the topic, a queen and a king was selected from 5-6 year classrooms under the study “Honey-Pie” in the third week (Appendix 1). The king and the queen were sitting in the center of the class and tried to find solutions for the questions directed by their friends. The responses to these questions throughout the study were realized as oral explanations, illustrated lecture, three-dimensional explanation, poetic, dramatic or song-type explanation.

Third week topics are sequenced as following:

- What should we do within our building to benefit more from daylight?
- How can we collect rainwater?
- How can we evaluate collected rainwater in our building?
- What can we do in order to make savings from electrical energy?
- What type of toys should there be in environment-friendly schools and from which material they should be made of? What disturbs you most when you look around the environment?
- Who is causing the most pollution in our world? Why?
- How can ecological agriculture be carried out?
- For what other purpose can we use plastic bottles instead of throwing them away?
- What are recyclable wastes? What can we collect in our recycling box?
- Which waste damages nature the most?
- What is most necessary to sustain our life? Such as food, heat, light, water and why?

In the fourth week children have performed studies under the name “Art Works” (Appendix 1):

- Making a 3 dimensional model of their dream school from box wastes,
- Creating a recycling box,

- Preparing the paper pulp of newspapers,
- Building a windmill and discussing formation of wind,
- Making puppets and animals from pet bottles,
- Designing clothes by using bags.

In addition to art works children have replied to following questions by performing little discussions among their friends throughout the fourth week under the topic “Thought Corridor” (Appendix 1):

- What would you feel if you experienced difficulty in breathing in a much polluted environment?
- What would you feel if you could live in an environment with clean air?
- What would you feel if you were a fish living in a sea polluted with wastes thrown out by people?
- What would you feel if you were a fish living in a clean sea?
- What would you feel if you were a bird flying in polluted air?
- What would you feel if you were a bird flying in clean air?

5.1.3 Illustrated activity sheet questionnaires and interviews

The illustrated activity sheet questionnaire and focus interviews which make up the second step of the research in terms of examining the preliminary information event under the name “Our environment and Us” were used in combination. The purpose herein is to examine the perspective of children on environment-friendly buildings based on the education they received for a month.

For this reason, the illustrated narrative method was chosen as the closest explanation and expression type to children. Four titles determined as a result of common interviews carried out with academics, psychologists, educators, child development specialists were matched and pictured with environment-friendly kindergarten buildings design criteria. Questions were directed to children with

illustrated activity sheets determined under four topics and the responses were written on the questionnaires.

The children were asked to respond to the following questions in order to realize the purpose of the study:

- Question1: Which school would you prefer to be yours? Why?
- Question2: In your opinion, in which picture is rainwater used more useful? Why?
- Question3: With which light source would you feel happier? Why?
- Question4: In which school garden is playing more enjoyable? Why? (Appendix 2; Figure 1, Figure 2, Figure 3, Figure 4).

Activity sheets depicting to each question contained 2 main pictures. One of these pictures contained environment-friendly characteristics as the other does not. The black line in the middle of the sheets in A3 format separated the two main pictures from each other. Specific points of pictures were highlighted with the help of coloring in order to strengthen the understating and perception related to the difference between two pictures. For each 4 activity sheet, the left side on the sheet defines option “a” as the right side defined option “b”. The reason for this is to provide a contribution in evaluating the conclusion part more objectively.

5.1.4 Data analysis

By virtue of the preliminary information event applied throughout a month during the first step of the research, the mastery of children on environmental protection awareness and environment-friendly buildings was enhanced. In this way, children were able to clearly express the responses and explanations to questions asked in the second phase of the research.

In order to enable better communication with children during the illustrated activity sheet questionnaires process and focus interviews, the study was carried out by calling children to the classroom one by one. In this way, interaction between participants and possible irregularities were prevented. With each participant called to the classroom, the name and age was obtained first, and researchers were enabled to warm up by carrying out little conversations before the event. After warm up studies, illustrated activity sheets prepared in A3 format consisting of 4 sheets were offered to children.

The illustrated activity sheets and focus interviews were carried out under the presence of child development specialists or trainee psychologists who work in the school. After having marked the responses of children given to questions, explanations were written in brief notes. In this way, information was acquired on how the responses were determined adherent to the perception level of participants.

Data was analyzed by calculating the percentage of responses marked on the illustrated activity sheets and by defining popular responses which emerged during focus interviews in adherence to these rates.

While conducting the analysis of the study, attention was paid respectively to 1) reading data with integrity, 2) to note responses which seemed to be different to the researcher or which are continuously repeated in focus interviews and 3) examining data objectively.

5.1.5 Outcomes

According to the results of the study, children at an age group of 5-6, who receive education in different district units and who are of different socio-economic levels were highly interested in environmental protection awareness and environment-friendly buildings.

Children who have particular interest in issues such as battery collection, evaluating waste material, not to throw waste in terms of environmental protection awareness were introduced with topics such as eco-system, ecology, environment-friendly building which made children experience new excitements by increasing their sense of curiosity providing children to ask questions.

It has been proved by means of the results carried out from illustrated activity sheet questionnaires and focus interviews that children have acquired new learning and attitudes in proportion to the education named "Our Environment and Us" received for a month.

As seen in Table 3, a large majority of the participants replied to question 1 "Which school would you prefer to be yours?" Why?" by selecting the illustrated explanation in which a large school is located within trees with a separate service road. The most popular responses by participants on why they selected this option were respectively that the "school is large and wide", "garden is large and beautiful" and that it have a "road without traffic" (Table 5.3).

Table 5.3 "Question 1: Which school would you prefer to be yours? Why?"

KINDERGARTEN	DISTRICTS	NUMBER OF PARTICIPANTS	OPTION A NUMBER OF RESPONSES	%	OPTION B NUMBER OF RESPONSES	%
KINDERGARTEN A	MAVİŞEHİR	20	4	20	16	80
KINDERGARTEN B	EVKA 6	20	2	10	18	90
KINDERGARTEN C	MENEMEN	22	5	22.7	17	77.3
KINDERGERTEN D	MENEMEN	23	3	13	20	87

It is observed when Table 4 is examined that a large majority of the participants selected the option in which the plant is watered with rainwater (Table 5.4). "Question 2: In your opinion, in which picture is rainwater used more usefully? Why?" The most popular answers to this questions are the sentences "flowers grow" and "bees make honey for us".

Table 5.4 “Question 2: In your opinion, in which picture is rainwater used more usefully? Why?”

KINDERGARTEN	DISTRICTS	NUMBER OF PARTICIPANTS	OPTION A NUMBER OF RESPONSES	%	OPTION B NUMBER OF RESPONSES	%
KINDERGARTEN A	MAVİŞEHİR	20	4	20	16	80
KINDERGARTEN B	EVKA 6	20	2	10	18	90
KINDERGARTEN C	MENEMEN	22	5	22.7	17	77.3
KINDERGERTEN D	MENEMEN	23	3	13	20	87

Most participants preferred to reply to the question directed with illustrated activity sheet questionnaires “Question 3: In which lighten surroundings would you feel happier? Why?” with the picture in which daylight is floating into the room (Table 5.5). The most popular responses given at focus interviews are the sentences “sun illuminates” and “the sun heats”.

Table 5.5 “Question 3: In which lighten surroundings would you feel happier? Why?”

KINDERGARTEN	DISTRICTS	NUMBER OF PARTICIPANTS	OPTION A NUMBER OF RESPONSES	%	OPTION B NUMBER OF RESPONSES	%
KINDERGARTEN A	MAVİŞEHİR	20	4	20	16	80
KINDERGARTEN B	EVKA 6	20	2	10	16	80
KINDERGARTEN C	MENEMEN	22	5	22.7	17	77.3
KINDERGERTEN D	MENEMEN	23	3	13	14	60.9

The percentage of the option to the question “Question 4: In which playground is it more enjoyable to play? Why?” with the option in which the school garden is large and equipped with plants, toys, animals is in majority (Table 5.6). The reason for choosing this option is that there are “animals, trees and toys in the garden”.

Table 5.6 “Question 4: In which playground is it more enjoyable to play? Why?”

KINDERGARTEN	DISTRICTS	NUMBER OF PARTICIPANTS	OPTION A NUMBER OF RESPONSES	%	OPTION B NUMBER OF RESPONSES	%
KINDERGARTEN A	MAVİŞEHİR	20	0	0	20	100
KINDERGARTEN B	EVKA 6	20	4	20	16	80
KINDERGARTEN C	MENEMEN	22	9	40.9	13	59.1
KINDERGERTEN D	MENEMEN	23	7	30.4	16	69.6

The most important result as a result of the illustrated activity sheet questionnaires and focus interviews applied after children have received education is that the fact that the perception of children has significantly changed after education. The children have become aware that changes both in terms of living and on social basis will affect their life in a positive direction. The willingness to change their existing lifestyle even with small steps by means of this awareness and to transfer new learning to their lives is the most important result received from the illustrated activity sheet questionnaires and focus interviews.

5.1.6 Recommendations

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 buildings with designs that will meet the development needs, comfort and health requirements of children is very important in terms of environmental protection awareness and in terms of the standard offered to children. In this way, environment-friendly kindergartens designed in terms of environmental protection awareness offer each child a healthy life within the nature and helps to continue these attitudes to their future lives by means of learned acquisitions.

For the rapid development of environment-friendly kindergartens, many qualitative and quantitative studies should be carried out on environment-friendly building design criteria and the results thereof should be made functional. Especially units, institutions or people having authorization on the issue should save our children from concrete structures.

By carrying out emerging changes in the regulations on pre-school education buildings and functional principles in our country, we should rescue our children from apartment flats stuck in city centers and should provide them the education they deserve.

6. CONCLUSION

Within the scope of the thesis, kindergartens constructed according to environment-friendly building design criteria were examined in terms of kindergarten buildings and were discussed in the light of examples designed in countries across the world.

It was observed that environment-friendly kindergartens try to minimize environmental issues caused generally by construction, in order to increase the life satisfaction and happiness of the child and to provide the child to live integrated with an environment-friendly life. In order to realize this purpose, it was determined that physical environment data, structural form, efficient landscape design, provision of efficient indoor air quality, daylight and energy saving as well as water efficient design topics play an important role in the planning process of environment-friendly kindergarten buildings.

The location of the building under physical environment data and selection of the building direction are among the most important design criteria. It is observed in environment-friendly kindergarten samples designed in countries across the world that location-direction selection is very important in order to benefit from daylight in the most efficient way.

It is determined that efficient daylight is provided by benefiting from the sun in winter in maximum level and by enabling protection from the excessive impact of the sun. Depending on the location-direction selection it is verified that the south facade is the most effective facade selected in kindergartens as it retrieves maximum sunlight in winter and minimum sunlight in summer. Frequently used places in accordance with this, in other words classrooms and gardens are located on the south facade. They also contribute to the heating process by reducing the consumption of electrical energy used.

It is learned that the most important criteria in the structural form created by the combination of variables such as form, structure height, roof type and slope, building shell is “form”. In order to provide energy saving and accelerate the

interaction between buildings, it was clearly observed in kindergarten samples designed globally that the application of environment-friendly kindergartens is a simple plan, in other words in the form of a square or rectangular. In addition to the building plan, kindergarten buildings planned maximum as two floors is another criteria being determined.

In terms of conservation of natural resources, maintenance of ecological balance, enhancing the quality of environment, creating visual and functional ambient, environment-friendly buildings started to give importance to landscape design. The purpose herein is to correctly plan the plant species and their locations within the building and the surrounding to provide visual comfort, as well as to reduce the heating and cooling burden on the building depending on seasonal processes.

For example, it was observed in environment-friendly kindergarten building gardens designed internationally that particularly grass was selected as the ground material for the garden. The purpose herein is to benefit from the cooling effect of grass against the impact of the sun. Other important criteria for landscape design in environment-friendly kindergarten buildings in countries across the world are green roofs. By virtue of green roofs, the ground cover lost from current ground is re-gained to reduce environmental loss, which at the same time provides a long-life of the structure by protecting the materials over the roof cover.

Ensuring indoor comfort conditions at maximum level is important for the realization of environment-friendly design criteria as well as to bring physical, mental and emotional developments of children to a desired level. In cases where comfort conditions cannot be fulfilled, the indoor air pollution rate increases which reduces the performance of children leading to various health problems. Acting sensitively in material selection from the production process of the structure up to the final inspection process will increase indoor air pollution and help to enhance indoor air quality. Besides the importance to be given to material selection, another important criterion in the provision of indoor air quality is natural ventilating. In most of the examples designed in countries across the world

facade windows and wide span windows on facade surfaces provide efficient indoor air quality from natural resources.

Efficient use of daylight within environment-friendly kindergarten structures has provided physiological and psychological comfort for children and has reduced the consumption of electrical energy required for lighting. In the environment-friendly kindergarten examples across the world, it is determined that wide-span windows and roof windows are preferred to provide an active use of daylight. In this way, desired daylight is easily carried into places as at the same time visual communication is provided with external places for the user.

It is determined in some environment-friendly kindergarten examples that natural resources are re-used. Particularly the electrical energy retrieved by means of photovoltaic panels meet the hot water, heating and cooling needs of the building. With this system and by virtue of the energy produce from renewable resources, the responsibility of the building towards the environment is enhanced as electricity costs are reduced.

Collection and reuse of rainwater, providing water saving in landscape watering, selecting facilities that use water more effectively show the importance given to water saving by buildings which provide them to be included among environment-friendly kindergarten examples.

The kindergartens in Turkey were examined after examining the environment-friendly kindergarten examples in countries across the world. However, it was determined that kindergartens in compliance with environment-friendly kindergarten criteria are not available. In order to highlight this result and to emphasize how important the results from environment-friendly kindergartens are; a questionnaire was applied to 5-6 year old kindergarten children. After an educational exercise named “Our Environment and Us” was given to participants before the questionnaire, the most important result as a result of applied illustrated activity sheet questionnaires and focus interviews is the fact that environmental perception of children is significantly changing upon receiving and education. The

children have become aware that changes both in terms of living and on social basis will affect their life in positive direction. The willingness to change their existing lifestyle even with small steps by means of this awareness and to transfer new learning to their lives is the most important result received from the illustrated activity sheet questionnaires and focus interviews.

The contribution of importance of stimulus to be included in the physical environment created for the 5-6 year old child who is introduced with and starts to question the social environment is another clearly observed questionnaire result. Children carry their environmental protection awareness created by environment friendly kindergartens to their attitudes in their life area and reflect this information to their behaviors by integrating theoretical knowledge with practical knowledge. In this way, they realize the behavioral learning theory in their lives.

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, is at a high level. In addition, it has been observed that the mental development and happiness of kindergarten children is enhanced in environment-friendly kindergarten structures which allow them to gain knowledge through living and experiencing.

Designing environment-friendly kindergarten structures that will respond to children's development characteristics, planned with comfort and health conditions at the highest level are important both in terms of environmental protection awareness and offered life standard for children. The importance given by internationally to environmental protection awareness and the comfort of the child can be clearly observed from the designed environment-friendly kindergarten examples. In Turkey, design criteria of kindergarten buildings is not subject to specific standards, lack of laws and regulations on school building constructions and operations, as well as lack of architects and interior architects specializing in professional kindergarten building design has led kindergarten buildings to appear in a uniform design. By being made aware of this situation as

soon as possible, it is necessary that the physical environment conditions that 3-6 year old children deserve in kindergarten buildings, in which they will gain basic development characteristics to be used throughout their life, match the design standards of the world.

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EĞİTİM

Lisans (Tezli) - 2009 İzmir Ekonomi Üniversitesi – İçmimarlık ve Çevre Tasarımı Bölümü / Şeref Öğrencisi

Yüksel Lisans (Tezli) - 2009 Yaşar Üniversitesi İzmir – Fen Bilimleri Enstitüsü / İçmimarlık Yüksek Lisans Programı / %100 Burslu - Halen Devam Etmekteyim.

İŞ TECRÜBESİ

2007 - Baysan Ahşap Grup Şirketleri / Serroli Mobilya Fabrikası

2008 - Frekans Mimarlık

2008 - Dekto Mimarlık

2009 - Yüksel İnşaat - Menemen / İçmimar Pozisyonu / Halen Çalışmaktayım.

2011 – MYCONCEPT – Karşıyaka / İçmimar + İşveren Pozisyonu / Halen Çalışmaktayım.

SERTİFİKALAR

2005 - Dokuz Eylül Üniversitesi Sürekli Eğitim Merkezi (DESEM) - AutoCAD 2008 – 2 Boyutlu çizim Kursu

2007 - Kariyer Günleri Sertifikası Kurum: İzmir Ekonomi Üniversitesi

BİLGİSAYAR BİLGİSİ

Word, Excel, Powerpoint: Çok iyi
Autocad 2d/3d: Çok iyi
Sketchup: Çok iyi
Photoshop: Çok iyi
Illustrater: Orta
3d Max: Orta

AKTİVİTELER

2007 - Kids' Guernica
2008 - Roger Ulrich önderliğinde "Hastane Tasarımı" Projesi
2008 - Mosder Mobilya Fuarı – "Strong Sincere" Sandalye Tasarımı
2009 - Nesrin Hasırcı – "Akıllı Malzemeler" Tanıtım Semineri
2009 - Joran Briand önderliğinde "Hotel Banyo Tasarımı" Projesi
2009 - "Mevcut Yapı Stoğunda Deprem için Tasarım" Yaz Atölyesi
2010 - Dante O. Benini "Mimari Çalışmalar" Sunum Semineri
2011 – Yaşlı Bireylerin Yaşam Memnuniyetini Arttırmaya Yönelik İç Mekan Çözüm Önerileri – Makale – Malike Özsoy ile yazılmıştır.

YABANCI DİLLER

İngilizce: Okuma, Yazma, Konuşma: Çok iyi

İspanyolca: Okuma, Yazma, Konuşma: İyi

HOBİLER

Serbest dalış
Müzik dinlemek
Yemek yapmak

APPENDICES

APPENDICES

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Appendix 1 “ÇEVREMİZ ve BİZ” Ön Bilgilendirme Etkinliği

Birinci Hafta – Çevre Dostu Yaşam; Tanımların yapılıp ön bilginin kazanılması ile gerçekleştirilmiştir.

1. Çevre nedir?

2. Ekoloji nedir?

3. Çevre dostu okul nedir, nasıl olmalıdır?

4. Çevre dostu yapılar neden önemlidir?

5. Ekolojik gıdaların faydaları nelerdir?

İkinci Hafta – Köşelenme Çalışması; Aktif eğitim çoklu zekâ sisteminde uygulanan teknik bir terimdir. Oyuna yönelik bir uygulamadır. Çocuklar farkında olmadan sonuca ulaşır. Amaç çocukların hayal güçlerini genişleterek tek bir doğru olmadığının ve farklı düşüncelerin olduğunu kabul ettirmektir. Konuya dair belirlenen 4 ana başlık altında çocuklar fikirleri doğrultusunda toplanırlar. Neden sorusuna bağlı kalınarak fikirler savunulur. Vazgeçme ve fikir değişikliği mümkündür.

1. Ekolojik bir okul için olması gerekenler:

a. Fiziksel çevre (binanın yeri, bitki örtüsü, iklim v.s) nasıl olmalıdır?

b. Yapı şekli (basit form, tek katlı veya 2 katlı, çok katlı, boya seçimi, pencerelerin yapısı vs.) nasıl olmalıdır?

c. Yapıda materyal seçimi (eşyalarda, boyalarda ve yer kaplamalarında geri dönüşümlü ve yeşil materyal kullanımı) neler olabilir?

d. Gün ışığından tasarruf ve en etkin şekilde kullanma ne demektir?

e. Enerjiyi en etkin şekilde kullanma ve enerji tasarrufu ne demektir?

f. Yağmur suyundan dönüşüm ile tekrar faydalanma nasıl uygulanabilir?

g. Bina içerisinde hava kalitesi nasıl olmalıdır?

h. Geri dönüştürebilir atıkların önemi ve bunların toplanması nasıl yapılır?

i. Su ve enerji tasarrufu için yapabileceklerimiz nelerdir?

j. Doğaya en çok zarar veren atıklar (pil/naylon, kağıt, metal), geri dönüştürülebilir atıkların önemi nedir?

Üçüncü Hafta - Bal-Börek; Aktif eğitim çoklu zekâ sisteminde uygulanan teknik bir terimdir. Oyuna yönelik bir uygulamadır. Her sınıf için bir kral ve kraliçe seçilir. Bu çalışmada çocuklara demokratik düşünce, fikir özgürlüğü ve kendini savunma hakkı amaçlanır.

a. Gün ışığından daha fazla yararlanabilmek için binada neler yapabiliriz?

b. Yağmur sularını toplayarak binamızda nasıl değerlendirebiliriz?

c. Yağmur sularını nasıl toplayabiliriz?

d. Elektrik enerjisinden tasarruf etmek için neler yapabiliriz?

e. Isı enerjisinden tasarruf etmek için neler yapabiliriz?

f. Ekolojik tarım yaparken nelere dikkat etmeliyiz?

g. Geri dönüştürebilir atıklar nelerdir? Geri dönüşüm kutumuzda neleri biriktirebiliriz?

h. Ekolojik bir okulda olması gereken oyuncaklar nasıl ve hangi malzemelerden yapılmış olmalıdır?

i. Çevremize baktığında seni en çok rahatsız eden şey nedir?

j. Dünyamızın kirlenmesine en çok kimler neden oluyor? Nasıl?

k. Plastik şişeleri atmak yerine başka ne amaçla kullanabiliriz?

l. Bir balık olsaydın nasıl bir denizde yaşamak isterdin?

m. Denizleri kim kirletir?

n. İnsanlar denizleri temiz tutmak için neler yapabilirler?

o. Denizlerde balıklar dışında hangi canlılar yaşar?

p. Denizlerdeki canlıların yaşaması için insanlar neler yapabilirler?

q. İnsanlar denizde balıklar gibi uzun süre kalabilmek için ne yaparlar?

Dördüncü Hafta - Sanat Çalışması; Bu çalışmada çocuklara özgürce hayallerinde tasarladıkları objeleri yapmaları için gerekli ortam ve materyal sağlanır.

a. Kutulardan hayalimizde olması gereken okulun 3 boyutlu maketini yapıyoruz

b. Geri dönüşüm kutusu oluşturma

c. Gazetelerden kâğıt hamuru hazırlama

d. Yel değirmeni yapımı ve bunlardan rüzgâr oluşumunu tartışma

e. Pet şişelerden kukla, hayvan yapımı

f. Poşetlerden kıyafet tasarlama

Dördüncü Hafta - Düşünce Koridoru; Aktif eğitim çoklu zekâ sisteminde uygulanan teknik bir terimdir. Oyuna yönelik bir uygulamadır. Oyun konuyla ilgili hikâye anlatımıyla başlar. Hikâye çift yönlü anlatılır yani hem negatif hem pozitif yönler sergilenir. Önce olumsuz yönler anlatılır ardından olumlu yönler anlatılarak çocukların zihinlerinde sadece olumlu yönlerin kalması sağlanır. Bu oyunda amaç çocukların empati kurmalarını sağlayarak duyarlılık kazandırmaktır.

a. Çok kirlenmiş bir çevrede, nefes almakta zorlansaydın neler hissederdin?

b. Tertemiz havası olan bir çevrede yaşasaydın neler hissederdin?

c. İnsanlar tarafından atılan çöplerle kirlenmiş bir denizde yaşayan balık olsan ne hissederdin?

d. Tertemiz bir denizde yaşayan balık olsan ne hissederdin?

e. Kirli havada uçan kuşlar ne hisseder?

f. Temiz bir havada uçan kuşlar ne hisseder?

Ekoloji: canlılarla içinde yaşadıkları ortamı inceleyen bir bilim dalıdır. Canlıların içinde yaşadıkları ortam demek cansız çevre olarak da ifade edilebilir. Bunlar hava, su, toprak, ışık gibi faktörleri kapsar.

Ekolojik Denge: İnsan, hayvan, bitki gibi tüm canlıların bulundukları ortamda yaşamlarını sürdürebilmeleri için gerekli olan şartlar ve bu şartların birbirleriyle olan bağlantısıdır. Örnek verecek olursak: bitki, fare ve yılandan oluşan bir ekosistem düşünün. Burada bitki topraktan suyu ve besini alsın, fareler bitki kökleriyle beslensin. Yılanlar da fareleri yiyerek beslensin. Burada her canlı birbirini yiyerek bir beslenme zinciri oluşturur. Eğer fareler bitkileri yemezse, bitkiler çoğalır ve zamanla topraktaki su ve minareler bitkilere yetmemeye başlar. Fareler bitki köklerini yemezlerse açlıktan ölürler. Eğer yılanlar fareleri yemezlerse açlıktan ölürler. Eğer yılanlar farelerin hepsini yerse bu sefer yine açlıktan ölecekler.

Günümüzde özellikle insanoğlu ekolojik dengeyle türlü biçimlerde oynar, küresel ısınma, ormanların yok edilmesi, baraj inşası gibi teknolojik bir takım olaylar ekolojik dengeyle oynar.

Ekosistem: İnsan yaşamı ve doğal yaşam çeşitli dengeler üzerine kurulmuştur. Bu sistemler arasındaki ilişkiler çoğunlukla kişiler tarafından fark edilmeyecek kadar uzun ilişki halkaları ile birbirine bağlı ve uzun süreli olabilmektedir.

Bu doğal sistemlere dışarıdan gelebilecek etkiler sonucu doğal dengeyi oluşturan zincirin halkalarında meydana gelen kopmalar zincirin tamamını etkileyerek bu dengenin olumsuz etkilenmesine neden olur.

Canlılar ve cansızlar birbirleriyle sıkı ilişki halindedir. Biri olmadan diğerinin olması düşünülemez. Ekosistemdeki bir bozulma bir bütün olan çevrenin yapı ve işleyişini olumsuz yönde etkiler. Bazı varlıkların azalması diğer bazı varlıkların azalmasına veya çoğalmasına neden olur. Sonuçta doğadaki enerji tükenmeye başlar.

Dünya coğrafyasının değişmesi: Ekosistemin doğal unsurlarını oluşturan iklim, toprak, hava, bitki, hayvan gibi faktörlerin olumsuz yönde değişmesi çevrenin ekolojik özelliklerini de değiştirmektedir. Uzun süren kuraklıklar sonucu bitki ve hayvan sayısı hızla azalır, suların kirlenmesi sonucu suya ışık girişi azalır, suyun hava oranı düşer, toprakta oluşan tahribat ve kirlenmeler önce bitkilerin sonra da canlıların zamanla ölmesine neden olur. Ormanların kesilmesi ve yanması çevrenin çölleşmesine ve sonrasında küresel ısınmaya neden olur

İklimin değişmesi: İklim şartlarının değişmesi canlı yaşam ve dağılışını olumsuz yönde etkiler. İklimi değişen bir bölgede bazı canlılar göç ederken, bazı canlılar ölür veya şartlara uymaya çalışır. Küresel ısınmaya bağlı olarak ozon tabakasının incelmesi, ormanların azalması, havanın kirlenmesi, yağışların azalması çölleşmenin başlaması bir bölgedeki iklimin değişmesine neden olur.

Su kaynaklarının azalması: Suların kirlenmesi ve azalması sonucu çevrede kullanabilir su oranı azalmasına, yağışların azalmasına, tarımsal verimin azalmasına, hidroelektrik santrallerindeki enerji üretiminin kısılmasına neden olur. Bu durum canlıların beslenmesini olumsuz etkiler.

Enerji kıtlığının başlaması: Madenlerin azalması sonucu termik santraller, su kaynaklarının azalması sonucu hidroelektrik santralleri, petrolün azalması sonucu ulaştırma araçlarının kullanım oranı azalır. Enerji kıtlığının başlaması sonucu insanların sosyal yaşamı felç olur.

Canlı çeşitliğinin azalması: Ekosistemdeki fiziksel ve kimyasal şartların değişmesi canlıların yaşama, yayılış ve üremesini etkiler. Bozulan şartlara uyanlar yaşarken diğerleri yok olur. Çevredeki bitki sayısının azalması besin zincirindeki canlı tür çeşitlerini ve sayısını da azaltır.

Çevre Kirliliği: Çeşitli kaynaklardan çıkan katı, sıvı ve gaz halindeki kirletici maddelerin hava, su ve toprakta yüksek oranda birikmesi çevre kirliliğine neden olmaktadır. Teknolojinin ilerlemesi ile birlikte artan cep telefonu kullanımı, 3G teknolojisi, televizyonlar, notebooklar, mikrodalga fırınlar, fotokopi makinaları elektromanyetik kirlilik kaynakları olarak hayatımızı etkilemeye başlamıştır.

Çevre Kirliliğinin Nedenleri: Çeşitli kaynaklardan çıkan katı, sıvı ve gaz halindeki kirletici maddelerin hava, su ve toprakta yüksek oranda birikmesi çevre kirliliğinin oluşmasına neden olmaktadır. Sanayideki bu artış beraberinde var olan doğal kaynakların hızla tükenmesine neden olmaktadır. Doğal kaynaklar hızla tükenirken, üretim ve tüketimden kaynaklı atıkların önlemler alınmadan doğaya atılması çevre kirliliğinin oluşmasına neden olmaktadır. Çevre kirliliğinin en önemli nedenleri aşağıda sıralanmıştır:

1. Göçler ve düzensiz şehirleşme

2. Kişi başına kullanılır enerji, su, kağıt, kömür artışı

3. Ormanların tahribi, yangınlar ve erezyon

4. Aşırı hayvan otlatımı ve doğal bitki örtüsünün tahribi

5. Konutlar ve işyerlerindeki ısınmadan kaynaklanan (özellikle kalitesiz kömür kullanımı) hava kirliliği

6. Motorlu araçlar ve deniz araçları

7. Maden , taş ve kum ocakları

8. Gübre ve böcek ilaçları

9. Doğal afetler

10. Kanalizasyon sularının temizlenmeden sulamada kullanılması

11. katı atıklar ve çöp

12. Sulak alanlar ve göllerin kurutulması

13. Kaçak avlanma

14. Televizyon, bilgisayar, röntgen ve tomografi gibi tıbbi cihazların yaygınlaşmasıyla ortaya çıkan radyasyon

Su Kirliliği: Ülkemizde su kirliliğine etki eden unsurlar:

1. Sanayileşme

2. Şehirleşme

3. Nüfus artışı

4. Zirai mücadele ilaçları ve kimyasal gübreler

5. Ülkemizde özellikle sanayi kuruluşlarının sıvı atıkları ile su kirliliğine ve dolaylı olarak yine su kirliliğine bağlı olarak toprak ve bitki örtüsü üzerinde aşırı kirlenmelere neden olduğu ve hızlı bir şekilde çevrenin tahribatına yol açtığı bilinmektedir.

Hava Kirliliğinin Çevre ve İnsan Sağlığına Etkileri: Hava kirliliği başta insan sağlığı olmak üzere bitkiler ve hayvan sağlığı üzerinde olumsuz etkileri vardır. Katı yakıtlar ve akaryakıtlar yanmasından meydana gelen duman, hava kirliliğinin bir çeşitidir. Bitkiler üzerinde ise öldürücü ve büyümelerini engelleyici bir etkisi vardır. Bu nedenle hava kirliliği hem canlıların sağlığı açısından hem de ekonomik yönden zarar vericidir. Hava kirliliğinin insan sağlığı üzerine etkileri yüksek miktardaki zararlı maddelerin solunması sonucu ortaya çıkar. İnsanların sağlıklı ve rahat yaşayabilmesi için havanın mutlaka temiz olması gerekir. Kirli havanın solunması, özellikle akciğer dokularını tahrip edici ve öldürücü olmaktadır. Solunum yolu ile alınan duman, teneffüs esnasında yutulur ve akciğerlere kadar ulaşır.

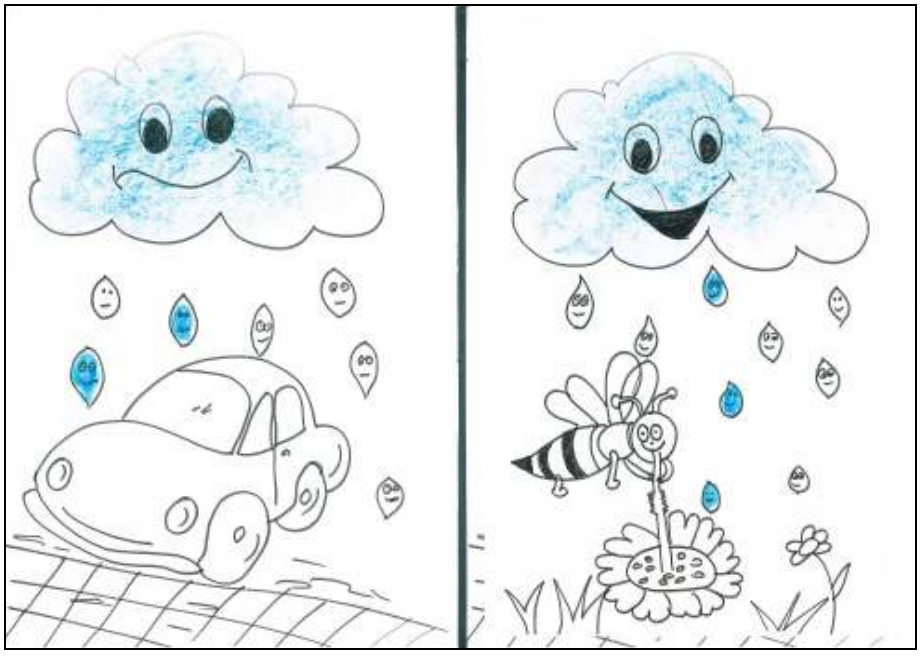
Hava Kirliliğine karşı Alınabilecek Önlemler: Hava kirliliğinin yoğun olduğu büyük illerimizde kaliteli ve temiz linyitin yakılması için gerekli tedbirler alınmalıdır. Kentsel ısınmada doğal gazın kullanımı artırılmalıdır. Yakıtların uygun yakılabilmesi için kazanın temiz olması, kazan ile uğraşan personelin periyodik olarak eğitim alması gerekmektedir. Büyük ısıtma sistemlerine filtre takma zorunluluğu getirilmelidir.

Organik Tarım: Üretimde kimyasal gübre ve ilaç kullanmadan yapılan doğal tarıma organik tarım denir. Organik tarımın amacı toprak ve su kaynakları ile havayı kirletmeden çevre, bitki ve hayvanları koruyarak sağlıklı ürünler yetiştirmekti.

Appendix 2 Resimli Faaliyet Yaprağı Anketleri

Şekil 1. Soru 1: “Hangi okulun senin okulun olmasını isterdin. Neden?”

Şekil 2. Soru 2: “Sence yağmur suyu hangi resimde daha faydalı kullanılmıştır. Neden?”



Şekil 3. Soru 3: “Hangi ışıkla aydınlatılmış ortamda kendini daha mutlu hissederdin. Neden?”

Şekil 4. Soru 4: “Hangi okul bahçesinde oynamak daha keyiflidir. Neden?”