YASAR UNIVERSITY
GRADUATE SCHOOL OF NATURAL AND APPLIED SCIENCE

MASTER THESIS

THE EFFECT OF DESIGN CONSTITUTING SUSTAINABILITY CONSCIOUSNESS IN KINDERGARTEN

Tugce ATAKAN

Thesis Advisor: Assist.Prof.Dr. Ebru ALAKAVUK

Department of Interior Architecture

Presentation Date: 10.08.2016

Bornova – İZMİR

2016

I certify that I have read this thesis and that in my opinion it is fully adequate,
in scope and in quality, as a dissertation for the degree of master of science.

Assist.Prof.Dr. Ebru ALAKAVUK (Supervisor)

I certify that I have read this thesis and that in my opinion it is fully adequate,
in scope and in quality, as a dissertation for the degree of master of science.

Assoc.Prof.Dr. Didem AKYOL ALTUN

I certify that I have read this thesis and that in my opinion it is fully adequate,
in scope and in quality, as a dissertation for the degree of master of science.

Assist.Prof.Dr. Ecehan ÖZMEHMET

Prof. Dr. Cüneyt Güzeliş
Director of the Graduate School

ABSTRACT

THE EFFECT OF DESIGN CONSTITUTING SUSTAINABILITY CONSCIOUSNESS IN KINDERGARTEN

ATAKAN, Tuğçe

MSc in Interior Architecture

Supervisor: Assist.Prof.Dr. Ebru ALAKAVUK

August 2016, 178 pages

Usually when it is said 'kindergarten period" it is understood one or two years before the children start school. Kindergarten term is used mostly for 3-6 years old children that are educated on well-arranged programme in institutions. In the widest sense the kindergarten period starts with the birth of a child and continuous until the child starts basic education. In this study will be discussed in detail the effect of design constituting sustainability consciousness in kindergarten.

If this study want to describe the sustainability not just according to architecture but generally; fulfilling the needs of today according to possible future demands, using the resources effectively, not harming the environment, recycling the waste and we can summarize this to leave livable world for the future generations. Educators are paying high attention on awareness and consciousness for establishing sustainability, and are suggesting "education for sustainability" for children before school to establish this kind of point of view.

In this thesis we researched the principles to enhance the sustainable buildings. In this study, after mentioning the importance of sustainability in education, we studied the important subjects in kindergarten design such as using the natural light, heating, cooling, air conditioning, wind power, not wasting water and material selection. Also criticize the world for not paying enough attention to sustainable buildings; although there are recently some improvements in Turkey, but there have to be more implementation and research regarding to

sustainable buildings. Another goal is to provide extra source for sustainable kindergarten designs.

Key Words: Kindergarten Education, Sustainable Education, Sustainable Material, Sustainability Consciousness

ÖZET

ANAOKULLARINDA SÜRDÜRÜLEBİLİRLİK BİLİNCİNİN SAĞLANMASINDA TASARIMIN ETKİSİ

ATAKAN, Tuğçe

Yüksek Lisans Tezi, İç Mimarlık Bölümü

Tez Danışmanı: Yrd. Doc. Dr. Ebru ALAKAVUK

Ağustos 2016, 178 sayfa

Genellikle, "okul öncesi dönem" denildiğinde, çocuğun yaşamının ilköğretime başlamasından önceki bir ya da iki yılı anlaşılmaktadır. "Okul öncesi eğitimi" deyimi ise daha çok 3-6 yaş arası çocukların düzenli bir programla eğitildikleri kurumlardaki eğitim için kullanılmaktadır. En geniş anlamıyla okul öncesi dönem, çocuğun doğumuyla başlayıp temel eğitime başlayacağı zamana kadar sürer. Bu çalışmada anaokullarında sürdürülebilirlik bilincinin sağlanmasında tasarımın etkisi konusu detaylı bir şekilde ele alınacaktır.

Sürdürülebilirliği sadece mimarlık açısından değil de çok genel olarak tanımlamak istersek; bugünün gereksinimlerini gelecek nesillerin de ihtiyaçlarını dikkate alarak karşılamak, kaynaklarımızı duyarlı kullanmak, çevreye zarar vermemek, atıklardan kaynak oluşturmak, gelecek nesiller için yaşanabilir bir dünya bırakmak şeklinde özetleyebiliriz. Sürdürülebilirlik yönünde farkındalığın ve bilincinin sağlanabilmesine eğitimciler tarafından büyük bir önem verilmekte, çocukların erken yaşlarda bu bakış açısının sağladığı kazanımları öğrenebilmesi amacıyla "sürdürülebilirlik için eğitim" programlarına okul öncesi eğitimden itibaren yer verilmektedir.

Bu açıdan, çalışmada okul yapıları için sürdürülebilir yapım kapsamında dikkate alınması gereken ilkeler araştırılmıştır. Çalışma kapsamında, bir öğrenme aracı olarak sürdürülebilir tasarımın önemine değinildikten sonra, doğal ışıktan yararlanma, ısıtma, soğutma ve havalandırma yöntemleri, rüzgâr enerjisi, su koruma ve malzeme seçimi kapsamında sürdürülebilir anaokulu tasarımında önem taşıyan konular araştırılmıştır. Sürdürülebilir tasarım ilkelerinin dikkate alındığı uygulamaların sayıca azlığı dünya genelinde eleştirilmekte;

Türkiye'de de son yıllarda konuya olan ilgide artış görülmekle birlikte, uygulama ve araştırma yönünde daha çok adım atılması gerekmektedir. Bu açıdan çalışmayla anaokulu tasarımları için yardımcı bir kaynak sağlayabilmek amaçlanmıştır. (Uludağ Üniversitesi Mühendislik Fakültesi Dergisi, Cilt 20, Sayı 1, 2015, B. Ece Sahin, 2015)

Anahtar Kelimeler: Anaokulu Eğitimi, Sürdürülebilir Eğitim, Sürdürülebilir Malzeme, Sürdürülebilirlik Bilinci

ACKNOWLEDGEMENTS

First of all, I wish to express my deepest gratitude to Assist.Prof.Dr. Ebru ALAKAVUK for her criticism, creative suggestions, helpful and invaluable supervision and encouragement all throughout the development of this thesis.

I am grateful to my family, Nuray ATAKAN and Tayfun ATAKAN for their, patience, and support.

I owe special thanks to Arzu ÇETİNKAYA PAJOTTE, Betül ÜNSEVER, Dilara ERGÜÇ, Rıfat İNCE, Selma İNCE, Zeynep DİNÇ for their valuable help and mainly Bora CANDİLER for their valuable help.

I am also thankful to Assoc.Prof.Dr. Didem AKYOL ALTUN and Assist.Prof.Dr. Ecehan ÖZMEHMET for their help and criticism.

Tuğçe ATAKAN

İzmir, 2016

TEXT OF OATH

I hereby certify with honor that this MSc thesis titled "**THE EFFECT OF DESIGN CONSTITUTING SUSTAINABILITY CONSCIOUSNESS IN KINDERGARTEN**" 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.

10 / 08 / 2016 Tuğçe ATAKAN

TABLE OF CONTENTS

Page

INDEX OF FIGURES

Figure Page

INDEX OF TABLES

INDEX OF SYMBOLS AND ABBREVIATIONS

A.D.A	: Americans with Disabilities Act
DfES'in	: Department for Education and Skills
EPA	: environmental protection agency
ETFE	: Ethylene tetrafluoroethylene (ETFE) a fluorine-based plastic
FSC	: (Forest Stewardship Council
I.U.C.N.	: International Union for Conservation of Nature
LED	: Light Emitting Diodes
LEED	: Leadership in Energy and Environmental Design
Ntsc	: National Television System Committee
PV	: Photovoltaics, SOLAR ENERGY
PVC	: Polyvinyl chloride
USGBC	: U.S. Green Building Council
USGS	: United States Geological Survey
VOCs	: Volatile organic compounds

1. INTRODUCTION

1.1. Aims and Problem Definition

Considering the buildings, people who mediate between the humanity and its adaptability to environment consume 60% of natural resources architects, have the most important responsibility for raising the ecological awareness. Impacts of the buildings on nature and environment can reach starting from the local scale to global extent (such as impacts on climates). In contemporary architecture, most of the structures are made by ignoring environmental issues and by being in a struggle for dominating the nature. This issue accelerates further the environmental pollution. One of the responsibilities of the architects is raising the sustainability awareness in society against these issues and designing structures with this approach. (O.D.T.Ü Mimarlık Fakültesi Dergisi Cilt 6, Sayı 1, Bahar 198)

Today, the development level of societies is measured by being information society and therefore education becomes more important. The more the societies develop the quality and period of education increases; consequently, the education buildings are needed more. Yet, these education buildings should go beyond being only projects; they should be environmentally conscious and should aim the quality of education and children's physical and mental health. Buildings that reach these aims have importance in terms of contributing protection of the environment, the sources and the energy; increasing children's success levels; supporting social values by design; being healthy and safe designs; transferring the sustainability concept to the next generations and creating more conscious and healthier world for both the present-day posterity and the next generations. At the present day, sustainability in schools not only provides lower operating expense, higher student attendance, higher teacher performance, longer life of structure and less environmental impact but also has positive effects on the children such as higher success rate or influencing them on behaving more positive to the

environment. Thereby, acquired information is transferred to societies and the necessary awareness is provided.

Reaching the desirable quality in education, raising healthy and modern individuals starts with preschool education. During kindergarten period, where the child develops an identity and gains skills, taking the desirable quality education is possible with well-designed education buildings that can meet the children's all kinds of needs. While developing societies that are aware of sustainability, schools have a highly special part. Because schools assist the children in understanding that they harm the earth, starting from their early childhood. Also, schools transfer the advantages of developing sustainable environments for the humanity's future to the youth and the society. First step to achieve this is goals starts from the preschool education buildings, designing all schools with the sustainable approach and making all students to embrace sustainable education understanding.

Designing kindergarten education buildings as sustainable structures is highly important in terms of environmental effects of the school buildings by being large-scaled structures, being able to shape the long term changes in children's behavior at early ages, being used by many different users and raising better schools by sustainable designs. Kindergarten education is carried out through different institutions aimed at different groups of age. These institutions are kindergartens, nursery schools and kindergarten. In the content of this thesis, independent preschool buildings specified as "kindergarten" in world literature have been chosen and kindergarten' taking part in complex education buildings use of materials have been examined.

The aim of this thesis is to examine the potentials of sustainability in preschool education buildings, how the criteria constitutes sustainability is approached in terms of design of these structures, choosing sustainable materials and the use of sustainable materials in preschools. Sustainable preschools in worldwide have been researched, been defined whether or not these buildings designed suited to these criteria. And also according to acquired results a survey

study about sustainable preschool buildings use of sustainable materials has been made.

- The aim within this thesis is examining the potentials of sustainability in preschool education buildings
- How the criteria constitutes sustainability is approached in terms of design of these structures
- Put forward sustainable materials and the use of sustainable materials in kindergarten
- Emphasizing the importance of the implementation of this concept in kindergarten, in order to establish the concept of sustainability from a small age
- Introducing the sustainability of awareness of the parents, school owners and employees

1.2. Scope and Limits of the Study

The scope of this study is collected under headings: sustainability and sustainable materials, sustainability in school building, evaluation of sustainable school buildings according to sustainable design criterias and case study. The significance of "sustainability and sustainable materials" chapters help to understood clearly sustainable materials and how it is used in kindergarten. Sustainability in school building chapter explains in detail essential principles for school building designs and sustainability in education.

The significance of the usage of sustainable materials in kindergarten chapter is the kindergarten education, materials and finishes for sustainable kindergarten; evaluation of sustainable school buildings according to sustainable design criterias chapter point of to sustainable school examples will evaluate 8 kindergartens around the world. I have selected schools are certified and have

received school awards. Sustainable through the world in selected schools were selected.

This study limited with 8 kindergarten design which includes physical environment data's, structural form, landscape designs provision of efficient indoor air quality, efficient daylight saving, efficient energy usage, water efficient design and sustainable materials.

Another limit of the study is survey participants. The study was carried out with 33 participants that are parents of sustainable kindergarten children, owners and employees of the sustainable kindergartens. That is located in South Florida.

1.3. Method of the study

As a method of the study, literature review, comprasion of sustainable kindergarten buildings and survey of a selected sustainable kindergarten sources such as academic papers, books, thesis studies, Internet sources, design guides of countries, etc. have been examined.

Defined sustainable kindergarten buildings within the content of the thesis; sustainability criteria have been analyzed in terms of which sustainability components they constitute from these four titles: sustainability and sustainable materials, sustainability in school buildings, evaluation of sustainable school buildings according to sustainable design criterias and analytical survey for sustainable kindergarten. According to the results of the analysis, kindergarten buildings potentially feature which sustainability criteria the most and impacts of these criteria on structure design have been defined. Also, example use of the sustainable materials for the chosen kindergarten buildings has been put forth.

In the first chapter; Subject of the thesis, aims of the study, method of the study, and scope and limits of the study is explained. In the second chapter; concept of sustainability is defined, history of sustainability is examined, and definition of sustainable materials and sustainable material option for interior

design are explained. In the third chapter; kindergarten education for sustainability of school buildings is emphasized. In the fourth chapter; evaluation of sustainable school buildings according to sustainable design criterias explained. Ecological, ecomomical and socio -cultural crtireias explained. Also 8-school building from the world is explained in detail with examples and In accordance with these explained considerations, comparison of Sustainable Kindergarten In The World. The fifth chapter; analytical survey for sustainable kindergartens in south Florida. The sixth chapter; consists of results of the study and implications. In this thesis, scientific resources, which are well accepted in the world, are used as main database.

2. SUSTAINABILITY and SUSTAINABLE MATERIALS

The concept of sustainability, firstly takes part in the document of World Charter for Nature that is accepted in 1982 by International Union for Conservation of Nature and Nature Resources. According to this, it is aimed to supply optimal sustainability to eco-system, organisms, land, sea and atmosphere sources that people benefit form. However it is envisioned to be arranged that would not endanger that unity of eco systems and species. Afterwards, the concept of "sustainability" in the various resources and statements of researches is defined as many different forms:

"It is the reception of today's requirement without bringing harm to ability of supplying their own needs of future generation" (OurCommonFuture, 1987:78).

"It is the improvement of the quality of human life by taking into consideration the carrying capacity of eco systems" (I.U.C.N., 1991:152-154).

According to John Dernbach who is an environment lawyer, sustainability is sensibility of freedom, the quality of life and opportunity, more productivity, a more active and compatible management, the desire of offering a better world for the future generation, volunteering of creating opportunity and exploiting them, a desire of a safer world and summoning to be a producer of International issues. (Neslihan Küçükaslan, 2011)

"The concept of sustainability is to achieve the most with the least resources. According to Foster, 'less is more' which is an idiom of ecology, the proverb of 'waste not, want not' is a warm for today's people".

Although the concept of sustainability enters the interest of many field of occupation in different platforms and subjects to searches, it draws attention that

they mention ecological, economical and social dimensions while researches are describing the components of sustainability. According to Bilge (2007:89) the data that is important to come up and to change the concept of sustainability are divided into three:

Ecological Data;

- Climatic Changes
- The moderation of differentiation concept
- Ecological Factors (sensitivity to environment)
- Food chain and recycle

Improvement of sources and waste concept

The usage of energy

Economical Data;

- The improvement of agriculture and transportation
- The improvement of industrial area

Sociocultural Data;

- The information of individual and public consciousness
- The examination of the relationship between population density and carrying capacity
- The consciousness and improvement of history

Becker (1999: 145) who is one of the researches trying to explain sustainability by dividing into categories explains sustainability separating analytically and clarifying environmental process into three categories.

- Economical process: It is related to production and consumption of goods

- Social process: Patterns and factors: It forms by protecting economical processes that are related to social and cultural structure such as social hierarchy, life form and standard of judgment

- The process of deciding and institutional regulation: It is related to intuitional regulation that is done for participation of deciding process, and sensitivity to this matter with conduct of approach strategies and changing conditions

According to Kim and Rigdon (1998:176) sustainability in the context of interior architecture can be provided with three principles. These provide for economical usage of researches, lifecycle and humanistic design.

- Protection of resources; reduce, reuse, recycle

- Lifecycle; analyzing of the process of building availability and effects to environment,

- Humanistic design; the strategies that are questioned the relationships between people and natural environment.

Sachs (1999:204) states that the components of sustainability should exist in every dimension for healthy and real sustainable process due to the fact that sustainability is a process that is multi-dimensional and open-ended.

Kohler (1999.148) emphasizes that sustainable buildings should be describe as ecological, economic, social and cultural sustainability dimensions, and these dimensions are design principles of sustainable building. (Figure 2.1)

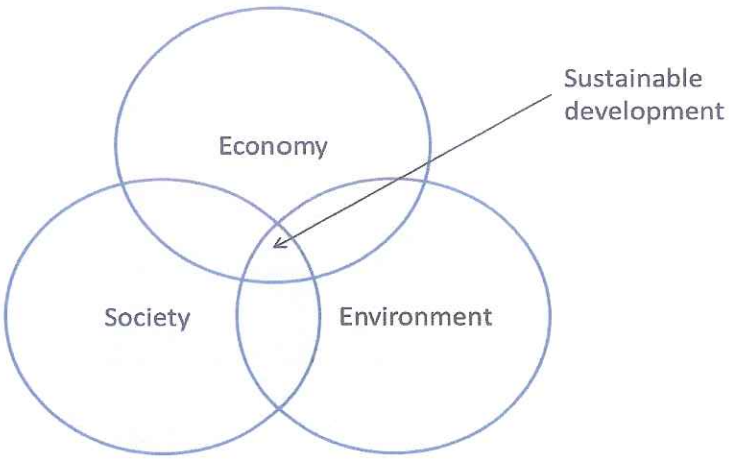


Figure 2.1: Principles and strategies of sustainable Resource: (Kohler, 1999:69)

Ecological sustainability contains sparing usage of resources, preference of renewable energy resources and preservation of eco systems. Economic sustainability is divided into two parts that are investment and usage cost. As well as production process and construction elements and materials are low cost, it is important that they have high durability and reusability.

In this way "long term productivity of resources" supplied by the way of reusability of buildings by regenerating. Low usage expenses are provided with the buildings spare usage of energy, being easy to cure and operate. Social and cultural dimensions of sustainability are the factors that are protection of health and comfort, and protection of values, which are main objective of protection projects. (Cole, 1999:73)

According to Pressoir (2008:149) sustainability consists of three components. These are;

- Ecological sustainability: awakening the usage of natural resources and physical environment.

- Economic sustainability: sensitivity to social and environmental effects and the potential and limits of economic growth.

- Social and cultural sustainability: it expresses social instructions and their roles over the improvement and transformation of the societies.

2.1 The history of sustainability

Future Energy gain, which started with petrol crisis in 1973-1979, affected the field of architecture. As priority small-scaled buildings, built in those days, supported solar energy gain through active and passive systems. It was mostly applied in building design.

The spotting idea of the period was approaching reusable energy sources against petrol crisis, and improvement and tries the appropriate new technology. (Tönük, 2008: 153)

Experts in Switzerland first discussed sustainable development and environmental issues in 1971. It was reported that environmental problems were arising because of supply and demand of the industrialized countries, poverty and underdevelopment. This approach to sustainable development made several developing countries join United Nations Conference on the Human Environment (UNCHE) in Stockholm in 1972.

In early 1980's houses, which include heat retention concept-passive house, came into prominence especially in Germany after the second petrol crisis. The contemporary approach was also applied to buildings' typology, one of the best examples is the youth center designed by Thomas Herzog and Peter Bonfig. (Tönük, 2008: 154).

In 1980s the technology, which enables to benefit from the natural resources, started to be used with large scaled buildings. Design through passive systems and benefit of active solar system from the most important approach to architecture of those times. The main concern of the period were studies, which were centered on environment and ecology due to the spoil of environmental commitment on people health, and how they affected acceleration in architecture. (Tonuk, 2008: 154)

The important theoric studies on ecology in Germany is the manual published with the order of German Environmental Ministry in 1982.The writers of the book, named (okologischen Bauen) in German are P.Krusche, D. Althaus and I.Gabriel.

Information about natural and artificial environment, running of active and passive systems, main approaches to ecological design are explained through various figures and graphics in that book, which is also known as the "Neufert" of ecologic architecture.

In 1983, a report called "Our Common Future" was prepared by United Nations General Assembly. In the report, the World Commission on Environment and Development President Gro Harlem Brundtland described sustainable development as development without divestiture of supplying today's need 1987. (Sev, 2009: 153)

The Brundtland report sustainability started to be accepted and applied in all areas of life. It was emphasized that sustainable development can be realized only if all countries in the world admitted that they are a part of the same economic, political and social whole. According to the Brundlant Report the necessary items for sustainability developments are; (Gunes, 2004:139)

- A political system, which enables active participation of citizens.
- An economic system which provides continues know how and surplus in production itself.
- A social system, which can find a solution to the problems arising from discordant development.
- A production system, which tries to protect the needed ecological base.
- A technologic system, which seeks, continues solutions.

In 1990s, not only scientists but also ordinary people started to think and work on environmental issues and how to protect it; relating both architecture and all other areas. The concept of ecological skyscraper underlines the rise of

building scale through an ecological design; whereas zero energy from natural resources and conscious energy consumption. (Tönük, 2008: 153)

In several international studies following the Brundtland Comission it was stated that sustainable development has to be dealt in a totalitarian approach, and a lot of decisions have been made accordingly. In June 1992, during the World Summit organized by United Nations in Rio Janeiro, Brazil, sustainable development was the main concern as it combined the idea of environment and development. In the meeting sustainable development was described as not using up fund-stock-riches, not preventing the next generation from supplying their own needs, protecting the balance between economy and ecosystem, and as an ecologically sustainable economic development.

In Stockholm reusable resources and pollution were discussed as problems; whereas in Rio improving sustainable economic growth and natural resources were the concern. 117 governments from 179 developed and developing countries came together and accepted 27 itemed Rio Declaration on Environment and Development on environment and development in RIO. Afterwards, it was decided to maintain global sustainability. As a consequence of Rio Declaration "Principles of Forest Report" was approved. Moreover, "United Nations Framework Convention on Climate Change (UNFCCC)" and United Nations Convention on Biological Diversity were signed. Agenda 21, which is a detailed action plan aiming to provide social and economic sustainability is the most comprehensive one among all the documents.

The report aimed to instill the idea that there was close relation between sustainability and environment to public opinion. The declaration focused on the following six ideas.

1) Life quality on the Earth
2) Efficient use of natural resources
3) Protecting the globally shared values
4) Planning the inhabitance of people

5) Managing of chemical waste and,

6) Maintainable economic progress

In June 1993, during World Congress of the International Union of Architects, held in Chicago, it was emphasized that architects had to plan their works on sustainable development.

The Rio Summit (1992), World Congress of the International Union of Architects (1993), the International Conference on Population and Development Copenhagen (1995), Istanbul Habitat II 'City Summit' (1996) and following United Nations Conferences and summits made whole world accept sustainable development and principles of global partnership.

Problems faced in urban life and solutions were discussed in Habitat II, which focused on cooperation, solutions and responsibilities needed for sustainable development in an urbanizing world. This, the role of urbanization in sustainable development was emphasized.

Economic and environmental results of climate change, and the necessary policies were brought up during a conference in Kyoto, 1997, five years after the Rio Summit. Afterwards it was decided to use the energy efficiently, encourage the use of new and clean energy sources, protect forests and create new forest and create new forest lands. According to the Kyoto Protocol developed countries had to reduce six different gasses, like carbon dioxide and coal gas, causing green house effect at least to % 5 of the year 1990 till 2012. IEA (2008) "Key World Energy Statistics 2008", International Energy Agency, (IEA) OECD/IEA, Paris.

In 2000s the fact that ecologic design is not restricted to technology use and decisions proper to the environment, and that the structure of the building, use and destruction steps of the environmental cycle have to be also considered gained importance.

The main idea of the period is trying to exceed the limits in order to protect environmental systems, give importance to and encourage theoretical,

technological and applicable studies, which adopt a mentalist and conscious approach. (Tönük, 2008: 49)

Two important environmental conferences were held in the period. During the World Summit on Sustainable Development, which was held in Johannesburg South Africa (26.08.2002 – 04.04.2002) the governments undertook the steps needed to protect water energy, health, agriculture and biological diversity. Global action to overcome poverty, use of natural resources, the relationship between poverty and nature were examined in the conference.

The most outstanding applications of the period are Chesa Futura Apartments ecological buildings, designed by Norman Foster and his partners, and Genzyme Center designed by Behnisch.

An invited design competition was organized in China in 06.09.2006. Seven architects from four countries joined the competition. Sam won with his 'Pearl River Tower' design.

The "Super tall" concept gain importance at the time. Clean Technology Tower, designed by Gordon Gill, is thought to be the most important example.

Global warming and how it affects climatic changes and environmental threats were discussed in United Nations Climate Change Conference in Bali, 25.12.2007.

As it can be inferred from the discussed ideas and made definitions by different countries all together, sustainable development cannot be limited to a specific discipline as it is related to each living being and area on the Earth. Sustainable development contains decisions paying sufficient attention to long term ecological, economic and social effects of each action related to human factor, like industrialization and urbanization.

2.2. Sustainable Materials

Materials are the components that reifying the design and putting it into practice. Chosen materials' features redound to product directly. Designers not only consider factors such as form, user requirements and image while designing, but also consider and use the material as the key item. In some mandatory situations, a significant material can be chosen and the design can be carried out according to that material's features.

Features of building materials used for the building of a structure have many effects on the structure itself. Material preferences during building process of indoors cause not only visible, perceivable effects and results; but also create many spatial qualities, which cannot be perceived at a glance. Temperature in artificial built in environment, humidity, climate, electricity and magnetic field features are closely associated with used materials. Designed structures that are considering these conditions, form a basis for utilizing these materials, in terms of structural biology. To do this utilization, some criteria must be determined beforehand. These criteria:

- Required energy amount during production of the material
- Released by-products and toxic substances during production of the material
- Recyclability of the material and reutilization
- Availability of the material from local sources
- Materials that do not need big facilities during production and installation
- Effects of the material on user health and comfort level

Considering the criteria mentioned above, it is possible to categorize them as usage of materials, place of use; positive, negative and neutral effects. According to Krusche and his colleagues, there are several building materials that are recommended to use and not recommended to use (Eriç and Ersoy, 1995).

Materials are dug up from the Earth to meet the prior needs; such as, food, clothing and shelter.

To understand the material flow from the source to the final process helps to manage the use of natural resources properly and save the environment. Material flow is a system, which informs how the material is supplied, processed, manufactured, transported and finalized. USGS (the U.S Geological Survey) researches how the material effects economy, society and environment. The aim of the study is to notify both how and why the material is used and principles, so the resources are used in amore effective way and the environment is protected (USGS, 1998:85)

Building materials contains, the %60 of the whole material flow in the buildings, roads and infrastructure applications. Furthermore, it was calculated that renewal, destruction and restoration includes %16 of the energy used by a building in a life span. (NSTC, 2008:33)

Building materials needed for environmental sustainability is examined in three phases in terms of the life cycle of the building. The feature of the phases helps to identify materials in relation with sustainability. They are: (Kim and Rigdun, 1998:76)

The pre-Construction Phase: Production;

- Waste minimization
- Pollution Prevention
- Recyclable content
- Minimization of the contained energy
- Usage of natural material

Construction Phase: Usage;

- Energy efficiency

- Water treatment
- Usage for nontoxic or less toxic materials
- Renewable energy systems
- Longevity

Post- Construction Phase: Deconstruction is; all buildings materials parallel to their own production processes cause harmful effects, to the nature, like reducing natural resources and terminating the environment. Therefore, to give importance to evaluate which material is less and which is more harmful to the environment enhances the process. (Caroll, 2006,194)

In each phase of their own life cycle materials and products affects the ecosystem and nature negatively. That materials are dug up from their source and are harvested endangers the soil needed for agriculture and leads to sedimentation in waterways. Emission and waste as a result of production no matter if near or far from the plant can cause containment of air, water and soil. Fuel oil used while transporting material and products in their all life cycle makes emission appear.

Building material and product care results in contaminated chemicals, which affect environment and internal environment quality. They can include solvents, adhesives, harmful constituents like water resistant material and volatile organic compound. (Calkins, 2009:153). While building restoration the use of that kind of new material causes several health problems. Therefore, private sector and public organizations prefer to use low emission building material owing to the rise of internal air quality awareness.

After use material and products can affect air, water and soil negatively. What to do to decrease environmental effects is listed as follows.

When only sufficient amount of material is used in building, environmental effects due to production from unspool resources is reduced. The fact that recyclable a material is used in construction is one of the most important steps to

minimize the use of source. For examples concrete materials like asphalt, wood and polyethylene plastic are easily recycled and reproduced. (Calkins, 2009: 155)

Examining resources and transporting, producing and setting up materials dug up from different places cause many environmental effects like emission. (Kibert, 2008:113). Locally dug up, used and produced materials decrease environmental effect arising from fossil fuel while transport and also transport cost; moreover, it supports local economy. If to use local material depends on the location of the projects. The distance between where raw material is supplied from and plants where the production is depends on the weight of the material: heavy material like aggregate and brick within 100 miles, lighter within 500 miles, and less lighter within 1000 miles of the project zone. (Calkins, 2009:157)

Common use of certification system LEED and_BREEAM (Building Research Establishment Environmental Assessment Method) U.K. system, first developed by BRE (Building Research Establishment) in 1990 and began to be used in the UK, may be used in applications abroad by synchronizing it to the circumstances of the relevant country. (BREEAM International / BREEAM Bespoke) Main criteria in BREEAM are detailed under the following topics: "Administration, Health (quality of lighting, acoustic, air, water, and thermal comfort), Energy, Transportation, Water, Materials, Waste, Land Usage, Ecology, Pollution, and Innovation." BREEAM system exercises rating scale as the following: Pass, Good, Very Good, Excellent, Outstanding.

LEED (The Leadership in Energy and Environmental Design), brought by U.S. Green Building Council (USGBC) and had been applied in the U.S. since 1998, is based on systems such as BREEAM, the rating system for green buildings. LEED evaluation system is applied in countries other than the United States as it is, and does not need need additional synchronization. There are eight LEED certificate programs in total, which are adjusted to the type of project and the form of usage of the structure being built. The main criteria of the evaluation is detailed as the following: "Sustainable Land, Water Saving, Energy and Atmosphere, Materials and Sources, Indoor Quality of Life, Innovation." Ratings are as the following: Certified, Silver, Gold, Platinum. (Yellamraju, 2011).

Yellamraju, V. (2011). LEED – New Construction Project Management, McGraw - Hill Publications, United States.

Llewelyn Davies Yeang (LDY) Eco Systems team, which consists of experts on LEED and BREEAM, tried to compare the two systems regarding fundamental categories such as water, energy, pollution, air quality, ecology, land usage, and transportation. Although the two systems resemble each other in their general characteristics, it is observed that BREEAM U.K. and BREEAM Bespoke checklists focus more on environmental effects, while LEED prioritizes the health and comfort of the consumer. Although the criteria between these systems are similar to each other, it may be seen that the significance levels could differentiate to a great extent because of their rating system; since the two systems are based on different standards, regulations, and guidelines. For instance, a building rated high by LEED could be rated much lower by BREEAM, and vice versa. Since the regulation systems in the U.K. is more strict than the ones in the United States, BREEAM International applications could be more difficult than those of LEED's. However, it is asserted that the usage of LEED criteria is easier, since BREEAM criteria needs synchronization to be used in foreign countries, based on those countries' environmental priorities, climate conditions, regulations, etc. The U.K. uses the metric system since 1986, while the U.S. still does not use the metric system. Comparisons, held voluntarily as a result of experience in the U.S., between LEED and Energy Star certificates showed that the one third of buildings holding LEED certificates are not energy-efficient in the real sense; and it has therefore become evident that Energy Star is more appropriate in terms of energy-efficiency criteria.

It is important to apply certificated materials through sufficient methods for sustainability. For example, wood, if harvested in a sustainable way from well-managed forests is considered as green material. The forest management, responsible of the environment, has to take care of maintaining the functionality, minimizing shaving-scalping and not controlled harvesting, and saving the old forests. FSC (Forest Stewardship Council) has identified third party certification for sustainably harvested wood. FSC has advice principles and evaluation criteria for forest management; moreover, they explain their mission as promoting

economically applicable, socially beneficial and environmentally proper management of world forest. (Figure 2.2)

Figure 2.2: FSC Chain of Custody Protection of Wood

(https://us.fsc.org/en-us)

Source: USGS, 1998. Materials Flow and Sustainability, Fact Sheet, FS-068-98.

Chain of Custody Protection of Wood

- Forests are certificated according to FSC principles and evaluation criteria.
- While cutting trees, sound management and harvesting applications are followed.
- Harvested trees are transported to workshops certificated by FSC.

- FSC certificated producers use FSC certificated raw material to produce wood and paper.
- FSC certificated goods are transported to shops all over the world.
- Consumers buy FSC a tabled goods is increased. (Calkins, 2009:161).
- Source: USGS, 1998. Materials flow and Sustainability, Fact Sheet, FS-068-98.

Goods, which are natural and need minimum production stages, are considered as green materials as they need low energy consumption and leave minimum dangerous chemicals during production. Examples of semi-processed products are wooden goods, natural stone and pebble. Minimal processed materials are preferred because they have little harmful effects to the environment.

In contrast to well-processed materials, like plastic and metal, minimal processed materials; like stone and wood are low energized. Evaluation of contained energy can help to contrast two different materials. Such analysis consists of resulted polluters, poisonous items, and usage of sources and destruction of natural environment. (Ortiz vd; 2009:28-29)

While selecting materials, it is important to consider the total energy necessary for extracting, processing, and transporting the raw material. For instance, a great amount of electric energy is spent during aluminum productio Embodied energy of a recycled aluminum, on the other hand, is less. Selecting low-energy materials reduces the environmental effects of the structure as well. It is important that the building material that is to be used for the first time should mostly contain recycled material.

Materials and goods, when produced with renewable sources (sun, wind, hydroelectric, biomass, geothermal) lessens the environmental effects. As a result of the analysis of energy sources it was understood that if produced with renewable energy sources high energized products affects the environment less of fossil fuel and using mostly the primary energy sources in production stage leads

to green house gasses and containment of air which cause global climate change, acid rain and negative effects on human health. (Calkins, 2009:176)

Reducing Detrimental Effects of Materials on Environment;

- Recycling: The percentage of recycled ingredients within materials and products used should be increased. If possible, all these ingredients should be made of recycled materials.

- Bio-based Ingredients: Products and materials based on self-restoring sources (for instance, wood materials with certificate of sustainability) should be used.

- Construction Waste: During the planning stage of a project, local solutions aiming at recycling scraps and waste materials of building sites should be found and applied. Market situation and opportunities regarding recycling at least 50% of waste generated by construction, destruction, field extension, and cleanup (only except soil excavation) should be researched and utilized.

- Compounds Harmful to Ozone Layer: Such compounds should not be used during and after construction if more environmental options and products are available.

While supplying some of the row material needed for the production and demolish of construction material leaves waste. Products and emission caused by them lead to spread of harmful pollutants and particles into air water and soil. Mining metal coating, demolishing cement and PVC goods cause less pollutant. Materials, which cause less pollutant, should be preferred in the whole process.

A great deal of water is required for the operation and production process of some materials and products. Most of the time used water, which is polluted by heavy metal, hazardous chemicals or particles, and residue constitutes waste risk

when treatment work isn't done. Some producers recycle wastewater through production. Removal methods of chemicals and heavy metal help to demolish potential contaminating in a safe way. (Calkins, 2009: 185)

2.3. Materials for Sustainable Kindergarten

In the pre-school education materials it is important that they are functional, hygienic, easily cleanable, give psychological trust to children and being durable. To achieve these qualities, the materials used, the production forms designed to be manufactured from the material or materials to be used depends on the intended manner. Because the most important aspect of the material selection is it is being functional, then being figural. In other words, it is important to design in the way of the designated function and conformity of the chosen material and design in the pre-school education structures.

The most important effect, after air conditioning, inside air quality is using effective materials. It's know that there are harmful materials inside of some paints, polishes, plywood, chipboard, sponge products, panels, vinyl and wood products.

At the present time, material variety is very high. While at the beginning of 20th century, 50 materials were used, today 55.000 materials are used in construction industry. Also after 1950's, building materials containing toxicity are reached to 25.000. Most of these materials are regarded as synthetic; also they can facilitate chemical reactions and microbial growth. For instance, materials such as plastic membranes or fiberglass consist between 1000 and 50.000 times more pollutant microorganisms than natural ones (Halliday, 2010). (Figure 2.3)

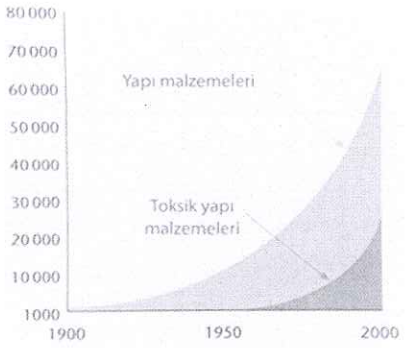


Figure 2.3: Increase in building materials and toxicity effect (narrated from Halliday, 2010)

The materials should not contain volatile organic composites such as essential chemicals, for example vinyl chloride, benzene, formaldehyde and toluene. The negative aspects of these composites are to vaporize on room temperature and harm human health. For example, formaldehyde is used on most of the composite wood and agrifiber products as resin. It shows itself with heavy smells on ponderous wood products. Formaldehyde is used on areas such as paint, plastic products, paper, textile, carpet, mdf, sponges that used for isolation and furniture; it can lead to cancer and asthma in long term. Even, when formaldehyde is 0.1 percent of million in the air, it can cause lachrymation, burning feeling on eyes and nose, coughing, pressure on chest and fallout on skin. Another composite solvent is proved to cause diseases such as brain damage, cancer, color blindness and such risks (Yudelson 2007, Halliday 2010). Kids have different body improvement comparing to adults, so it's extra important to keep kids away from such environments (Murphy and Thorne 2010).

It's very simple to find equivalent non-harmful materials for volatile organic composites. For example, sponge isolation materials consist of formaldehyde, that's why it's suggested to use cellulose isolation and instead of wallpaper, you can use water-based emission, instead of mdf, you can use natural wood furniture. Formaldehyde stays naturally in wood, although it's on reasonable level. We can use flax seed organic based paint instead of water base paints, which contains solvent. We can avoid using wallpaper with using non-solvent and non-formaldehyde linoleum and rubber on floor (Murphy and Thorne 2010). Also it's not risky to use fungus, bamboo, linoleum and wool carpets on floors. Linoleum consists of flax oil, fungus powder, natural fiber and wood powder, also it's

known as very healthy products; it is renewable, competent and can be recycled, which makes it very efficient (Yudelson 2007). Instead of using petrochemical vinyl wallpaper products, we can use recyclable wallpapers. You can also be more sensitive and use all natural paints rather than petrochemical water based paint that has volatile composites (Anderson 2008).

Recently, there are couple suggested materials that can use building materials such as wheat, rice straw, sunflower seed, cannabis and such natural components to build agricultural plants (Yudelson 2007). One of them is "cardboard", which is natural and renewable. This product doesn't pollute the environment and it can easily dissolve in the earth. It's very popular in school buildings. (Figure 2.4)

Figure 2.4: "Cutting-edge cardboard" education building (Richardson 2008).

In case of lose resistance during burning or humidity, it is possible to provide water conversation by installing coaters consisting non toxic chemicals and plastic films. This material can be used as panel and pipe (Halliday, 2010). In the example below a category of composite panel system as surface lining, in which "cardboard" is used, can be seen. Wood, which is a natural material, can be used in many different options. For instance, metal or plastic as roof structure and roofing should be avoided because of being energy-dense and toxic. However, wooden tiles and wooden shingles can be a good preference; oak or cedar as enduring trees can be used without the need of applying preservatives (Anderson,

2008). Low-value wooden panels are healthy and very enduring. Wooden panels (brettstapel) as innovative, low-impact flooring, wall and roof component materials can be produced between 8-30 cm, 16 m long and 620 cm wide (Halliday, 2010).

One of the important points of material is gas oscillation and the second issue is the moisture. In this matter, it's very essential to use materials that have hygroscopic features that suck the moisture and leave moisture according to the humidity in the area. Wood, plaster, textile and paints that open to moisture are some of them (Olds 2001). It's proven that hygroscopic materials provide 9 times better control on moisturized inside climate compare to air condition. (/http://www.scotland.gov.uk/Resource/Doc/920/0034304.pdf; 2014).

Renewable and natural materials should be chosen on school buildings, gas oscillation and moisture has to be considered as well. In this frame, today we have several of material to choose and we have to do deep research on choosing materials.

Concrete is a, while it is the second most used material after water, multi-dimensional, durable, economically efficient and aesthetically appropriate building component. It has far superior environmental characteristics when it is blended with metal, glass and polymer. The most important feature that defines the value of sustainability of materials is the energy required for production. This value for aluminum is 170 MJAg, for plastic 80-90 MJ/kg, steel 38 MJAg, brick 2,8 MJAg, and for concrete 2 MJAg.

90% of the total production energy of concrete is the energy resulting from the production of cement; cement's total production energy is 7,8 MJAg. While the production of cement uses somuch energy and resources, same cannot be applied to concrete.(Lawson, 1996). Concrete building component is a good choice in terms of sustainability.

Durable and long-lasting construction material; Formed by cement and water mixture, the crystalline matrix has a high compressive strength of sand and

aggregate to each other by chemical bonds and form an inert substance. This inert substance is not subject to corrosion, rot-proof, fireproof. That is why it is an efficientfire guard. When exposed to fire, it has no toxic smoke emissions.

It can be obtained locally. This feature makes it more economic and decreases the energy consumption resulting from transportation. Thermal storage capability is very good.

Materials with a high thermal capacity will increase the energy efficiency of the building by storing heat. Especially buildings made of concrete blocks with thermal insulation performs well in terms of energy efficiency. Buildingmaterials in terms of thermal capacity is gaining importance for energy efficiency since %90 of the environmental impacts are occurring because of heating-cooling process. For example, Detached House's, built in Germany/Riderau, long front was put in the south to benefit sunlight, and interior concrete walls, reinforced concrete ceiling and dark colored mosaic flooring stores heat during the day.

Recycling is an important stage in the life cycle of concrete. After completing his lifetime demolished concrete structures separated and can be used in the production of roads as aggregate, car parks etc. Besides, concrete mixtures may also contain high industrial waste such as fly ash, blast furnace slag. The usage of these waste saves natural resources. Some concrete producters are able to recycle their own materials in proportion of %75-95. North European Countries' firms are seeking a way to use their concrete in the air conditioner, and after they complete their lifecycle, seeking to recycle them. (Forster, 1998)

Health and Pollution Problems; Toxic gas emissions resulting from concrete material is very low. However, the fact that additional materials used for concrete and substances used for the mold to be easily detached are causing health and pollution problems should not be neglected. Material reduces the water consumption in the production of substances and super plasticizer often creates skin and respiratory problems in the users. Using wax and mineral oil-based products instead of these provide benefits. (Sev, 2009).

Furthermore total energy of the field of artificial stone masonry building materials into cement-based terracotta and natural stone are low and long-lasting materials with high thermal capacity. It has been used in natural stone building since very old times, it is durable for atmospher effects, humidity and micro organisms, and it can be used again and easily recyclable. Thus it has positive features. However, the reason it brings weight to the building, obtaining and processing difficulties it gave its place to artificial stone. Natural stone removed from the natural soil causes erosion, environmental pollution, damage to creatures and causes deterioration of the ecological balance. (Vares, 1998).

Even though with the enhancing technology the stone block can be cut very thin, 15-90% of the stone is being lost during cutting operations. Majority of these losses are either being used in quarries as filling material, or in the road construction as aggregate.

The transportatin of the material that producted in the quarries results in huge energy losts. The reason that using natural stone which completed its useful lifecycle as transport elements are inconvenient, it gains function when it is transformed to aggregate. Reasons such as those, the natural stone's place is repaced by stone broken with binding materials, glass and etc. artificial stones and terracotta materials derived from aggregate. (Sev, 2009).

Health and Pollution Problem; the finished product of stone materials' negative effect on human health and air pollution is very small. However, the measures should be taken to reduce the environmental pollution due to usage of fuel in the production of terracota material and the cooking should be done in energy efficient, natural gas-powered oven. The binder materials used in the construction of artificial stone must be taken account because of their impact on human health and the environment.

Otherwise one of the renewable materials that come into mind is wood, when you think about pre-production and renovation. Wood is a natural material that can be used without any process and can provide renewable and less waste. It

doesn't harm health, have less fossil source and store CO2. (Herzog vd., 2003, ss.48,74-75.)

It's very useful on heat and sound isolation; it can be burned although it has all right fire behavior. (Affentranger vd., 2000, 18,55)

Wood can be reused, destroyed and transfer into energy or raw material. You can produce wood products fast, store and transport easily because of lightweight.

The first rule of ecologic sustainability is using the natural resources without polluting the environment. Living resources can produce themselves. Although lifeless resources can put environment into danger, it can be polluted as water and air; it won't be able to reuse them again. One building materials is environmental friendly, if not harming the environment on production, usage and destruction part. That's why it's so important if the materials are reusable, renewable and recyclable. The same things are also applicable for energy sources. All the trends mentioned above to lead the sector to natural materials and production improvement.

It must be ensured that the used wood derived from the forests cultivated with sustainable methods. After demolition derived wood elements must be evaluated by repairing damaged parts or as sawdust.

Using the trees growing quickly and have small-scaled boles for production of chipboard elements is highly advantageous. It is possible to produce chipboards by evaluating used papers. These elements also have high thermal insulation value (Goldish, 1986).

Glues used for some chipboard products may affect indoor air negatively by causing poisonous gas emission. Phenolic resin and polyurethane glues are the materials that cause the lowest level of emission (Rousseau, 1995).

Wood is created by tree, which is a living organism, has homogenous texture, is fibrous and organic-based material. Unlike other building materials,

wood is a nice material; perhaps it is because wood is a production of a living thing, that's why we would like to see wood more in our structures. However, at the present time, it's become difficult to use natural wood, especially due to economic reasons. Natural wood is developed as a homogenous and isotropic material thanks to present advanced technology possibilities. Therefore, it is started to use composite materials, which are provided opportunity to benefit uttermost from nonsuitable woods in terms of their scales, other plants and valuable trees in our structures. These materials are fabricated and produced from natural wood, have economic purposes and more favorable possibilities than natural wood (Eriç, 1994).

Natural wood materials are; separated into two groups, in terms of tree species, which are their primary material: coniferous (evergreen) and broad-leaved (non-evergreen) trees. Coniferous trees such as pine, spruce and broad-leaved trees such as beech, oak, poplar, hornbeam, ash tree, lime tree and chestnut are used mostly in structures. Other categorization is depending on wood's hardness and being resinous: Hardwoods (oak, ash tree, beech, hornbeam, chestnut and walnut), softwood (poplar, alder and lime tree) and resinous woods (pine and spruce).

Composite wood; material came out of as a result of technological developments in our era, economic difficulties in use of natural wood and necessity of different sizes for new details after the entity of natural wood. It is possible to separate composite wood materials into three groups, according to their type of production: pressed covering, pressed agglomere and pressed solid. Covering and plywood belong to the pressed covering group; sawdust, fiber and chipping belong to the pressed agglomeres group; lastly densified, preservative-treated woods and glued laminated wood belong to the pressed solid group. (Eriç, 1994)

Also stone material is a preferred material because of its natural appearance indoors, its own texture and the most importantly its high durability and endurance to external effects. In general, natural stones are used more indoors than cast stone materials.

Natural stones are; crystal internal structured, inorganic-based, natural materials which are caused by rocks forming the earth's crust in various effects. Natural stones used as building materials since a long time ago, however at the present time; they are used only for special purposes. Because, they put a certain weight to the structure and are hard to process and use. Besides, they cause space loss and there are lots of developments in the material technology.

Aggregate is mostly used in producing cast stones; it is an irreplaceable material for cast stones. "Natural stones combined with inorganic or organic based binders, crumble due to atmospheric effects or some materials created artificially for this purpose are called aggregate." According to this definition, cast stones formed with various aggregates are called agglomere. Aggregate, agglomere are formed by combination of water and binders. Aggregate, water and binders combine, and they form agglomeres such as; mortar, concrete, terrazzo, asphalt etc. (Eriç, 1994).

In textile materials used;

- Organic cotton fiber is produced naturally without using any chemicals.
- Bamboo fiber is produced in Asia and became thread in Turkey. Thread made of the fiber of bamboo tree is shiner than cotton, high water observation and natural antibacterial.
- Soybean fiber made of soy plant. This thread looks like cashmere and soft as wool, durable to UV light, regulating the human temperature and antibacterial.

Also it is important that the plastic materials used in kids' rooms are not recycled. Reproduced plastics from used materials are not suitable for kids' health, so they are not suitable for kids' furniture design. When right types of

plastic material are used, they are proper in terms of being resistant to chemical and physical impacts and offering various color options. For instance; plexiglass material is used in bedstead sides for tracking the child's movements as a functional and aesthetical material. Metal is a hard material and sharp edged fitting elements could be dangerous for kids' rooms. However, it is preferred for its substantiality in kids' furniture. Results of conducted researches, it is revealed that metal materials produce magnetic field and affect the organism negatively. That may cause kids to feel tired and correspondingly sleep irregularities. Therefore, it is not approved to keeping large metal furniture in kids' rooms. (Demiray, 2002)

Furthermore photovoltaic (PV) is a technology can transform the light entirely to the electrical energy. At the producing energy from the sun stage, best known system is making use of solar cells. PV cells are put under protection against environmental factors by designing in between the glass plates. For making use of all PV units, all cells are connected to each other with electrical network, transformed into photovoltaic module (solar panel) and form integrity. In a square section of the modules, 100 W of energy can be produced approximately. Modules are used as connected to each other for creating the total energy.

Photovoltaic process: from solar rays through lattice energy; Photons – Solar rays are holding by photovoltaic cells and transformed into electric current . Electricity connected with the help of inverter to the network.

In order to increase photovoltaic capacity, it is possible to use different surface options, such as canopies and shades. Photovoltaic system is most effective when it's used at midday hours.

In this respect, integrating this system to buildings are not used during these hours of the day, does not seem right. For instance, in houses that not used in stated hours during the day, the system can produce the most energy at midday hours. There are many examples of photovoltaic applications in different forms. As it can be integrated to roof as roofing, there are also thin film systems that applied by spreading. To see the level of acquired energy, a definition for a

standard house in England is a guide. A house that its annual power requirement is 4500 kWh, it is possible to provide 30 m2 of its power requirement by photovoltaic panels and degrade its electricity demand, thereby reduce that area (Anderson, 2008). Because schools are used during the day, system's effective usage hours and structure's usage hours coincide with each other. In this respect, it is beneficial to use solar energy based systems in schools.

In order to insulation materials provide a healthy and comfortable environment, buildings should be protected from undesirable factors. Insulation is applied to prevent undesirable loss or gain of heat, to prevent water from harming construction elements by infiltrating through the crust of the building, or to avoid fire and outside noise. Thermal insulation is very beneficial regarding the energy efficiency in all structures. Energy save is achieved by using materials that are high in insulation value in the crust of the buildings, where the loss and gain of heat are most intense; or by increasing air voids; and it is an important step in decreasing air pollution. After determining the targeted insulation value, materials that are capable of fulfilling this value and that are unlikely to cause medical issues should be selected. (Sev, 2009)

Fiberglass, rock wool, rolled polystyrene / polyurethane foam, phenol foam, glass foam, wood fiber plaques, expanded perlite and cork are among the most common materials of thermal insulation.

The water problem created by rain, snow, ground water, or functional sources of water used in watery environments has deleterious effects on health; besides, it causes the materials of bearing elements to rust and subsequently lose their carrying potential. For this reason, plastic, cement, bitument, polyurethane, and acrylic based materials are used in waterproofing.

Another important factor in buildings, on which additional precautions should be taken, is fire. Besides rock wool, which is incombustible and unable to transmit fire, plaster, fiber cement plaques; special mastics, that are expandable by heat, are used in ceiling and upholstery voids, along with special gaskets and door

seals are used in fire insulation to minimize the loss of life and property as a result of fire.

It is important to select insulation materials scrupulously, so the building would be long lasting. Materials that are to be used for this purpose should be durable to outside factors, recyclable, and be suitable to climatic conditions and local labor potential. (Sev, 2009)

Increasing Source Efficiency; Vermiculite and perlite are the most common used minerals to produce insulation materials and are easily found in nature. Fiber glass insulation materials are obtained by recycling wasted glass at a rate of 30%. Cellulosic thermal insulation materials and sound insulation materials applied by pulverization are obtainable from waste paper.

It is possible to use recycled material in polystryne foam production. However, one should be attentive to a possible emission of poisonous gas, most important of which is chlorofluorocarbon. Roofing plaques with bitumen are of high quality, and they are more durable to external factors.

Problem of pollution and health; Insulation materials made of minerals and fiberglass are counted as deleterious to health in many countries. For this reason, people should not have physical contact to these materials while transporting, applying, or using; and their residues should be properly cleared after application. Moreover, it is important to keep these materials from contacting heating, cooling, or air conditioning systems. Cellulosic fibers are more secure compared to others regarding human health. However, they contain types of borates and sulphates that could accelerate fire. Vermiculite and perlite dusts should not be inhaled, and proper measures should be taken during application. These materials should be applied outdoors, since all plastic insulation materials emit great amounts of poisonous gas.

2.4. Sustainable Material Options for Kindergarten Interior Design

Choosing materials for sustainable interior house design affects the design's impact on the environment substantially. It is related to spent energy for taking off, processing, protecting, using and recycling of the material. Second important factor of using these strategies is the pollutant impact of the material on the environment and on us. Most of these materials are used for interior architecture and preferred for their decorative or luxurious features. Alongside the chosen building base materials, interior architects usually work on the schemas where it's necessary. Most of the time, additional or advanced budget is needed to support these. The reasons of these materials for being more expensive are being rare to find, spending much more energy and producing more pollutant waste products (Dumitraş, 2008).

One of the greatest factors for pollution of the environment is human activity. Humans produce waste as living organisms due to their presence. Produced solid wastes during industrial and daily activities are furniture, domestic materials, clothing etc. Most of these wastes are biologically degradable but others can be seen directly as poisonous waste for the environment. When it's viewed percentage-based, solid wastes caused by daily human activities %55, metal wastes %9, food wastes %14, textile wastes %5, wood wastes %4, plastic wastes %1 and miscellaneous %3.

Most non-sustainable materials are used in interior architecture. Interior architects primary duty is being careful about the materials' features that they suggest or specify.

Furniture; There are two main features on organizing the event area in kindergartens. These are unchangeable features as doors, windows, walls, electric sockets and cables and changeable features as materials and furniture (Estes, 2004). The furniture should be according to kids' age group and improvement features. The sharp edges of furniture and nails should be considered and be sure that the paint should not harm kids. There should not be furniture that includes glass and mirror. The necessary furniture should be demobilized and inside

classroom furniture should be cleaned easily, has more functions, easily carried and matching colors. (Özkubat, 2013, 58-66)

Laminate coverings are; suitable for kids' furniture in terms of being easy to clean, enduring, offering various color options and being affordable. Melamine, vinyl and paper coverings can peel off from the furniture surface over time, so they are not preferable for kids' furniture design. Paints used for kids' furniture must be lead and toxicant free. Anti-dust, stain proof and easy to clean furniture must be chosen, must be careful about preferred glues do not contain toxic and carcinogen. At the present time, there are custom paints that do not have carcinogen for kids' rooms. (Gilberg, 1996)

Window frames; durability maybe one of the most important choosing factors. Wood is not a good product in terms of rotting. However, uPVC and aluminum windows are known as durable alternatives to wood. This notoriety of wood is not because of raw material. Rather, because of other factors such as, poor workmanship, poor assembly and so on. But, a well-elaborated wood window can endure as long as the others. For instance, one of the hardwoods, oak can be the most suitable window material, after its proper preservation applied or after not applying paint or wood preservative at all. Despite the fact that, we put certified wood to most suitable frame part, if these frames painted with synthetic solvent-based paints, they may cause important environmental damages through its life. Therefore, if it is necessary to use paint, using plant-based paints is always the better environmentalist option. As a matter of fact, a frame from certified wood painted with synthetic paint might be harmful to the environment than an uPVC window.

Aluminum windows; can be placed into window void directly or can be immobilized onto wooden blind frame. Aluminum frames that are exposed to wearing conditions can lose their shininess and start to rust. Therefore, they need to be coated with eloxal coating or organic-based liquid coating. Aluminum is quite an energy-dense material (180-240 MJ/kg). Aluminum industry constitutes %1.4 of total power consumption in the world. Using recycled aluminum provides us %80-%95 of energy gain. Released heat during production of the aluminum is

used for four things; as a beginning, for heating the bauxite-burner soda solution, for drying the solution, for creating the electrodes will be used in the process and lastly for electrolytic reducing process. These consist of necessary energy inputs during the general production of aluminum. In addition to these, extra energy is needed for shaping the aluminum.

In general it can be can say for wooden windows that either they should be produced from hardwood or they should be preserved with wood preservative paints or with preservatives. However, even they are naturally hardwoods, applying wood preservatives show better results, generally. The most important input of production energy of wooden frames is transport energy input. Especially, if these hardwoods are imported, this energy increases even more.

Although it has a 30- year history, PVC still can be put in the new building materials category, and its formulation is still developing. In the past, due to uPVC extrusion was too bulky than other frames, no one preferred it. But at the present time, strengthening of the material and production of smaller profiles are the reasons for preference. In addition to this, PVC cannot be strong as wood or metal; therefore, it can be strengthening with galvanized steel or aluminum components.

Furthermore, recently there are concerns that carpets make cheap- quality effect on places. Canadian carpet makers have been following the standards that forbid them to use volatile chemical emission from 1993. This program controls the volatile organic chemical level, collect the scientific data, find the non-standard products and provide customer satisfaction. Carpet samples take from production line and send it to independent laboratory. If it passes the test, it gets green label. According to the USA carpet manufacturer Host/ Racine, reaches show that carpet helps the inside air. Company found out that dust, home pets, pollens and allergy makers either come from carrier or a person walk on the carpet. There were a study made in 17schools in Nebraska, Florida, Wisconsin and North Caroline that shows air holds more spor than carpet. Carpet becomes a

filter till vacuum cleaner cleans it. Another proof is the results that carpets don't affect the air gotten from Norway and Sweden. Norway, close area expert Gaute Flatheim mentions there is no proof that carpets change air quality, although there is a prejudgment. Test institution Rogaland Research made a research to understand which one provides better air soft or hard floor surface. They put carpet to two classes that both have hard floor surface. They tested the air on school hours and after school hours. The results show us that carpet decrease the noise and higher the standards.
(http://www.evdose.com/tur/zemin/hali/zemhal0025.html)

Furthermore, carpets can provide a soft surface for children to sit comfortably and with its sound absorbing feature it helps to create an acoustic in the room. However, it is especially is not appropriate for infants. They are hard to clean, blocks and lego(s) do not stay straight on them, and toys that are moving are not easy to move on them as they are on the wooden floors. Besides, since carpets are absorbing the humidity in the environment they make breathing hard for allergic children. If you have to choose a carpet, you should choose anti-allergic carpets. Hand-woven carpets are generally less allergic rather than machine-woven ones. All carpets that will be used in children's room must be fire reterdant. Short-haired wool carpet is suitable for babies and small children. Plush carpets are unhealthy for babies since they keep so many dust and they make breathing hard for babies. Rugs and carpets in part to be able to sit comfortably in particular wood and resilient flooring coating materials are preferred over the child in terms of providing a soft and comfortable surface. Since children spends too much time on floors crawling, playing games and painting the floor must be comfortable and maintenance friendly. Designers suggest a combination of soft and hard floor in the purpose of this. For example, soft but flat material provides a good surface for toys to stay good and be played, carpets or rugs makes a good, cozy and suitable environment for reading book and watching TV. (http://www.yedigun.com/cocuk-odasi-nasil-duzenlenir)

Earthenware products used as floor and wall coverings are quite enduring and their emission levels are low. They are dirt-resistant, easy to clean, abrasion resistant and they don't need maintenance – repair. Regarding finishing materials,

main factor affecting the indoor air quality application method, used mortar, surfaces with no grout or glaze and used protection layer. Also, the spent energy during the production process should be judged on life cycle perspective. In finishing materials, the most remarkable products for human health are resilient floor and wall coverings. Vinyl, caoutchouc, linoleum, cork and carpet coverings are included in this group. Some of them can be produced from recycled materials. Some types are abrasion resistant and need less maintenance and repair. They have different place from other material groups, in terms of effects on indoors air, application methods and maintenance – repair. However, types have higher recyclable component ratio, less polluting and need less maintenance can be produced at the present time (Arslan, Gönenç, 2007).

The flooring material chosen for the children room must allow the children to not to hurt themselves when they hit the floor, provide suitable surface for games and other activies and it should be easy to clean. For children's room design, there is a wide range of materials from rug and wooden floor to vinyl flooring. The most important criterias to be considered are providing safety for children since they are too active, easy to clean and prevent the noise.

At the same time, this material can also create a cheerful and colorful atmosphere in the children's room with a different texture and color possibilities. Vinyl tiles, although they are resistant to roll up flooring, in the children's room it can be used a variety of colors and patterns in one room and with its interesting and unique designs that allow to make good for and replacement of the damaged tiles can be an economical choice as well. The rubber flooring materials, usually because of the textured surface is not suitable for children's rooms for containing dust and dirt.

Cork floor tiles can be installed on the ceiling and the wall, suitable for sound insulation, available in different thickness and density of a polished material. Little infants may harm the cork floor tiles by damaging them, so it is better to choose a tile with hard polish.

Wood flooring, by failing to provide temperature to the room and aesthetic, lack of sound absorbing, also unsuccessful to provide comfort floor to sit for families, is not much of a choice. Laminate or engineered wood flooring are very popular because they are more economical than solid wood flooring. Massive and laminated wood flooring must be polished to increase their resistance to stains. In the one part of the room, anti-allergic wool carpet can be used to control the sound.

For rug-typed floorings; one of the environmental factors, the effects of synthetic floorings, fibers, rubbers on health are more important than production energy within the scope of sustainability. Apart from wool flooring material, which is a natural material, all other flooring materials are in bad condition in terms of both production energy and other sustainability criteria. Rug-typed floorings do not have many good values, but on the other hand, building materials shown as plain floorings (except PVC) have quite good values, in terms of sustainability and production energy and during the production and usage processes. In addition, some kinds of tiles can be produced at the rate of %70, and that is also decreases the production energy even more.

The elements used for furniting and interior design has multiple area of utilization rather than their traditional roles. In their acoustic usage, they decrease the sound and noise that occured because of the residence; they amost remove the impact sound. Especially the low frequencies are highly absorbed by them, also they are inclined to deflexion, that is why they are applied at short intervals. It is possible to use them as they are freely hanging or stretched framed. Organic wood and textile-based materials as well as floating floors of glass wool and stone wool is used. (MEGEP, 2008)

Paints have a highly important place in terms of its effects on human health. Most of them contain aromatic solvent, lead and asbestos, and cause vast amount of poisonous gas emission for a while after they applied. After the paint dries, this emission gradually decreases. In recent years, the European paint industry has emphasized on human health and imposed legal restrictions for production of aromatic solvent-free and unleaded paints. Paints do not contain aromatic solvent,

lead and asbestos; water based types and paints cleanable with water should be preferred (Esin, 2004).

(Volatile Organic Compounds – VOC) is one of the most important factors that should be considered while studying paints and lacquers. Water-based paints are one of the most preferred paints at the present time. Contrary to what is believed because of its name, water-based paints are not quite environmentalist materials. Even though it is secure for users because it releases low level of VOC; during the production lots of chemical process is needed in order to use water, and that increases the released toxic level. To this material, there is an alternative plant-based raw material usage that we can also call it organic-based. They are less harmful to the environment than petroleum-based products. Still, they release VOC and are quite expensive than the other products.

Synthetic – Solvent Based; petroleum-based chemicals are obtained by processing the raw material (crude oil or gas) through quite high-energy processes and obtaining intended material. Petrol is the primary raw material for the petrochemicals. Petrochemicals constitute %7 of the petrol consumption around the world.

Organic-based; solvents are used in the solvent based organic-based paints, however used solvents are not petroleum-based but they are plant-based. We can mention naptha gum made by balsa tree oil and oil made by citrus fruits' peel as typical solvents. Also we can example flaxseed from drying oils. Released waste from their production can be degraded biologically. Their production energy is really low compared to synthetic solvent-based products.

Increasing Source Efficiency; plaster construction products, as long as paint and additive agents not used, can be recycled substantially. Recycled paper should be used as surface plating in plaster panels.

At the present time, none of the high-pressure laminate producers use recycled components considerably. Such products should not only be considered in terms of components but also source efficiency during the production.

Using local raw materials for earthenware products provides source efficiency. Using components such as broken glass or ballast can produce some ceramic products. With the application of developed nano-technology in material area, it is possible to clean large surfaces with using a small amount of paint at the present time.

This, while providing source efficiency, also causes less negative effects on human health.

Health and Pollution Problem; plaster products single-handedly have no negative effects on human health. However, effects of paper coverings and adhesives used on their surfaces should be considered. Besides, plaster surfaces have great advantages in terms of aspirating pollutants.

Emissions caused by the produced dust and used adhesives during the application of laminate and wood products; affect human health in a negative way. For this reason, necessary precautions should be taken during the application. Acrylic adhesives used for earthenware products and developed cement mortars are the safest ones for human health. In applications where resilient joint fillers desired, low solvent component products should be preferred. Cement and cellulose based joint fillers have low emission value, and safe for human health.

Only the joint filler materials containing epoxy as additive have noxious components. Both resilient floor coverings and products used for their maintenance –repair cause poisonous gas emission (Arslan, Gönenç, 2007).

Sustainable Material Options for Windows and Doors Woodwork:

1st Option: Wood

2nd Option: Galvanized metal

Not preferable: Tropical trees

Sustainable Material Options for Wall Paints:

1st Option: Water-based natural paint

2nd Option: Water-based acrylic paint

3rd Option: Madder

Not preferable: Alkalic paint (Produced by mixing methane, ethane and propane.)

Sustainable Material Options for Wall Coverings:

1st Option: Paper

Not preferable: Vinyl wallpaper

Sustainable Material Options for Bath, Kitchen and Restroom Floors:

1st Option: Terrazzo (Clay based surface plating).

2nd Option: Ceramic

Not preferable: Plastic based plating

Sustainable Material Options for Kitchen & Bath Cupboards and Countertops:

1st Option: Wood

2nd Option: Chipboard, plywood

Not preferable: Plastic based plating, tropical trees

Sustainable Material Options for Furniture and Fittings:

1st Option: Wood

2nd Option: Chipboard, plywood

Not preferable: Tropical trees

Sustainable Material Options for Furniture and Fittings' Upholsters:

1st Option: Cotton based fabrics

Not preferable: Nylon based fabrics

Sustainable Material Options for Floor &Wall Coverings' Natural and Synthetic Stones:

1st Option: Natural stones

2nd Option: Ceramic

3rd Option: Synthetic stones

Not preferable: Plastic based plating

Sustainable Material Options for Living Quarters' Floor Coverings: (Such as Drawing Room, Living Room, and Bedroom etc.):

1st Option: Wood parquet

2nd Option: Laminate parquet

Not preferable: Plastic based laminate coverings, pvc coating

In this research, preferable materials for interiors in sustainable building design was researched and explained with given examples.

3. SUSTAINABILITY IN SCHOOL BUILDINGS

3.1. Kindergarten Education

We can describe the kuindergarten education from birth to compulsory education where kids get physical, emotional, language, social and mental improvements, positive behaviors, creative sides and self confident with considering their physical improvement, individual differences and skills. (Zenbat: 1998:10,12)

- Kindergarten education between 0- 72 months is considered as early childhood education in Turkey (Gurkan, 2009)

- Systematic, organized and planned all kind of education for 0- 6 ages is considered as kindergarten education. It's all together the things you do for kids to live, grow, improve and maintain (Ural, Ramazan, 2007)

- It's educational system where 0 – 72 months children is taught cultural values of the community, improving and controlling emotions and creativity, gaining self confident and self control (Yilmaz, 2003).

The building features of these educational institutions should be built according to kids' improvements, attention and health; thus kindergarten demand increases. In this point educational buildings become tool; architecture, engineering, child development, education and psychology have to work side by side (Gules, 2013).

The first thing has to be considered before building kindergarten educational buildings are designing for kids. This design should make kids move easily and be single floor buildings where it's safe for kids (Gur, 2000, Baran, Yilmaz and Yildirim 2007). Kid's improvement features should be well considered. Kindergarten students are willing, mobile and curious that wants to learn by

living; so the buildings have to be designed according to that (Demiriz 2003). Goelman evaluated the quality of kindergartens on his study. The data received from "Instructor interaction scale, Educational environment evaluation scale for newborn to walking age babies, Educational environment evaluation scale" show that distance from the center affects the quality and this kindergarten has average level quality according to the study.

When the land is chosen this features should be considered to have unevenness and cliff, landslides, humidity and moisture of the land and the area for designing the building efficient for kids. When the buildings are in standard to meet kids' improvements and individual needs; kids will feel them safe and they will have the opportunity to improve their social and academic skills. (Özkubat, 2013: 58-66)

The brain of a 3 years old kid works 2,5 times more and 2 times faster till 6 years old compare to a professor (Rethinking the brain 1997). According to the international studies and tests show that pre-schooled kids have better change of success compare to other kids and they learn how to read and write faster. Their IQ level 5 point higher at 12, %90- 100 success on skill test at 15 years old. %65 complete the high school and %45 go to university and complete it. When they become adult, they have better communication with world and they become social people.

There couple important elements on kindergarten interior designs such as; doors, windows, floor, heating and cooling. Another important issue on interior design is supplying demanded materials. Before planning programs, the wins and loses have to be considered; in this point, should not forget the high role of educators on class orders (Henniger, 2005).

We can list some features that kindergartens should have:

- Let kid move freely
- Protect kid from accident

- The events should be implement easily
- Individuals and groups activities should be supported
- Be esthetic
- Heating, lightening, air conditioning and cleaning should be healthy (Ozdemir 2007)

The idea of preschool education emerged with the first studies in child development. The first to study on child development were medical doctors and social reformers. (Başal 2007: 182)

Jean Jacques Rousseau (1712-1778) who see the first years of lifts as a critical period effecting individual development advocates freedom in physical activities provided to the child, and he puts forward learning by doing methods through various equipment's as a basic function of education. For the reason that he was thinking that harsh attitudes towards. Children during education disturb inner tendency and talent of children; in contrast, he was thinking that it was necessary to improve developmental power within the child in a free environment. (Başal, 2007: 190)

Johann Pestalozzi's observation on his own child, 1774, has been accepted as the first scientific record on child development. (Yavuzer, 1990:214). Friedrich Wilhelm Froebel is a German educator who believes in the importance of preschool education. Froebel named the first preschool in Germany as "Kindergarten", 1840 (Figure 3.1) (Oğuzkan and Oral, 1983:120)

Figure 3.1: Kindergarden

(Morel, J. C., Mesbah, A., Oggero, M., Walker, P., 2001 "Building Houses with Local Materials: Means to Drastically Reduce the Environmental Impact of Construction." Building and Environment, Vol. 36, pp. 1119 – 1126).

Carl Schuz, a student of Froebel, designed the first preschool in America in 1855. (Figure 3.2)

Figure 3.2: The first preschool in America (Kantarcıoğlu, 1984:84)

- Maria Montessori who had a great deal of contribution to the field of child education took care of mentally retarded children and claimed that she could gain greater positive effects applying the same methods to normal children. She started the first preschool in Rome in 1907. (Başal, 2007: 153)

- After Froebel and Montessori, the other countries also opened pre schools. Margret McMillan and her sister Rachel in London opened the first nursery school in 1908.

- McMillan and his siblings' studies affected the USA and English style preschools were built in cities like Boston and Detroit in 1920s.

- In their studies, carried between 1920 and 1930, in Yale University in America, Arnold Gesell and his friends underlined the development stages of physical development and motor skills of children. (Oğuzkan and Oral, 1983)

- "Experimental Learning" psychologist Thorndike, the founder of "Behaviouristic Method" Watson, and the owner of "Conditioned Response Method" Pavlov can be mentioned between specialists who contributed to child psychology in the 20th century. (1990: 97)

How preschool education differs in developed countries is as follows:

The main aim of schools in Germany is to help the child develop as a responsible member of the society. Preschool institutions have to carry out programs and provide services in accordance with needs of children and their families. In different regions in Germany there are various types of institutions that provide preschool education. They can be listed as follows:

- Day Nurseries which educate 0-3 old children

- Kindergardens which educate 3-6 old children

- Extended Age Centers, which educate 4 months – 6 years old children. These schools were seen as a pilot study of full-day institutions, which accept 0-12 old children.

- Pre schools which are for primary school aimed 5 years olds

- Family Care Centers which educate 0-3 old children (Oktay, 1999)

In France children have to attend 1-2 year preschool education before they start primary school. Those schools, called Ecole Metnelle, are supported by the Ministry of Education and have been active since 1885. Almost 100% of 5 olds benefit of Kindergarten education in France. The major aim of preschool education in France is not only to help children who have working mothers and live in insufficient conditions but also identify and cure children with special needs. (Oktay, 1999: 184)

Spanish education system adopted preschool education according to the general movement in preschool education in 1970. The aim of preschool education is to develop child personality in harmony. This optional education is realized in two steps:

- Kindergarden: 2-3 olds

- Nursery School: 4-5 olds

Many different types of institutions are responsible of preschool education in Spain. Among those are the Ministry of Education, the Ministry of Labor, the National Social Welfare Institute, municipalities, private organizations and other private institutions. According to the general education movement all the schools have to obey the same principles. A new preschool program, suitable with the reform principles formed for primary school first circuit, was generated on 17 February 1981. The main principles of the program are:

- The holistic feature of education

- Identification of the major standards

- Formation of the topics, study areas, main standards and activities.

In order to guide the reforms to be made in preschool education, universities in Spain organized an International Congress on Early Childhood Education with

the cooperation and contributions of educators from different counties. The overall aim of those studies was both to spread preschool education and to rise quality and reach standards throughout the country. (Oktay, 1999: 181)

Italian education system consists of three-staged structure:

- State – school organization
- Regional vocational training organization
- Institutions parallel to state – school organization and regional vocational training organization

While the Ministry of Education has the general responsibility of preschool institutions, in practice school management is assigned to the local education governments. Kindergartens in Italy are responsible of 3-6 old children.

The present institutions can be listed as follows;

- Private kindergardens related to the church
- Private kindergardens
- Official kindergardens of municipalities
- Official State Kindergardens

Kindergarten education is thought of as a public service provided to all Italian citizen by the state and is realized 40% in public schools; the state, private sector, the church and municipalities all cooperate. It is protected by law that those schools, when asked, have to be supplied by the local authorities in all residency areas except for small residential units.

According to the 1982 statics 87.2% of Italian children who are over three and are not to attend school compulsory go tokindergarten. An act put into effect

in 1968 essentially contributed to the development of preschool education. Through the act, kindergarten education became a public service for all children of Italian citizens. Moreover, the law grounded on personality development and helping children get ready for primary school education during their kindergarten experience. It is expected that preschool education institutions support parent education, and also support them balance social instability and negativeness in education. All institutions, either private or state, have to follow the practice.

Although there is not a specified formal program for kindergartens, the educational principles are framed. Especially in Rome, a program called Montessori and designed for families who lack of the needed requirements is used widely in the private sector. However, when compared with the other countries, the system is more teacher-centered and structured. Additionally, the public welcomes childcare programs started from infancy.

- When examined, today there are two educational programs in Italy to draw attention:

- Schools which look after children whose mothers are at work

- Schools which give importance to the most modern ideas and when compared with any school in Europe supply the best education (Oktay, 1999: 193)

3.2. Essential Principles Designs for Sustainable School Building

Sustainability awareness was started to become more important after 1990. United Nations stated that sustainability on engineering and architecture is the most important issue that they should discuss. In this matter, the dimensions that should be considered for the design practice;

- Efficient usage of sources (minimum energy usage on building materials from production to usage)

- Energy- efficient building system
- Renewable energy usage
- Using grey water and saving water
- Protecting and maintaining the natural environment
- Flood control
- Using recycled, non-toxic, unused and local material
- Creating healthy indoor environment
- Resistance and durability on design and material
- Flexibility on building usage
- Having access to alternative transportation options (Yudelson 2007)

It can be look at the principles as a whole including of decision-making process for designing cities and production of building materials. Although, in this study sustainable design is considered only school building design and the study's frame is determined. Benefiting from daylight, heating, cooling, air conditioning, wing power, saving water and material selection were researched for the sustainable school building designs. (Ali Yurdum Orbak, Uludağ Üniversitesi Mühendislik Fakültesi Dergisi, Cilt 20, Sayı 1, 2015)

Daylight usage; Benefiting from the daylight is very important regarding to their physiological and mental improvement in schools (Murphy and Thorne 2010). The most effective element in school to learn is daylight.

Daylight is got in the building by windows, top lights, light shelf and such. The mobile panels can increase daylight. We can control the reflection with curtains and shutter. We have to consider the interior heat to choose the

component on interior or exterior surface. We can decrease the powerful sunlight problems with adjustable shutters, although we have to reduce the sun light. (Olds, Holiday 2010, Walden 2009)

It's very important to benefit from sunlight for decreasing the energy usage. Sun based energy systems (photovoltaic) are enough by themselves (Prakash and Fielding 2007).

The positive impact of daylight in living and working environments cannot be denied. Besides increasing the productivity; the most important benefit of utilizing daylight for lighting is saving the electric energy that would otherwise be used in artificial lighting.

In a research on various types of building structures, held by a lighting company in California, showed that lighting is proportionally the most important reason of energy expenditure; and it is remarked that the natural lighting using daylight regarding energy save is of major importance. (Tönük, 2007)

Daylight had been the only available source of light for centuries, and benefiting from daylight had played a principle role in decision-making processes during architectural and interior architectural design. Receiving adequate amount of daylight to areas and volumes and providing an appropriate distribution of daylight had been among the leading principles while forming structures. Although architects were more liberated in this respect as a result of the development of artificial lighting, conscious consumption of energy resources is a requirement today. Consequently, effective usage of daylight and solutions toward decreasing the consumption of energy used for lighting has become one of the most important issues of modern day architecture; especially regarding warming and cooling loads of the buildings.

To decrease the energy used by artificial lighting in structures, the first thing to do is limiting the time that the artificial lighting would be in circulation, by developing solutions toward effective usage of daylight. It is possible to substantially decrease the luminous energy consumption by reducing the usage of

artificial lighting during daytime, without compromising visual comfort conditions, specifically in functional buildings that are utilized all day long, such as offices and schools. A design providing effective use of daylight depends on the decisions to be taken on buildings, volume, construction elements, and materials; starting with habitation scale. (Yener Güvenkaya, 2005)

Designing natural lighting systems to be horoughly scrutinized and discussed with its principles and methods under the topic "Effective usage of daylight and energy-efficient lighting in sustainable residence design."

Lighting is a necessary light application in order to see ambiance and objects (İncir, 2008). Not preventing the sight and perceiving the real view is possible with proper use of lighting. Therefore, qualities of ambient to be light up, for what purpose it is used, which level and color are needed in these ambient, ambient conditions, features of the objects in these ambient (e.g. reflecting or absorbing the light) and especially whether there are any objects to be light up or not should be considered (Yaman, 2007).

Makes us feel secure by allowing seeing the presence in the ambient;

- Lightings can demand users' aesthetics; improves morale, reduces fatigue and makes a sense of comfort.
- Well-lit environments do not cause eyestrain; it improves eyesight and protects eye health.
- Accidents such as falling, crashing, breaking etc. that have negative effects on users' safety comfort, becomes less likely to occur.
- Lighting compatible with the objects wanted to show in decorative sense, gives meaning to view and allows easier perception to users.

- Situations such as loss of vision and motivation or eyestrain caused by inconvenient lighting are prevented by proper lighting (Yaman, 2007 and Güler, 2005).

Environment's physical qualities and user requirements should be considered while providing indoor illuminance. Using natural and artificial lightings together make comfort to users. Human eye can adapt to illuminance changes, however illuminance changes may cause loss of adapting ability and adapting difficulties, thereby prevent making visual comfort. While going between places, illuminance changes will occur. Therefore, lighting transition must be done controllably and prevent being dazzled and dark shadow formation.

Natural variables and artificial environment design variables have a role in natural lighting system designs. Natural variables are changing variables, depending on outdoor illuminance and the field that structures' positioned in, and architects and interior architects can accept them as data during the design process. They also change depending on visual variables that are variant during the day and the year such as; outdoors illuminance, climate, geographical position and haze in the atmosphere. Artificial variables are relative variables to the volume of the structure, indoor sizes, surface voids, structures components and materials (Bulhaz, 2010).

Taking sunlight into environment in the way to provide indoor visual comfort conditions is depending on structure's shape, its direction to benefit from sunlight, size and type of recesses and protrusions on the surface (Bulhaz, 2010). Indoor illuminance changes depending on skew or flat surfaces. When the lux evenly reduced on the skewed parts, more lighting will be provided. In situations when the illuminance is not enough, such as J, K, L and M, reflecting surfaces (e.g. light tube, optical collector and spreading systems) should be installed, thereby it will facilitate the light enters to the structure at a sufficient level.

Sunlight entering from windows into the environments directly, change depending on the days, hours and the direction of the windows. For intended use of the environment, taking the sunlight in is an important situation in order to

make natural lighting comfort. In the case of low light conduction, light shelves installed to inner and outer surfaces of the windows will allow conducting natural light deeper. Light shelves change depending on roof height, reflecting multipliers of surfaces and so on. Usually, they are installed to south surfaces. Besides, with the use of specular core systems, prismatic panels, anidolic roofs and light guide systems, conduction of natural light is provided naturally to places where there are no window openings. When natural lighting is too high; solar control systems such as, collapsible blinds in structure shell, smart windows and shading may be needed to design. Also, solar control systems can transmit light surplus to necessary places of the structure when it's needed.

It's very essential to get maximum benefit from natural sunlight according to sustainability scope. Additionally, we have to consider the energy consumption and eye health while choosing the enlightening components. Compact fluorescent lights use up to %75-80 percent less energy and they have 8 to 10 times lifespan; that's why it's suggested to use (Holiday 2010). New fluorescent lights give warmer colors instead of cold blue color as used to be, heat up fast and enlighten the room very fast. LED (Light Emitting Diodes) is not enough to enlighten the whole place, although it's very efficient to use in small places (Anderson 2008).

Energy Efficient Lighting Systems; in the process of designing the buildings providing energy-efficient lighting, the values of natural variables should first be determined. Correspondingly, most appropriate values of artificial environmental design variables should be determined, considering the function of the structure. For this reason, to provide visual comfort conditions suitable to the function of the structure, an artificial lighting system with high energy-efficiency should be designed. It is possible for this system to minimize the daylight energy consumption without compromising visual comfort conditions. (Yener Güvenkaya, 2005)

Innovative and advanced daylight strategies and systems would decrease the electric consumption in structures considerably, all the while increasing the

interior's quality of light substantially. As approaches in which developed systems and structural design coalesce become more and more common; visual and ergonomic necessities in artificial environment are fulfilled, while thermal and energy requirements (thermal comfort and energy behavior) are met. The usage of renewable energy (daylight) would also increase, and in parallel with all these factors, environmental quality and quality of life would increase significantly. We can divide the daylight systems to three categories: (Energy Technology, 1997):

- Elements transmitting daylight: Light shelves that steer and distribute the daylight into the internal area of the structure; reflective ceilings; and light tunnels, tubes, or pipes can be counted in this group.
- Translucent elements: These are the elements that allow the daylight pass through a room or a part of a structure to another. Windows, roof lights, and sunroofs are among these elements.
- Control elements: These elements are specially designed to control the light reflected on themselves, and therefore control its transmittance. Reflective or semi-permeable coatings, shading tools etc. are among these elements.

New sustainable implementations are improved day by day for providing the thermal comfort. It's essential to use sun, wind, small hydroelectric sources and geothermal heat of earth for renewable energy. The important matter on the design is minimizing the general energy demand with passive systems (Yudelson 2007). Minimizing the building exterior, optimizing the connections (orientation, infrastructure, layout and microclimate), choosing the less wasteful materials and minimizing the heat requirements are considered in passive systems (Halliday 2010). The importance of passive heating and cooling will increase in close future with the study of architecture, engineering and ecologic planning (Walden 2009). These passive systems that use the earth heat are geothermal implementations. Buildings use the air condition that connected to the earth to preheat and precool in this system. It's suggested to use this geothermal system in summer and winter to cool and heat the building.

It is also stated that the tendency in recent years is installing the non heating systems as a further step at a level of application of passive standards. Supporting this seeking, even in Northern Europe can described as a surprising situation, in terms of validity of the subject. In Germany, these kinds of applications defined as "Energieplus" and "Minergie" standards. Many structures were built according to "Minergie" standards. In structures built according to "Energieplus" and "Minergie" standards, it is absolutely necessary to provide a very good level of insulation, airtight construction (was tested with pressure testing), ventilation controlled sufficiently. It is attached vital importance to ventilation; also it is possible to use roof ventilation when necessary.

For taking advantage of daylight passively, settlement decisions are also matters. Usage level of the structure and the effect of body temperature on ambient temperature are considered in these structures' design. For instance, "The Weetabix School" carried out by Gaia Architects in this conception, students presumed as main heat sources, and thereby using additional heat source found unnecessary (Halliday 2010).

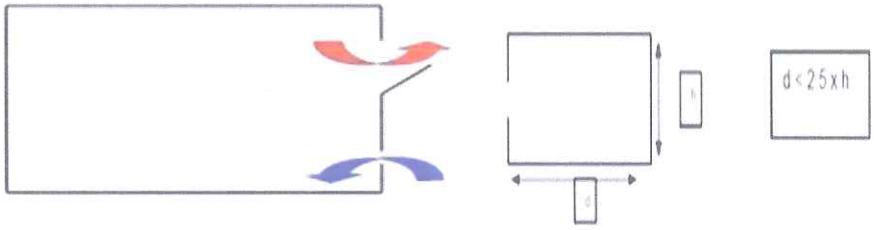
We can give couple examples that use heating and cooling canal system in educational buildings. Optimum heat temperature air flows to school building with air canals according to the weather without using any mechanical technology. We can give example Borhaug Kindergarten, which provide healthy interior climate, designed by Gaia Architects. Here, the architect uses preheat canal air conditioning and isolation dynamic flooring; this microclimatic design allows them to reduce the energy demand. The air passed in from the roof through the perforated floor reach the interior of the building. There non-toxic natural materials used in the building, also two layer wall use to let the air in and out easily to prevent humidity. The same firm made similar project Vnse School in 2003, where the hot air flow in winter and cold air flow in summer. Additionally, low energy heating is used on floor, humidity controlling hygroscopic materials is provided, wood surfaces and open humidity paint is applied (Halliday 2010).

Ideal temperature for kindergarten group room is 20-22 C (68-72 F). Although, it's essential to have adjustable for activities and daylight (OLDS 2001).

We have to see air conditioning as a tool to provide energy efficiency and comfort (Prakash and Fielding 2007, Halliday 2010, Walden 2009). In this context, controllable passive air conditioning system can be designed where integrated to the window or roof. If inside of the building doesn't have air circulation, unhealthy things will arise. So air conditioning provide to keep the volatile organic composites, carbon dioxide and other gas in one level. Carbon dioxide decreases the concentration of students; so insufficient oxygen lowers the students' performance and cause exhaustion and laziness at the end of the day. (Murphy and Thorne 2010)

Necessary criteria are defined for appraising natural ventilation in school structures. For instance, the standards defined for schools about ventilation in England categorized as; general strategies, one spacing for one surface, two spacing in bottom and top elevations on one surface, opposing ventilations and opposing ventilations on different heights, chimney effect, chimney effect created through corridor/atrium to a few classrooms and spacing used in roof. In the same report, in addition to technical calculations, main design rules are defined. In this study, it is indicated that when an opposing method preferred, depth of classroom can be designed at most 5 times of room height; when one surface used, depth of classroom can be designed 2.5 times of room height. Regarding to spacing sizes, it is also expressed that when ventilation is used on one surface in the summer months, it is mandatory to leave spacing at the size of at least %5 of the floor area; when opposing ventilations are used, %1 of each surface and %2 of the floor area in total must be leaved as spacing (Figure 3.3).

One-surface ventilation and rates



Opposing ventilation and rates

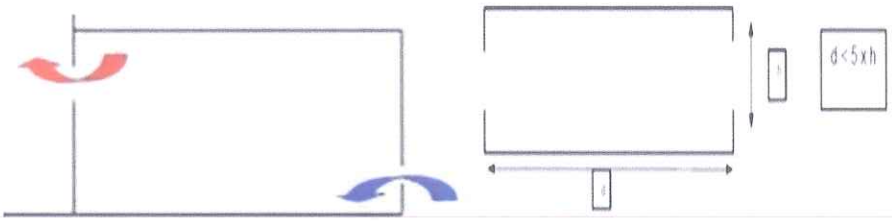


Figure 3.3: Different methods and ideal rate limits

(https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/276711/Building).

It is blatant that the ever-increasing population density over the world, consumption of resources, and the environmental pollution has detrimental effects on the ecology of our planet. The significant decrease in the flow of natural resources endangers the humankind and the other livings in nature. Considering that the natural resources are rather predominantly consumed by construction sector, but not by motor vehicles as presupposed, the importance of sustainable development and sustainable architecture to the future generations becomes clearer. It is also clear that regarding the dimensions of resource usage in structures, high-rise buildings come into prominence. Resource usage in high-rise buildings, during processes of either construction or usage, shows increase compared to low and medium height buildings. The areas within which this increase is concentrated are the vertical circulation vehicles, which offer technological challenges during their design and production, and façade systems.

Germany, a member of the European Union, succeeded in overcoming these challenges thanks to its technologic and financial capabilities. For this reason, high-rise buildings gained prominence in German construction industry compared to the construction industries of other European countries. (lead-edge, 2006)

Natural ventilation is defined as the circulation of fresh air from outside to inside, while the same amount of used air is expelled from inside to outside, by air motion which is generated by shifts in temperature. This method is used commonly in countries with moderate climatic conditions. However, in areas where harsh climate prevails and therefore heat gain and heat conservation is important, it is necessary to used advanced ventilation systems. Such system consumes only a small amount of energy, and provides quite efficient ventilation while producing noise at low rates.

Traditionally, the necessity of ventilation is achieved purely naturally only when an air draught created by shifts in temperature is provided. In mild climates, the design is made with regard to the opening of windows and the natural permeability of the crust of the structure.

In regions with cold climates, a design of natural ventilation systems requires complex calculations with mechanical ventilation systems. In other climates, the benefit-cost relationship that the natural ventilation is expected to provide should be carefully examined. (Schittich, 2006)

Natural ventilation is a notion that should be approached in its entirety regarding structures. It is based on the principles of air stream, for the purpose of ventilation and cooling. The goal is to control the conditioning of fresh air, while the air composes a permeable structure crust. Buildings with natural ventilation, open spaces that make air conditioning easier, and openable windows contain air inlets and outlets. For this reason, atriums, well holes, ventilation pipes, and small fans render the design easier. Natural ventilation might be necessary for the following reasons: Providing comfortable circumstances in hot and humid climates, providing the necessary amount of oxygen for human health, keeping

pollution rates in acceptable levels, providing consumer satisfaction, reducing or removing mechanical ventilation, and therefore providing energy save.

The chief disadvantage of natural ventilation is, in case the draught cannot be kept under control on acceptable levels, that it causes excessive heat losses. With an efficient design, the air stream can be kept under control by standard procedure, can be blocked when necessary, and can limit the amount of fresh air to be received in a way without harm to human health. While the natural ventilation system of a building is being designed, two different design strategies should be considered for summer and winter months. In winter, small amounts of fresh air should be permitted to flow inside. (5–8 l/s) In summer, on the other hand, for the sake of an effective cooling, an adequate amount of fresh air is required to flow inside. In some design buildings, to provide adequate cooling and sufficient flow of fresh air from outside to inside, mechanical systems could be used as auxiliary systems. (Yeang, 1997).

It can be use the wind power either direct or building integrated energy source. After reaching the average wind speed, the system can be applied independent or roof integrated. We can connect the wind power to directly electric network or to small batteries that we can use as electric or heating (Anderson 2008). As we mentioned before, sustainable designs becomes example for the society. Small wind power applications are very effective example for the society. Yudelson (2007), as a counter idea, Paul Gipe worldly famous wind power specialist explains, building integrated wind power doesn't work so well; although small applications can help in three levels.

It's applicable to use wind turbines in schools and educational buildings for kids to gain sustainable energy conscious.

Expect to have water saving applications on sustainability matter. In this matter, stocking rainwater, using climate pools, using gray water on WC and such application can be used to not waste water. Also, there are designs such as slow flow closets, dry urinal and such designs. It's very important to have new concepts to teach kids about sustainability. For example, when you design storage

to store rainwater visible to kids, this application becomes the part of sustainable education (Gelfand and Freed 2010).

3.3. Sustainability in Education

Dora and Bertrand Russell foresaw in 1923 " If it is not to take a measure, industrialization will bring wealth to current generation, poverty to the next, and femine to the third." (Yapici, 2003: 178)

While examining sustainability in education, it is a must to mention about the first and most extensive study on sustainability "Agenda 21"

Agenda 21 is program which focuses on the importance of involvement of youth in environmental and developmental issues. The report focuses on two main programs, which involve youth and children respectively.

1-) The aim of the youth program is to provide and improvise contraptions so that youth are enabled to share opinion on governmental decisions including the application of Agenda 21, attempt to find solutions to unemployment and education problems, provide opportunities for youth to be represented effectively in all United Nations processes, and fight against violation of human rights of youth. Agenda 21 offers the following programs for sustainability in education;

a-) Improving primary education and rearranging the current education system; Focuses on how vital is teaching to improve sustainable development and man power in environmental issues.

b-) Social Understanding and Awareness; Focuses on rising public sensitivity to compliant behavior to sustainable development, and reinforcement of standard judgment as a crucial part of global education.

c-) Encouraging Education; Focuses on the effect of education on qualifying with the needed knowledge, and the importance it has in rising consciousness in environmental issues and development.

2-) Children and Sustainable Development; The aim of United Nations World Summit For Children 1990 was to maintain that children rights are protected, bettered, and not being ignored during the process of development of the participants.

According to the United Nations Population and Development Conference Action Plan education that enables all people, especially giving importance to females, to improve their potential, protects their honor, and develops human resources is a natural right. Education has to be designed to foster understanding in fundamental rights and liberty and cover issues related to population and development. The principle, which caretakers have to follow, is that they have to supply children need until it is enough; in other words, parents have the biggest responsibility (Marmara, 2006:102)

To sum up, sustainability in education is equal to equality of opportunities no matter what the religion, the language or the sex is. Moreover, it provides a qualified education, education for all, planning according to the need of human resources and placement of environmental issues in education to raise environmental consciousness. All the mentioned are vital for sustainability. (Kayihan, 2006:71)

3.3.1. Child-Place Relation

Studies made by Barker in 1968, Bechtel in 1977 and Wicker in 1979 most of the childre behaviors, identity, IQ, intelligence and characteristic features are determined by psychosocial environment and place (Gur and Zorlu, 2002).

Children grow up on natural or human made, traditional or modern, open or close places and effected by those places. Different children have the same characteristics that grow up the same places show that places affects the character.

The good designed architecture is not proved to teach all kids or make them all success. Although there is a belief that the place concept is significant for kids

(Dudek, 2007). We have to know psychosocial needs and place impressions to define the kid- place relation.

3.3.2. Sustainable design as an education tool

Recent studies where the environmental conditions are defined show that the importance of the sustainable design is underlined. There are principles on sustainable school designs such as usage of daylight, clean air and usage of more environmental friendly materials, so we believe to have healthier and creative environment.

We generally approach to the definition to a point of sustainable schools for saving water and energy, minimizing the waste, staying away for the polluters, protecting and supporting the natural life, using the sources efficiently and respecting participation of people (Murphy ve Thorne 2010).

The "Living Building Challenge" constitution is working to increase the life quality and consumer satisfaction with zero energy, using of rainwater, decreasing the toxicity of the materials (such as heavy metals, formaldehyde and etc), using certificated wood products, controllable window for fresh air and benefiting from daylight; these are the essential principle for sustainable buildings and one of the most important issue is to educate the public (Yudelson 2007). In this matter, it has high potential to have sustainable building to transfer the idea of sustainability to small kids. So we can put as an example to small kids how the sustainability work in school buildings. According to Prakash and Fielding (2007), it's a perfect educational tool to have design, architecture, engineering, building, environmental science, environmental friendly, sustainable and dynamic model.

Energy efficient systems in schools support kids to learn about environmental friendly and energy saving (Prakash and Fielding 2007). Also we can create the school like a museum with leaving heating, cooling and air condition systems out for the kids to observe (Taylor 2009). Prakash and Fielding (2007), instead of hiding the photovoltaic panels, we can put it somewhere that

can be seen so the kids will be more aware of energy efficient systems and will help to track the system.

Day (2007) explains, most of the schools has one personal in charge of heating and cooling, they are using electric lights all day and the kids have no idea how the climate changes work and change the lights in the building. According to him, kids have to take responsibility on energy usage in their class. For example, kids should learn how to keep the shutter and curtains close on winter nights, open the air condition on summer, close them in the morning and adjust all according to the light and shadow. Kullerbyttan Day Nursery gave the responsibility of the lights controls in empty classroom to give them energy awareness. Kids adjust the light in the rooms with reflectors and closers. In this matter, he believes that the kids will know the energy of sun (Day 2007).

According to Murphy and Thorne (2010), schools have to warn community about sustainability other than education. Schools should make a difference regarding to sustainability and support them to learn on this subject according to the view of recycling and renewable energy. It's very important to give early education regarding to sustainability. In this matter, we can create sustainable world with the strategy of "education for sustainability, EFS" and early education (David 2010). The importance of having sustainable educational sources and

3.4. Child Playground and Sustainability Criteria

Child playground is one of the most important areas that can support sustainable philosophies. These places are the places where young generation spends their time and learns while playing. The kids who grow up in these kinds of places will use the possibilities smarter. These places allow kids to have natural environment and it will teach them to know the value of the environment and protect it. You can't teach kid anything without green places or equipment.

Also it's very important to have outside organizations, these can protect people from depression, rachitism, obesity, low muscle tone, low bone density, insufficient motor coordination, diabetes, heart diseases and early pass away. Outside playgrounds and the connection between inside and outside places expand the education in schools (especially kindergartens). Kids needs healthy outside places as much as inside places.

It's very important to increase the bio-variety with keeping long grass on some areas, leaving bat and bird cages, growing wild flowers and different kinds of plants.

If one playground has water element in it, it should be able to provide its own water and water sustainability has to be considered very carefully: How much water it's going to use? What will be water resource? Will it be recyclable? We have to make cost analysis before deciding; also the system complexity, maintenance and total expense have to be considered.

- You have to consider material features while designing landscape design such as playgrounds. You have also extra careful about checking the floor material is permeable or not.

- Energy usage and waste of enlightening has to be considered on enlightening design.

- We can teach kids clean energy with design playgrounds consist of wind, solar and renewable energy resources. For example, we can let kids to arrange sun panels on different angels and make an optical illusion.

You can decide to go with one concept because of positive effect on environment. For example, designs that collecting water and slowing down the water flow can be helpful to collect water and decrease the sewer operations.

Sustainability is not having negative effect on environment and creating something and using it forever. We should understand actual meaning of sustainability, not the meaning of painting everything to green. (http://www.spacesforchildren.com/,http://www.freeplaynetwork.org.uk/pubs/design-for-play.pdf)

4. EVALUATION OF SUSTAINABLE DESIGN CRITERIAS ACCORDING TO SUSTAINABLE SCHOOL BUILDINGS

4.1. Sustainable Design Criterias

It's effective to choose the right technology and material to reduce the energy demand, for example climate sensitive place solutions. Although as a designer, it's also very important convert these values to educational program and include them as educational tool.

Today, children spend most of their times inside formal or informal buildings. As the other factors, the building features affect the kids' health. That's why; it's getting more important to have sustainable educational buildings. Some European and America make laws to provide sustainable educational buildings. The buildings have to have some specification to get a certificate. These are sufficient sunlight, color choices, energy efficient design, better air quality, acoustic comfort, educational building tools, sharing the building opportunity with community, durability and easy to clean. The biggest reason that these issues matter the most is the users of the buildings are kids. With this result, sustainable design criteria I researched before, the criteria contained in kindergartens evaluated and determined after the outcome of this is a comparison table between sustainable kindergartens.

4.1.2 Economical Sustainable Design Criterias

Economic sustainability is composed of investment cost, and utilization cost. Apart from the fact that the production process, construction elements, and materials are low-cost; it is also important that they possess high durability and are reusable. Thus renovating and reusing the buildings achieve "the long-term efficiency of the source". A low utilization cost is achieved by the building's economic usage of energy and the easiness of its maintenance and operation. (Cole, 1999).

Economic sustainability, in its largest definition, is "the realization of the development aiming at ecological and social sustainability by appropriate financial resources and therefore becoming economically affordable." The researchers think that, with such a development process, the next generation will be relieved of greater financial liabilities. (Çahantimur, 2007).

Under the economic sustainability topic, factors such as the building forms, selection of materials, place, and building crust are examined

Building Form; one of the parameters of design that is effective in heating and air conditioning energy conservation is the form of the buildings. Building form can be identified through geometric variables concerning the building, such as shape (the proportion of the building's height to its depth on the plan), building height, roof type, its slope, or the slope of frontal surface. The proportion of the surface of the crust of the building, which limits the space and protects it from external factos, to the volume of the building plays an important role in energy save and energy loss. (Göksal ve Özbalta, 2002).

To conserve resources, interior space should be used as efficiently as possible; it should be as tiny as possible –but large enough to meet the needs–; and the structures should remain in small scales. This provides conservation of resources by using fewer materials during construction; and the necessary comfort conditions during the stage of usage is therefore achieved in smaller volumes, with less energy, and much more easily. (Tönük, 2001).

- Designing the aspect ratio according to climatic data
- Designing the structure by considering the catch of sun and wind, and sheltered areas
- Deciding the story height by considering the natural lighting
- Using different colors of polycarbonate sheets according to usage intensity of areas

Materials to be selected are; of importance in ecological architecture. In this context, selecting materials that are not harmful to the nature comes to mind. However at this point, as Horst Kleiner mentions, ecological design involves the critical point selection of materials that are respectful to the nature. The notion of critical point selection of natural materials and materials that are respectful to the nature emphasize the possibility of harmful effects to the limited natural resources while selecting natural materials. Herein the selection of artificial materials that are respectful to the nature gains importance. However, the situation in which artificial materials are respectful to the nature depends on a series of criteria. These criteria are as the following: Durable and low maintenance cost materials, materials during whose production little amount of energy was used, materials during whose production the least amount of elements harmful to the nature were used, nature-friendly materials that are to be used during construction, utilization, and the demolition of the buildings, and the materials which can be recycled and reused afyer the demolition of the building. (Tönük, 2001).

As a result of the literature review, factors that should be taken into consideration for sustainable preschool education buildings, with regard to natural lighting and natural ventilation, are as followings:

- Using durable materials
- Using material with low maintenance cost
- Using recyclable materials
- Using materials that are supplied from natural and local resources

- Supplying the wood from sustainable
- Using quickly renewable materials
- Using materials that can enhance the inner-space quality

Building envelope; is a major building element that separates the indoors from the outdoors, and it consists of all vertical and inclined building components. It is one of the most important variable in the control of the designer, regarding providing conservation of energy and climatic comfort. (Katırcı, 2002).

The optical and thermo-physical characteristics of the building envelope are the determinants of the quantity of heat gained and lost from a unit of area of the building envelope, with the help of external temperature and solar radiation. Internal climatic situation, artificial heating, and air conditioning loads differentiate according to the total quantity of heat gained and lost from the building envelope.

The design team, which includes architects as a part of construction design process, should put forward a form, which contains a building envelope that answers functional, structural, and aesthetic criteria. This envelope encloses various spaces in the building and provides controlled access to those spaces. The building envelope not only aims to protect the building from external factors, but it also aims to form a relationship with them. The sub-systems, which constitute the envelope, integrates thermal protection, structural support, protection from water and air and many other functions inside a single structure that is more economic. (Tönük, 2011; Kayıhan, 2006).

The building envelope, which bears importance with regard to controlling the climatic conditions, should primarily provide protection from rain, excessive heat, and excessive cold. In this context, the form of the envelope, and the characteristics of the transparent and opaque components that forms it gains importance with regard to decreasing heat losses, inspecting the internal temperature, benefiting the thermal mass, and preventing air leakage through heat and moisture bridges. (Ayeam, 1999).

As a result of the literature study, factors that should be taken into consideration for sustainable preschool education buildings, with regard to the building envelope, are as the following:

- Using heat insulting materials in building envelope
- Using the wide windows on sun-catching surfaces
- Prefering green rooftops
- Precautions of heat insulation on building surfaces and windows
- Green surface design

Transportation; determining the transportation axis in building settlements is in direct relation to organizing the axes of the parcels. Since organizing the transportation axes and the decisions to be taken while organizing would influence the other stages, this stage is the most important design element of the settlement.

Energy consumption and pollution generated by transportation usually amounts to more than all the remainder energy the school buildings consumed. The main purpose of sustainable transportation issue is to extend the alternative transportation options other than the usage of private motor vehicles, and therefore reducing the energy consumption and its environmental impacts to the minimum. (Akın, 2010)

Benefiting from the public transportation lines around the settlement is considered for planning a sustainable transportation. For this reason, it is important to choose land, on which the building is to be built, whose proximity to the public transportation lines. Encouraging the usage of public transportation and facilitating an easier transportation reduces the traffic circulation, and therefore reduces commotion and unwanted noise, and consequently minimizes the usage of parking lots. (Kayıhan, 2006).

As a result of the literature study, factors that should be taken into consideration for sustainable preschool education buildings, with regard to transportation, are as the following:

- Determining the transportation routes
- Priority of low emission vehicles for service
- Projects about alternative transportation and designing bicycle stands

4.1.3 Ecological Sustainable Design Criterias

Ecological sustainability includes economic usage of resources, preference of renewable energy sources, and protection of ecosystems. For this reason, under this topic, the following criteria are examined: Selecting habitation areas, water protection, energy and atmosphere, transportation, natural lighting, natural ventilation, and inter-structural distance. (Cole, 1999)

Ecological sustainability, in its most clear-cut and common definition, is "sustainability and protection of the natural wealth of the earth." Mitlin and Satterthwaite explain this natural wealth as the following:

- Limited stocks of non-renewable resources,
- Limited natural capacities of local and global ecosystems for dissolving and absorbing resoluble waste,
- Limited capacities of ecosystems for keeping renewable resources at sustainable levels. (Çahantimur, 2007)

It requires that the renewable material sources and natural systems should not be consumed at a faster rate than it is renewed; that the consumption rate of non-renewable sources should be lower than the rate of replacing them with renewable sources; and that the rate at which waste released to nature should be lower than the soil's rate of absorbing and re-processing this waste. When these requirements are met, the quality of air, water, and soil would be sustained at

necessary standards so that humans, animals, and plants can maintain their lives in a healthy way. (Çahantimur, 2007)

Selecting the area of habitation; the habitational configuration in preschool education buildings differentiates than the arrangements carried out in the context of sun protection or sunlight utilization. It is necessary to examine the design variables on habitational scale and the relationship between them. It is also necessary to select the effective climatic factors, and exert the climatic performance requirements.

It is beneficial for the designer to know which variables should be taken under control, and on which level the priorities and operative conditions in optimization of these variables in terms of climatic conditions belong. Design variables that can change the climatic effects on habitational scale are as the following: Physiographic variables, all of which are determined by water surface, topographic pattern of the habitational area, vegetation, latitudes, longitudes, and altitudes. Correspondingly, factors such as land usage, site selection, configuration of the habitational unit on which the building is founded, space between the buildings, the relationship between the dimensions of the buildings, variables regarding habitational configuration such as transportation axis, data regarding the buildings and the open areas between them can be determined. Therefore, it is necessary to investigate the design variables on habitational scale according to climatic factors. (Akın, 2010)

The first step of the construction activities is the selection and the analysis of the habitation site. While selecting the site, embracing the sustainability criteria is closely related with the success of the future stages. Selection of the habitational site, as far as the sustainable preschool education buildings are concerned, is the prerequisite for providing a healthy and safe living environment for the students – members of the next generation. (Tönük, 2011; Kayıhan, 2006).

The main goal in selection of sustainable land is protecting the users of the education building from external sources of pollution, and selecting lands

1) To which the users can reach securely

2) Which have no transportation problems

3) Which are in central locations

4) Which have the least potential to create harmful effects on green areas. (Kayıhan, 2006)

As a result of the literature work on sustainable preschool education buildings, the criteria that should be taken into consideration are as the following:

- Conservation of present land and proper design for land grade
- Using natural substances in the land as playground
- Adequate observation of human-vehicle movement by school authorities
- Optimization according to the climate
- Compatible design of the building with the land in which it is positioned

Water protectiom; in the past century, water usage increased more than six fold because of the exponential increase in population. 54% of precipitation that falls on land is consumed by humans; and according to the statistics, these buildings constitute 20% of this usage. (L.E.E.D., 2011).

Water is becoming more precious and its lack is increasing day by day. Therefore, it is highly important to decrease the water consumption of the buildings. The issue of controlling the rainwater is vital in the context of the security of the school areas, ecology, water resources on earth, and the natural habitats. In water protection, it is aimed to protect excess water from non-permeable layers, and the pollution created by accumulated rainwater. To accomplish this, rainwater management program should be performed. By performing the following methods, water consumption –which is a major problem in some regions– decreases and the structure becomes more ecologic:

- Recycling the waste water
- Reducing the usage of clean water for landscape watering
- Selection of plants with less need for water
- Storage and usage of rainwater
- Refinement and usage of grey water
- Using endemic plant species

Energy and Atmosphere; Conservation of energy and its efficient use is the first precondition of eco-sensitive design, because generation of electric energy greatly harms the nature. Not only because the spread of hydrocarbons, but also coal mining is creating serious pollution and thus have adverse effects on human health. Regardless of the method electricity is produced, it has a negative effect on nature.

In the context of eco-sensitive design, the following emerge as the principle issues: Keeping energy consumption at optimum levels, energy efficiency, utilizing higher technologies, usage of renewable energy sources instead of fossil fuels, and reducing consumption of gases harmful to ozone layer. (L.E.E.D., 2011).

The disadvantages of the usage of fossil fuels overwhelm its advantages. Fossil fuels had become prevalent with industrial revolution, and the CO^2 levels released to the atmosphere has increased dramatically. According to calculations, from 1850 until 1984, the CO^2 amount in the atmosphere increased at a rate of 25%. (Kışlalıoğlu ve Berkes, 2003).

Renewable energy sources, on the other hand, are able to be renewed within earth's natural cycle, and they are normally inexhaustible. The advantage of such sources regarding ecology and environment is that they can be used in the long term and they are relatively less harmful to the nature. (Berkeş ve Kışlalıoglu, 2003) Hydorelectric energy, hydrogen energy, geothermal energy, wind energy, and solar energy are primary types of renewable energy. It can be seen that the

ground heat and the tidal energy caused by the movements of the Moon have more energy value with less harmful effects to the environment than the other renewable energy sources. (Katırcı, 2003)

While seeking answers to the question on how architecture could contribute to a sustainable future; it can be said that an architectural pattern in which renewable energy sources rather than the non-renewable energy sources are used, considering that such an attitude is identical to preserving human, cultural, and natural resources of earth, is preferable. (Çimen, 2001).

As a result of the literature study, factors that should be taken into consideration for sustainable preschool education buildings, with regard to energy and atmosphere, are as the following:

- Natural ventilation
- Delivering energy from the sun by passive solar systems (winter gardens, etc.)
- Utilization of solar power
- Using photovoltaic

Furthermore daylight is one of the most important factors in the formation of interior environmental conditions. With regard to the notion of sustainability and the wise usage of energy within buildings, it is required to demonstrate the contribution of daylight to the energy activity. It is important to develop methods toward evaluating the contribution of daylight to the building as an energy.

In suggested reliable and effective methods; regional climatic conditions, shading, artificial lighting, the usage of control system, and the consumers' behavior toward these systems should be taken into consideration. (Kesten, 2009).

Natural lighting constitutes the keystone of a high-performance and sustainable design towards preschool education buildings. Natural lighting provides necessary lighting for discerning the environment and performing a job,

the natural rhythm that determines the cycles of days and seasons, our body systems, and the biological incentives that regulate the psychological state.

Natural lighting systems, when designed properly, greatly decrease the operating costs. In the first step, the need for electricity for lighting will reduce. Additionally, wasted heat that was created by the lighting system would decrease. Since natural lighting will provide the maximum necessity of lighting in daytime, when the education takes place, electric consumption would reduce to minimum levels.

In preschool education buildings, children spend their time mostly indoors. According to E.P.A. (Environmental Protection Agency) in the United States, indoors pollutants of a building is two to five times more in amount than the outdoors pollutants. Thus decay in the quality of air indoors would lead to short and long-term health conditions on children and personnel increase in the rate of absenteeism, and deterioration on plants. The chemical toxins and biological factors that constitute the indoor pollutants would cause short term and long-term health problems. Moreover, it does not affect each child in the education environment to the same extent. As a result of the literature study, factors that should be taken into consideration for sustainable preschool education buildings, with regard to natural lighting and natural ventilation, are as the following:

- Using skylights and sunroofs
- Space and environment organization in order to maximize the natural lighting
- Controllable ventilation system, by designing the window bays and opening directions
- Using light-colored
- Utilization of sunlight
- Well-designed passageways for utilization of sunlight
- Partitioning the building in thermal zones

- Informing the people about conservation of and natural resources
- Spiriting up the immediate vicinity with its user motion

4.1.4 Socio-Cultural Sustainable Design Criterias

Social and cultural sustainability, in its largest definition, is "providing protection and development of the social conditions that would support the environmental sustainability and that would meet the human necessities, and consequently providing the efficient usage of natural resources today and in the future by the future generations." (Çahantimur, 2007)

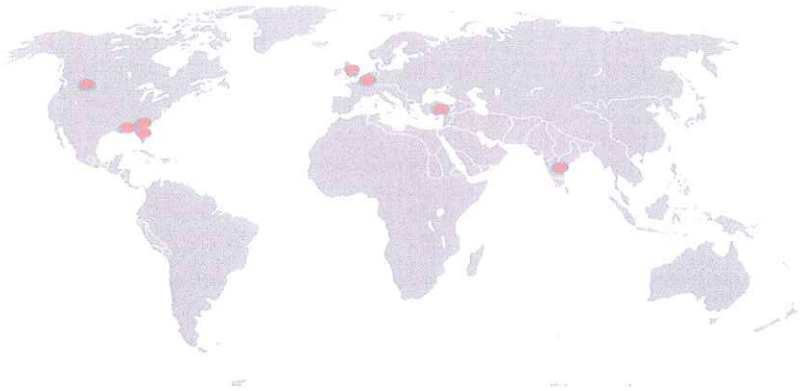
Redclift (1997) takes sustainability in the context of maintaining the relationships between individuals and the social foundations that conditions the natural, economic, and political environments. (Çahantimur, 2007)

According to Aydın and Okuyucu (2009), embraces the reusing and of old buildings within the scope of providing the the most efficient usage of the scarce sources and obtaining economic gains as a sustainable approach. Reusing the buildings provides the following advantages: Being economic, providing cultural and historical continuity, creating a labor-intensive process instead of energy, decreasing the energy consumption environmentally, and at the same time becoming an indicator of ecological approaches. Re-functioning the buildings, the contributions they provide to the area and the texture on which they stand, the contributions it provides to the society with regard to the necessity met by the function; should be taken into consideration from a socio-cultural perspective.

Re-functioning structures contributes to the publicity of a city, meanwhile creating dynamism to its environs through user mobility. As a result of the literature study, factors that should be taken into consideration for sustainable

kindergarten education buildings, with regard to the socio-cultural sustainability, are as the following:

- Compatible design of the building with the environment in which it is positioned
- Presence of a symbol near the building
- Informing the people about conservation of and natural resources
- Spiriting up the immediate vicinity with its user motion



4.2. Kingsmead school -Northwich, Cheshire, England/Craig White (White Design)

Kingsmead Primary School is one of the good examples to sustainable design to reduce the energy usage. The school was completed in 2004 and becomes very good example for the neighbor schools. 250 students capacity new school was building according to population rise. This project was result of sustainable Future Projects program of department for education and skills. School has curve corridor goes east to west. The classes are on north side and offices and hall is on south side. The classes on north receive enough light without extreme heat. Each class has winter garden according to their playground.

These tampon area that reduces the heat loss are used as storage and vegetation area. The main curve is created from sustainable source laminated wood. (Figure 4.1, 4.2) Outside walls are made by wood. Interior block walls keep the building warm in summer.

Figure 4.1 Kingsmead School

(http://www.fourthdoor.org/annular/?page_id=416,access date may 2015)

Figure 4.2 Kingsmead School

(http://www.fourthdoor.org/annular/?page_id=416, access date may 2015)

Non-carrier cement walls are perfect to give nice interior design. Roof is designed to collect the rainwater for wc.(Figure 4.3)

Figure 4.3. Kingsmead School

(http://www.fourthdoor.org/annular/?page_id=416 access date may 2015)

This application helps to save %30 percent water. %Solar energy panels provide 20 percent of the hot water demand. School has biomass boiler that made of old lumber. Architects try to use natural sun light on most of to places to save energy (Figure 4.4).

Figure 4.4. Kingsmead School

(http://www.fourthdoor.org/annular/?page_id=416, access date may 2015)

Call light switches put on places that only the teacher can turn on and of them. Electric lamps are connected to sunlight sensors to save some energy. Although

the energy analyze, after the building is used, is not found efficient. Photovoltaic panels only provide %6 electric instead of %15 and there are some operational problems on biomass boiler. Personal and students are very happy and proud of their school. The environmental feature of the school is used to teach kids about sustainability and even the school curriculum forces that. Electronic indicators show kids how the rain is collected and are used educational tool for math and geography classes. This data also use to calculate complicated problems such as average rain in a year. Although the problem is when no electricity, the system can't calculate the total water. There is clear evacuation pipe to show kids how the water is evacuated.
(http://archrecord.construction.com/schools/0701_CS6_benFranklin-1.asp)

4.3. Assisi St. Francis Academy-Liverpool, England/Richard Woods (Capita Percy Thomas)

This kind of academies are initiated by English government and supported by entrepreneurs. It provides high quality education with modern equipment. Each academy focuses on specific subject, supports academic excellence and public participation. Academies teach kids how to be good citizen, self-confident and personal responsibilities. They become the center the community and share events. They also support wide, supportive and innovative curriculums. Capita Percy Thomas (Capita Symonds) designed Assisi St. Francis School that focuses on protecting environment. (Figure 4.5) The school has 900 students capacity; it shows itself as educational source and target to show the best application for environmental application. This school was built on a poor area in Liverpool that one of its kind and supported by Anglican and Catholic churches.

Figure 4.5. Assisi St. Francis Academy

(http://www.liverpoolecho.co.uk/news/liverpool-news/liverpool-schoolgirl-attacked-two-women-3355177, access date march 2014)

St. Francis (solar power, collecting rainwater, storing heat and less cement walls, underground sport center with light tunnel, stonecrop roofs and roof gardens etc) is one of a kind sustainable school structure. The school building is 7.704 square meters in Newsham Park inside crowded buildings. That's why the school embodied underground. The building is in L shape with two blocks, one is two floor other side is two floors. The classes are in long block, which is looking to north, other part has specialized areas. Exterior wall siding is made of Duglas glass and bricks. The north side windows are made of copper. (Figure 4.6, Figure 4.7)

Figure 4.6. Assisi St. Francis Academy, Copper Window Frame Design

(http://www.liverpoolecho.co.uk/news/liverpool-news/liverpool-schoolgirl-attacked-two-women-3355177, access date march 2014)

Figure 4.7. Assisi St. Francis Academy, Half opaque roof is made of ETFE.

(http://webarchive.nationalarchives.gov.uk/20110118095356/http:/www.cabe.org.uk/case-studies/st-francis-of-assisi?photos=true&viewing=5567, access date march 2014)

Comparing to glass, ETFE is much lighter, more light reflection and %70 less cost. Sport center is underground and get light from the roof. The roof of second floor block is made of stonecrop (Figure 4.8) and the other roof is coated with sea shell and sand from Morecambe gulf (Figure 4.9). Electric is supplied from photovoltaic panels and hot water is supplied from solar panels. Undergrad water tanks can collect rainwater up to 5000 liter for WC usage. Each class has a board according to sustainable improvement concept. Also each class is responsible from their garden. Each year classes decide their theme for the year and organize it according to that. The harvest either is used by school or sold.

Figure 4.8. Assisi St. Francis Academy, Underground Sport Center and get light from the roof.

(http://www.fira-la.com/portfolio/st-francis-of-assisi-academy/, access date march 2014)

Figure 4.9. Assisi St. Francis Academy, Photovoltaic Panel

(http://asfaonline.org/, access date march 2014)

School is housing so much events, festivals and celebrations. The specialty of the academy is environment and sustainability. School is an educational source on a concept of providing customer satisfaction, helper to environmental education and pretty nice environmental design application. The center philosophy of this school is environment and the students use the building and environment to understand the nature according to curriculum. Building consists of natural air circulation, collecting rainwater and planting. Designers avoided using harmful materials. The school is designed to be sample of sustainability, the details on the building won them the BREEAM "excellency" reward. Also school won International School, Green Flag and Sustainability Reward in 2011. (www.aisch.org)

4.4. International American school-Chennai (Madras), India /Hillier Architecture

Hillier Architecture designed the American School (K-12) 550 student capacity according to sustainable design. Chennai is 10 degree north to equator and one of the biggest and hottest cities in the world. High temperature, electric shortage and monsoon rains cause significant natural occurrence. This design directly is looking answer for inclining to sun, smart usage of air conditioning, maintainable landscape and rainwater collectors. The school is in 22 thousand square meters, top closed and covered with routes. (Figure 4.10)

Figure 4.10. International American school

(http://www.aischennai.org/, access date June 2015)

The school is located in very hot area, so they built fountains on the yard to provide natural coolness. (Figure 4.11)

Figure 4.11. International American school

(http://www.aischennai.org/, access date june 2015)

Yards and gardens open to east to get cool wind afternoon. Yards are very operational as well as fun, keep the students cool and give them a chance to have a break from academic environment. It's natural climate because they found the water source in the yard. (Figure 4.12)

Figure 4.12. International American schoo

l(http://www.aischennai.org/, access date june 2015)

Rainwater is collected for watering and other usages. There are less windows on the east and west windows; it has more windows on south and north. Because of the often-electric shortage, all classes get sun light from either direction. Architects used local materials to teach kids the importance of the local market and lessen carbon feet step. Doors and windows are made of local materials. Renewable bricks, terra-cotta ceramics are mixed and made roof plate. This change and distribute the direction of the heat. (www.atelierpro.nl/n/projects/108/trias-vmbo-school)

4.5. Anglo-American school -Sofia, Bulgaria Hillier Architecture and A.D.A. (Ivo Panteleev, Radomira Metodieva, Miryana Krasteva, Rumyana Karamanska, Yuliana Tomova, Iskren Galev, Galya Georgieva, Petar Marinov, Darina Kyorcheva)

Anglo- American School board decided to built a school in Bulgaria that reflect the idea of ecology and sustainability in 2000. The school is built in 2006 and is on 9.500 square meters; it's the only one building on this matter. (Figure 4.13).

Figure 4.13. Anglo-American schoo

(http://www.aas-sofia.org/, access date may 2015)

The purpose of the project is to be environmental friendly and energy saving according to the most recent technology. The school is located on a plateau on Vitosha Mountain, it has 500-student capacity and designed to be the "best application." Ecology and "green" are the main philosophy of the school and the design exposes this concept. The school is designed by A.D.A. according to Hillier's drafts. It is totally educational environment with building with local and natural materials, inspired by the traditional agriculture, water, energy and light usage and local plant usage. Solar panels, water collection pools, bird-feeding cages, air monitoring system and star observation center is making kids feel like they are also part of the nature. This concept makes school to living laboratory

and teaches kids that they have to respect and know the value of the world. Sun light is getting inside class within control. (Figure 4.14, 4.15) Roof monitor filters the unnecessary light and double the light inside classrooms.

Figure 4.14. Anglo-American school

(http://www.aas-sofia.org/, access date may 2015)

Figure 4.15. Anglo-American school

(http://www.aas-sofia.org/, access date may 2015)

It took 14 months to built this building; it received her first reward on 2006, Most Ecological Building in 2006. In 2012, US Green Building Council (USGBC) rewarded school with LEED EBOM Golden Certificate in 2012. This school is the first one to receive this award in Bulgaria and third one in the world non-including K-12 schools in USA. The purpose of the building is not getting the LEED certificate. Although the main purpose is to cover unique design, saving energy, water, material and sustainable strategies. LEED certification process started in 2011. The building inspected according to mechanical and electrical systems. The project consisted of inspecting certificates, operation, maintenance strategies, green design and construction features. Other effective features on certificate are controlled energy and water consumption, filtering water and recycling it, sustainable building materials, recycling material policy and transportation plan. (www.buildingoftheyear.bg)

4.6. Benjamin Franklin School-Kirkland, Washington, ABD/Mahlum Architects

Benjamin Franklin Primary School that is designed by Mahlum Architects is a sustainable school with natural light and air conditioning system. The school opened to service in 2005 and educate kids till sixth grade with 450 capacities. (Figure 4.16) The students, teachers, families and community of the Franklin school work all together to reach social, economical and educational goals. Learning is thought as opportunity and applied on environmental sustainability and reached outside of the classroom. The north side of the school has trees and it is also open to public. The first goal of the designers is to create relations between rich environment and the building.

Figure 4.16. Benjamin Franklin School

(http://www.discoverdesign.org/discover/spaces, access date may 2015)

The school designed to give students link between where they live and school, it replaced the old building on north- south direction. It is in 5.200 square meters, two floor arms are reaching to forest, so student can create relation with the nature. Also these arms provide natural light and air to all areas. The building is designed to provide sustainability to built with knowledge of rich environment,

protect the forest, use it as educational property and empower the relation between students and nature. (Figure 4.17)

Figure 4.17. Benjamin Franklin School

(http://www.discoverdesign.org/discover/spaces, access date may 2015)

The student gather around these yards learn faster and better. Shared areas (physic laboratuar, computer room and music room) are united with green design features to science more understandable. Natural area is connected to inside of two main yards. Organized outside educational areas connect students with art and local landscape. The operational part of the south yard is to expose the changes on ecosystem, sun, wind, rain and shadows. This environment let every visitor from any age to see our relation with the nature. (www.cabe.org.uk/case-studies/st-francis-of-assisi)

4.7. Beachside Montessori Village- Hollywood, Florida

Prekindergarten through eighth-grade school Beachside Montessori Village thrives to create an environment that inspires children to take action for change toward a sustainable world.

Beachside's facilities staff, teachers and students work together to find ways in reducing environmental impact and costs.

School offers a sustainability elective class and students form that class visit other classrooms to read and discuss environmentally themed books.

School also partners with Recycle Across America to standardize recycling and educate all students. Dedicated recycling rangers make sure every bin is labeled throughout school for proper recycling and reducing contamination.

Beachside participates Miami Heat's "how low can you go energy efficiency Challenge" to reduce energy use and cost.

First school in this district to offer a sustainability elective class for its students. In partnership with ASU Sustainability Teacher Academy students participate in filed based environmental studies at Everglades national park and Pigeon Key

The Beachside Montessori School creates a unique learning environment for students that are aware of the future in sustainability and partnership with passionate community inspires students to become guardians of the planet. (Figure 4.18, 4.19,4.20) (http://www.fldoe.org/schools/safe-healthy-schools/healthy-schools/green-schools.stml)

Figure 4.18. Beachside Montessori Village

(http://www.beachsidemontessori.com/, access date may 2015)

Figure 4.19. Beachside Montessori Village

(http://www.beachsidemontessori.com/, access date may 2015)

Figure 4.20. Beachside Montessori Village

(http://www.beachsidemontessori.com/, access date may 2015)

4.8. Alachua County Public Schools, Florida- Gainesville, Florida

In this schools district %50 of the students receive free lunch thanks to EPA 2014 Energy Star leader award granted to this district. Schools were able to improve efficiency of its facilities by %10 compared to 2005 numbers.

Information Technology department at the school district monitors and shuts down 17000 computers daily and received APA Energy Star low carbon IT campaign recognition.

All 21 Schools in the district have more than 2 megawatts of photovoltaics installed and these projects were provided in partnership with local utility companies.

This school district and its schools have %100 recycling capacity and regularly distribute recycling bins and dumpsters to all schools, also offer custodial training. (Figure 4.21, 4.22) (http://www.fldoe.org/schools/safe-healthy-schools/healthy-schools/green-schools.stml)

Figure 4.21. Alachua County Public Schools

(http://www.edline.net/pages/ACPS, access date july 2015)

Figure 4.22. Alachua County Public Schools

(http://www.edline.net/pages/ACPS, access date july 2015)

4.9. Orange County Public School, Florida- Orlando, Florida

School district has 36 schools designed and constructed using a sustainable rating system. In 1996 school district implemented indoor air quality management program. Program trains school personnel; assists in investigation of potential indoor air quality problems and verify the effectiveness of the plan.

Since its start in 1991 recycling program saved millions of dollars, $600,000 alone in the last three years just by recycling. They kept 55 million pounds of waste out of the local landfills. Orange county school district developed its own Green School Recognition program to create cultures of sustainability. This program incentivized schools in categories such as, energy efficiency, innovation school grounds, Transportation, waste, water.

School District implemented curriculum specifically designed to integrate environmental and sustainability topics into the kindergarten through 12th grade academicexperience.(Figure4.23-4.24-4.25-4.26)
(http://www.fldoe.org/schools/safe-healthy-schools/healthy-schools/green-schools.stml)

Figure 4.23 Orange County Public School

(https://www.ocps.net/Pages/default.aspx, access date july 2015)

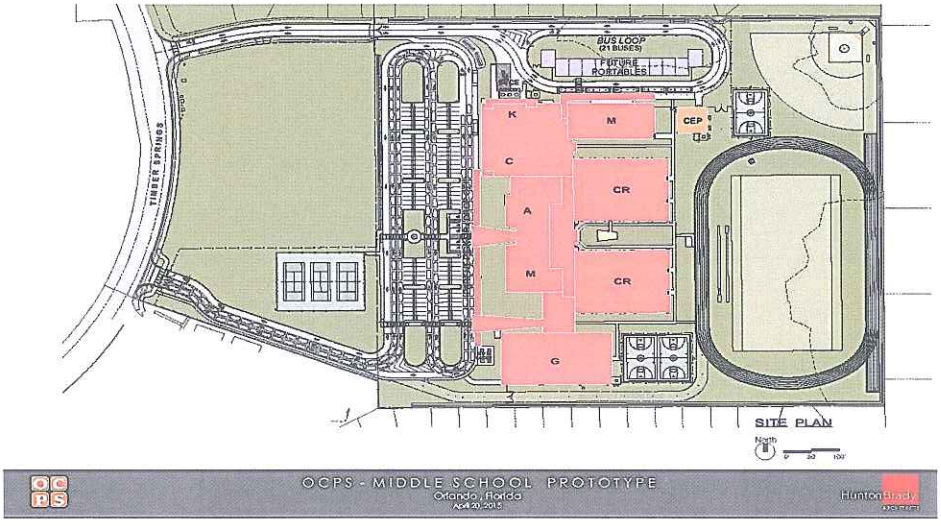


Figure 4.24. Orange County Public School

(https://www.ocps.net/Pages/default.aspx, access date july 2015)

Figure 4.25. Orange County Public School

(https://www.ocps.net/Pages/default.aspx, access date july 2015)

Figure 4.26. Orange County Public School

(https://www.ocps.net/Pages/default.asp;access date may 2015)

4.10. Comparison of Sustainable Kindergarten in The World

Results of evaluation of "sustainable pre-school education buildings" in the world and Florida in terms of sustainable design criteria, is approached and evaluated.

In consideration of the results, which sustainability criteria (built-up area selection, building structure, usage of proper materials, etc.) do "sustainable pre-school education buildings" in the world and Florida supports from their potential sustainability components (ecological, economical, socio-cultural), and most significant substances (pedestrian and bicycle way designs, material selection in outdoor design, usage of rainwater for landscape watering, etc.). According to this, classifying all properties that are seen in 8 sustainable pre-school education buildings attains following results:

4.10.1 Evaluation of Sustainable Kindergarten Building Examples According to Ecological Sustainable Design Criterias

Built-Up Area Selection;

Information about "built-up area selection" of sustainable pre-school education buildings (8 buildings), which are analyzed as part of the thesis is aggregated in table 4.1. According to this, following results are attained:

- Conservation of present land and proper design for land grade (8 buildings),
- Using natural substances in the land as playground (8 buildings),

- Adequate observation of human-vehicle movement by school authorities (8buildings),
- Optimization according to the climate (8 buildings),
- Compatible design of the building with the land in which it is positioned (8 buildings)

	Used Factors Unused factors No Data	Ecological Sustainable Design Criteria	Kingsmead	St.Assisi School	Int. American	Anglo American	Benjamin Frank.	Beachside Mont.	Alachua	Orange Country	Total Found
Built-UP Area Selection		• Conservation of present land and proper design for land grade									8
		• Using natural substances in the land as playground									8
		• Adequate observation of human-vehicle movement by school authorities									8
		• Optimization according to the climate									8
		• Compatible design of the building with the land in which it is positioned									8

Table 4.1. Ecological Sustainable Design Criterias; Buit-up Area

Regarding "Built-Up Selection" Category: All samples studied fulfill all the criteria –100%– within this category.

Conservation of Water;

Information about "water conservation" of sustainable pre-school education buildings (8 buildings) that are analyzed is aggregated in table 4.2. According to this, following results are attained:

- Recycling the waste water (5 buildings),
- Reducing the usage of clean water for landscape watering (4 buildings),
- Selection of plants with less need for water (8 buildings),

- Storage and usage of rainwater (7 buildings),
- Refinement and usage of grey water (2 buildings),
- Using endemic plant species (8 buildings)

	Used Factors Unused factors No Data	Kingsmead	St.Assisi School	Int. American	Anglo American	Benjamin Frank.	Beachside Mont.	Alachua	Orange Country	Total Found
	Ecological Sustainable Design Criteria									
Conservation of water	• Recycling the waste water									5
	• Reducing the usage of clean water for landscape watering									4
	• Selection of plants with less need for water									8
	• Storage and usage of rainwater									7
	• Refinement and usage of grey water									2
	• Using endemic plant species									8

Table 4.2. Ecological Sustainable Design Criterias; Conservation of Water

Regarding "Conservation of Water" Category: All of the eight samples –100%– fulfill "using endemic plant species" and "selection of plants with less need for water" criterias. Five of eight kindergartens –62.5%– fulfill "recycling the waste water" criteria, meanwhile four of eight samples –50%– provide "reducing the usage of clean water for landscape watering" criteria. Seven of eight schools – 87.5%– provide "storage and usage of rainwater" criteria. Two of eight samples – 25%– fulfill "refinement and usage of grey water" criteria.

Energy Usage;

Information about "energy usage" of sustainable pre-school education buildings (8 buildings) that are analyzed is aggregated in table 4.3. According to this, following results are attained:

- Natural ventilation (8 buildings)
- Delivering energy from the sun by passive solar systems (6 buildings)

- Utilization of solar power (6 buildings)
- Using photovoltaic (4 buildings)

	Used Factors Unused factors No Data	Ecological Sustainable Design Criteria	Kingsmead	St.Assisi School	Int. American	Anglo American	Benjamin Frank.	Beachside Mont.	Alachua School	Orange Country	Total Found
Energy Usage		• Natural ventilation									8
		• Delivering energy from the sun by passive solar systems (winter gardens, etc.)									6
		• Utilization of solar power									6
		• Using photovoltaic									4

Table 4.3. Ecological Sustainable Design Criterias; Energy Usage

Regarding "Energy Usage" Category: All eight samples –100%– fulfill the "natural ventilation" criteria. Six of eight structures –75%– provide "delivering energy from the sun by passive solar systems (winter gardens, etc.)" and "utilization of solar power" criteria's. Four of eight buildings –50%– fulfill "using photovoltaic"

Providing Natural Lighting and Natural Ventilation;

Information about "providing natural lighting and natural ventilation" of sustainable pre-school education buildings (8 buildings) that are analyzed is aggregated in table 4.4. According to this, following results are attained:

- Using skylights and sunroofs (3 buildings)
- Space and environment organization in order to maximize the natural lighting (8 buildings)
- Controllable ventilation system, by designing the window bays and opening directions, in means of inner-space quality (8 buildings)
- Using light-colored paints (8 buildings)
- Utilization of sunlight (6 buildings)

- Well-designed passageways for utilization of sunlight (2 buildings),
- Partitioning the building in thermal zones (2 buildings)

	Used Factors Unused factors No Data	Ecological Sustainable Design Criteria	Kingsmead Schoo	St.Assisi School	Int. American	Anglo American	Benjamin Frank.	Beachside Mont.	Alachua School	Orange Country	Total Found
Providing Natural Lighting and Natural Ventilation		• Using skylights and sunroofs									3
		• Space and environment organization in order to maximize the natural lighting									8
		• Controllable ventilation system, by designing the window bays and opening									8
		• Using light-colored									8
		• Utilization of sunlight									6
		• Well-designed passageways for utilization of sunlight									2
		• Partitioning the building in thermal zones									2

Table 4.4 Ecological Sustainable Design Criterias; Providing Natural Lighting and Natural Ventilation;

Regarding "Providing Natural Lighting and Natural Ventilation" Category: All eight samples –100%– fulfill (1) "space and environment organization in order to maximize the natural lighting," (2) "controllable ventilation system, by designing the window bays and opening directions," and (3) "using light-colored" criteria's. Three of eight samples –37.5%– fulfill "using skylights and sunroofs" criteria. The criteria "utilization of sunlight" is provided by six of eight –75%– structures. Lastly, two of eight –25%– buildings fulfill "well-designed passageways for utilization of sunlight" and "partitioning the building in thermal zones" criteria's.

		Kingsmead School	St.Assisi School	Int. American School	Anglo American School	Benjamin Franklin School	Beachside Montessori School	Alachua School	Orange Country School	Total Found	Percentage %
	Used Factors										
	Unused factors										
	No Data										
	Ecological Sustainable Design Criteria										
Built-UP Area Selection	• Conservation of present land and proper design for land grade									8	100
	• Using natural substances in the land as playground									8	100
	• Adequate observation of human-vehicle movement by school authorities									8	100
	• Optimization according to the climate									8	100
	• Compatible design of the building with the land in which it is positioned									8	100
Conservation of water	• Recycling the waste water									5	62.50
	• Reducing the usage of clean water for landscape watering									4	50
	• Selection of plants with less need for water									8	100
	• Storage and usage of rainwater									7	87.50
	• Refinement and usage of grey water									2	25.00
	• Using endemic plant species									8	100
Energy Usage	• Natural ventilation									8	100
	• Delivering energy from the sun by passive solar systems (winter gardens, etc.)									6	75
	• Utilization of solar power									6	75
	• Using photovoltaic									4	50
Providing Natural Lighting and Natural Ventilation	• Using skylights and sunroofs									3	37.50
	• Space and environment organization in order to maximize the natural lighting									8	100
	• Controllable ventilation system, by designing the window bays and opening									8	100
	• Using light-colored									8	100
	• Utilization of sunlight									6	75
	• Well-designed passageways for utilization of sunlight									2	25.00
	• Partitioning the building in thermal zones									2	25.00

Table 4.5 Ecological Sustainable Design Criterias

4.10.2 Evaluation of Sustainable Kindergarten Building Examples According to Economical Sustainable Design Criterias

Building Structure;

Information about "building structure" of sustainable pre-school education buildings (8 buildings), which are analyzed as part of the thesis, is aggregated in table 4.6. According to this, following results are attained:

- Designing the aspect ratio according to climatic data (8 buildings),
- Designing the structure by considering the catch of sun and wind, and sheltered areas (8 buildings),

- Deciding the story height by considering the natural lighting (8 buildings),
- Using different colors of polycarbonate sheets according to usage intensity of areas and surface differences (8 buildings),

	Used Factors Unused factors No Data	Economical Sustainable Design Criteria	Kingsmead	St.Assisi	Int. American	Anglo American	Benjamin Frank.	Beachside Mont.	Alachua	Orange Country	Total Found
Building Structure		• Designing the aspect ratio according to climatic data									8
		• Designing the structure by considering the catch of sun and wind, and sheltered areas									8
		• Deciding the story height by considering the natural lighting									8
		• Using different colors of polycarbonate sheets according to usage intensity of areas									8

Table 4.6. Economical Sustainable Design Criterias; Building Structure

Regarding "Building Structure" Category: Of the "economically studied design" criterias, all kindergartens –100%– studied provide 100% of the requirements of "building structure" category.

Proper Material and Structure Substance Selection;

Information about "material" of sustainable pre-school education buildings (8 buildings) is aggregated in table 4.7 According to this, following results are attained:

- Using durable materials (8 buildings)
- Using material with low maintenance cost (8 buildings)
- Using recyclable materials (5 buildings)
- Using materials that are supplied from natural and local resources (8 buildings)

- Supplying the wood from sustainable forests (1 building)
- Using quickly renewable materials (8 buildings)
- Using materials that can enhance the inner-space quality (8 buildings)

		Kingsmead	St.Assisi	Int. American	Anglo American	Benjamin Frank.	Beachside Mont.	Alachua	Orange Country	Total Found
	Used Factors									
	Unused factors									
	No Data									
	Economical Sustainable Design Criteria									
Material and Structure Substance Selection	• Using durable materials									8
	• Using material with low maintenance cost									8
	• Using recyclable materials									5
	• Using materials that are supplied from natural and local resources									8
	• Supplying the wood from sustainable									1
	• Using quickly renewable materials									8
	• Using materials that can enhance the inner-space quality									8

Table 4.7. Economical Sustainable Design Criterias; Proper Material and Structure Substance Selection;

Regarding "Material and Structure Substance Selection" Category: All the studied structures fulfill the requirements of (1) material and structure substance selection, (2) using durable materials, (3) using material with low maintenance cost, (4) using materials that are supplied from natural and local resources, (5) using quickly renewable materials, and (6) using materials that enhance the inner-space quality. Five of eight samples –a rate of 62.5%– fulfill the subcategory of "using recyclable materials," while only 1 of 8 samples –12.5%– fulfills the subcategory of "supplying the wood from sustainable."

Building Envelope;

Information about "building envelope" of sustainable pre-school education buildings (8 buildings) is aggregated in table 4.8 According to this, following results are attained:

- Using heat insulting materials in building envelope (4 buildings),
- Using the wide windows on sun-catching surfacess, and least possible number of windows on surfaces in direction of the wind (0 buildings),
- Preferring green rooftops (2 buildings),
- Precautions of heat insulation on building surfaces and windows (4 buildings),
- Green surface design (8 buildings)

		Kingsmead	St.Assisi	Int. American	Anglo American	Benjamin Frank.	Beachside Mont.	Alachua	Orange Country	Total Found
Used Factors										
Unused factors										
No Data										
Economical Sustainable Design Criteria										
Building Envelope	• Using heat insulting materials in building envelope									4
	• Using the wide windows on sun-catching facades									0
	• Prefering green rooftops									2
	• Precautions of heat insulation on building surfaces and windows									4
	• Green facade design									8

Table 4.8. Economical Sustainable Design Criterias; Building Envelope;

Regarding "Building Envelope" Category: All kindergartens –100%– fulfill the "green surface design" criteria within the "building envelope selection" category. Four of eight samples –50%–, on the other hand, fulfill the "using heat insulating materials" criteria in the same section. None of the samples –0%– provides the "using the wide windows on sun-catching surface" criteria. Only two of eight kindergartens –25%– provide "preferring green rooftops" criteria. It is observed that four of eight samples –50%– fulfill "precautions of heat insulation on building surfaces and windows" criteria.

Transportation;

Information about "transportation" of sustainable pre-school education buildings (8 buildings) is aggregated in table 4.9 According to this, following results are attained:

- Determining the transportation routes (8 buildings),
- Priority of low emission vehicles for service (8 buildings),
- Projects about alternative transportation and designing bicycle stands (8 buildings)

	Used Factors Unused factors No Data	Economical Sustainable Design Criteria	Kingsmead	St.Assisi	Int. American	Anglo American	Benjamin Frank.	Beachside Mont.	Alachua	Orange Country	Total Found
Transportation		• Determining the transportation routes									8
		• Priority of low emission vehicles for service									8
		• Projects about alternative transportation and designing bicycle stands									8

Table 4.9. Economical Sustainable Design Criterias; Transportation;

Regarding "Transportation Selection" Category: All samples studied fulfill all the criteria –100%– within this category.

	Used Factors Unused factors No Data	Kingsmead School	St.Assisi School	Int. American	Anglo American	Benjamin Franklin	Beachside Mont.	Alachua School	Orange Country	Total Found	Percentage %
	Economical Sustainable Design Criteria										
Building Structure	• Designing the aspect ratio according to climatic data									8	100.00
	• Designing the structure by considering the catch of sun and wind, and sheltered areas									8	100.00
	• Deciding the story height by considering the natural lighting									8	100.00
	• Using different colors of polycarbonate sheets according to usage intensity of areas									8	100.00
Material and Structure Substance Selection	• Using durable materials									8	100.00
	• Using material with low maintenance cost									8	100.00
	• Using recyclable materials									5	62.50
	• Using materials that are supplied from natural and local resources									8	100.00
	• Supplying the wood from sustainable									1	12.50
	• Using quickly renewable materials									8	100.00
	• Using materials that can enhance the inner-space quality									8	100.00
Building Envelope	• Using heat insulting materials in building envelope									4	50.00
	• Using the wide windows on sun-catching facades									0	0.00
	• Prefering green rooftops									2	25.00
	• Precautions of heat insulation on building surfaces and windows									4	50.00
	• Green facade design									8	100.00
Transportation	• Determining the transportation routes									8	100.00
	• Priority of low emission vehicles for service									8	100.00
	• Projects about alternative transportation and designing bicycle stands									8	100.00

Table 4.10 Economical Sustainable Design Criterias;

4.10.3 Evaluation of Sustainable Kindergarten Building Examples According to Socio-Cultural Sustainable Design Criterias

Information about "socio-cultural sustainability" of sustainable pre-school education buildings (8 buildings) which are analyzed as part of the thesis, is aggregated in table 4.11 According to this, following results are attained:

- Compatible design of the building with the environment in which it is positioned (8 buildings),
- Presence of a symbol near the building (8 buildings),
- Informing the people about conservation of and natural resources and, handing them down to the next generations (8 buildings),

- Spiriting up the immediate vicinity with its user movement (8 buildings)

	Used Factors									
	Unused factors									
	No Data									
		Economical Sustainable Design Criteria	Kingsmead	St.Assisi	Int. American	Anglo American	Benjamin Frank.	Beachside Mont.	Alachua	Orange Country	Total Found
Socio-Cultural Sustainability	• Compatible design of the building with the environment in which it is positioned									8
	• Presence of a symbol near the building									8
	• Informing the people about conservation of and natural resources									8
	• Spiriting up the immediate vicinity with its user movement									8

Table 4.11 Soci- Cultural Sustainable Design Criteria;

Regarding "Socio-Cultural" Category: All samples studied fulfill all the criteria – 100%– within this category.

5. ANALYTICAL SURVEY FOR SUSTAINABLE KINDERGARTENS IN SOUTH FLORIDA

This survey conducted in 2016 at Beachside Montessori Village Kindergarten, this school located in south Florida.

5.1. Method of the Case Study

First step of the case study is definined survey questions.
Second step is asking questions to the owners, employees and parents.
Third step is putting the questions into monkey survey program for evaluating the results.

Parents of children in kindergarten who attend a sustainable school (n = 20)

Employees who work at a sustainable school (n=10)

Owners of sustainable schools (n=3)

Respondents were recruited using precision sample, Owners of sustainable schools were recruited via manual recruitment methods. Respondents completed an online survey, which was hosted via Survey Monkey. Through this research, it can be seek to gain a deeper understanding of the perceptions of parents of students attending sustainability schools, employees, and school owners around issues related to sustainability.

5.2. Evaluation of the survey

This survey conducted in 2016 at Beachside Montessori Village Kindergarten located in Broward County, South Florida. 33 People was asked to answer 18 survey questions. Results were analyzed and presented below.

Demographics of the survey participants as follows:

5% of the participants have high school diploma

50% of the participants have bachelor degree

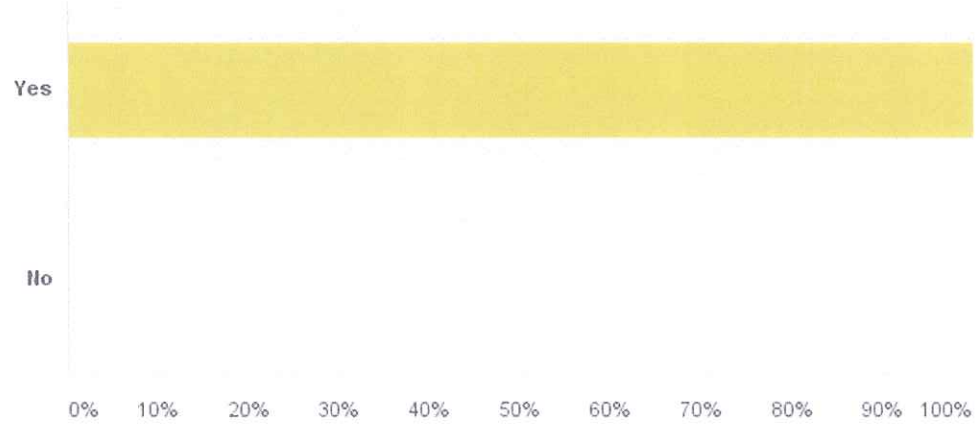
45% of the participants have master's degree

All participants represent the working middle class

33 Total Responses; In the light of the poll study I conducted, it is understood that employees and parents are aware of the concept of sustainability. As a result of the obtained data, the awareness of owners, employees, and parents with a child who attends to a sustainable kindergarten school is one hundred percent. (100%) The outcomes obtained as a result of the question asked;

Q1: Are you a parent,owner or employess with a child who goes to a sustainable kindergarten school?

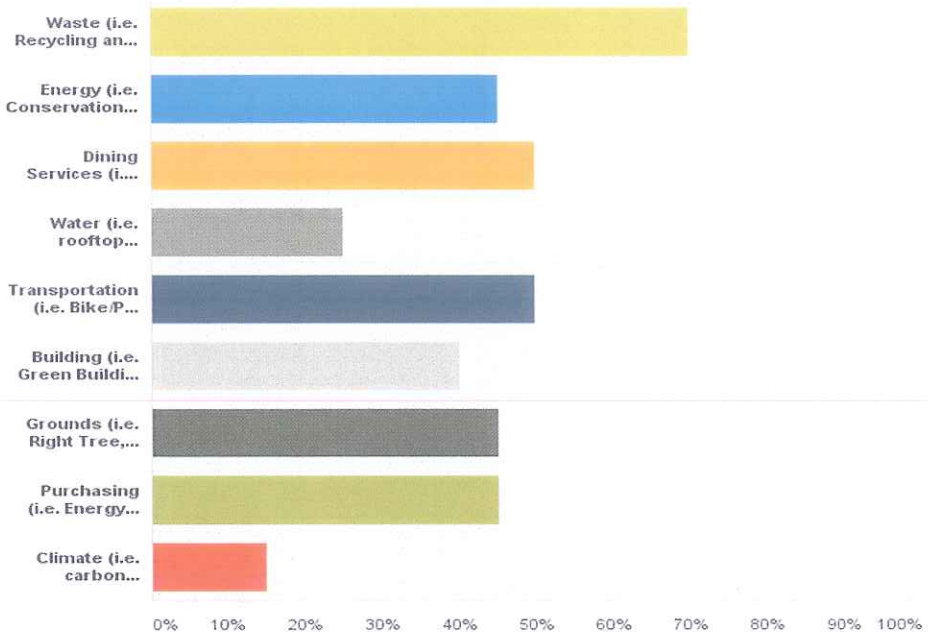
Table 5.1. Question 1 (parents, owners, employees)



Q2: Which of the following sustainability efforts are you aware of on this school?

Parents;

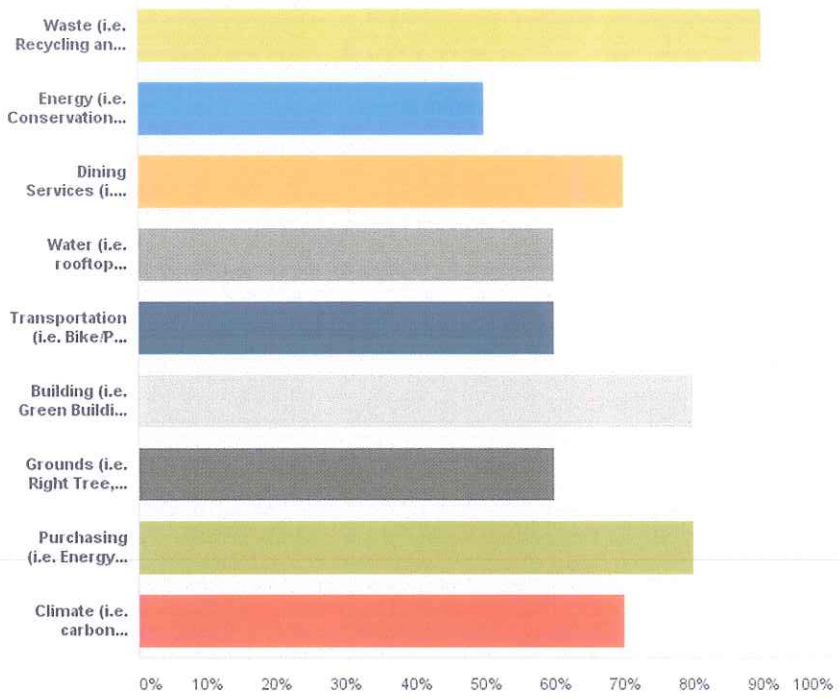
Table 5.2. Question 2; Parent Answers



Regarding the parents, 70% of them (14 people) are aware of the waste, 45% (9 people) are aware of the energy, 50% (10 people) are aware of the dining services, 25% (5 people) are aware of the water, 50% (10 people) are aware of the transportation, 40% (8 people) are aware of the building, 45% (9 people) are aware of the grounds, 45% (9 people) are aware of the purchasing, and 15% (3 people) are aware of the climate.

Employees;

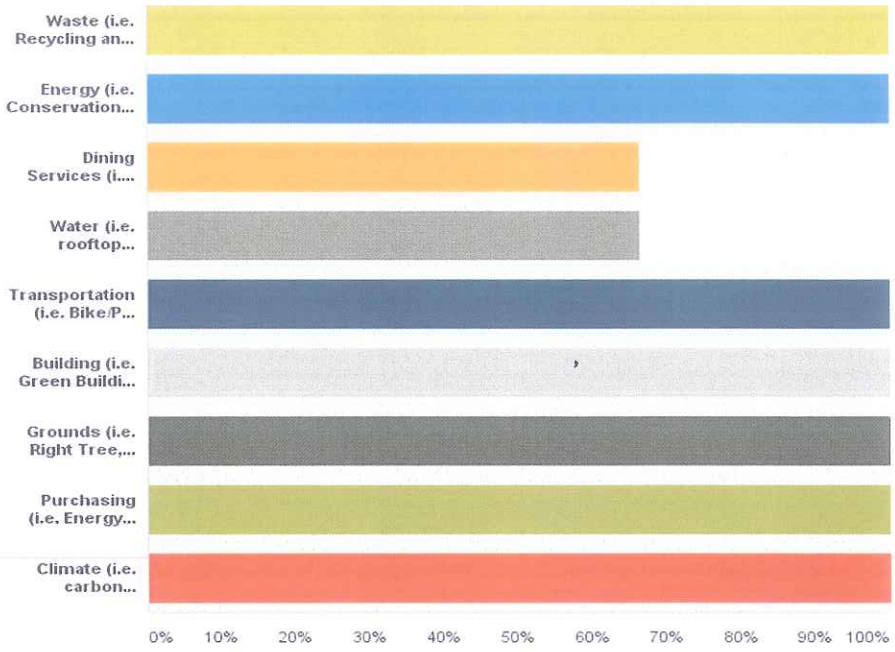
Table 5.3. Question 2; Employees Answer



Regarding the employees, it is observed that 90% of them (9 people) are aware of the waste, 50% (5 people) are aware of the energy, 70% (7 people) are aware of the dining services, 60% (6 people) are aware of the water, 60% (6 people) are aware of the transportation, 80% (8 people) are aware of the building, 60% (6 people) are aware of the grounds, 80% (8 people) are aware of the purchasing, and 70% (7 people) are aware of the climate.

Owners;

Table 5.4. Question 2; Owners Answer

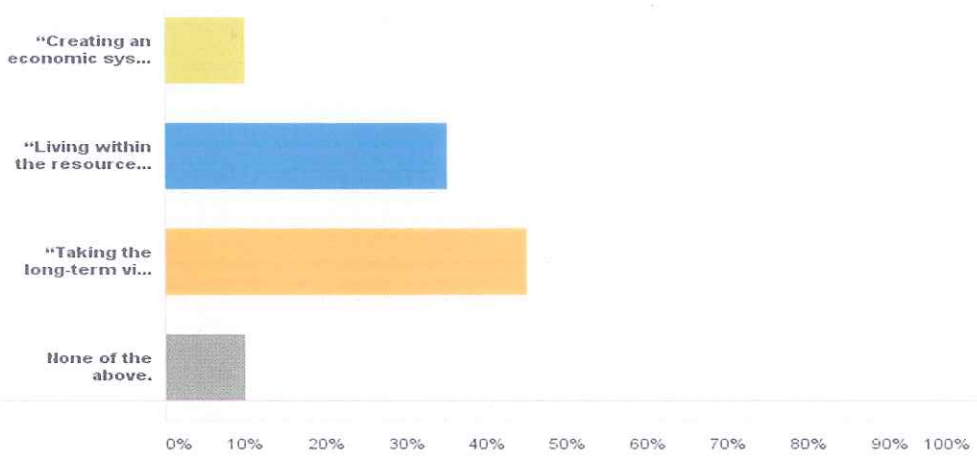


Regarding the owners, 100% (all ten of them) are aware of the waste, energy, water, transportation, building, grounds, purchasing, and climate; meanwhile 66.67% (2 people) are aware of the dining services.

Q3: Which of the three definitions of sustainability below resonate with you? Sustainability means:

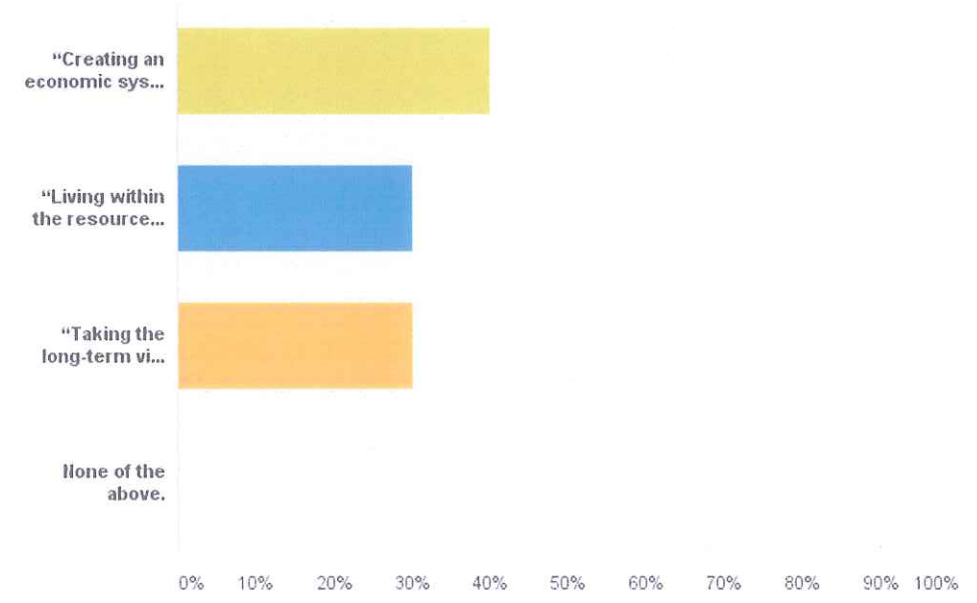
Parents;

Table 5.5. Question 3; Parents Answer



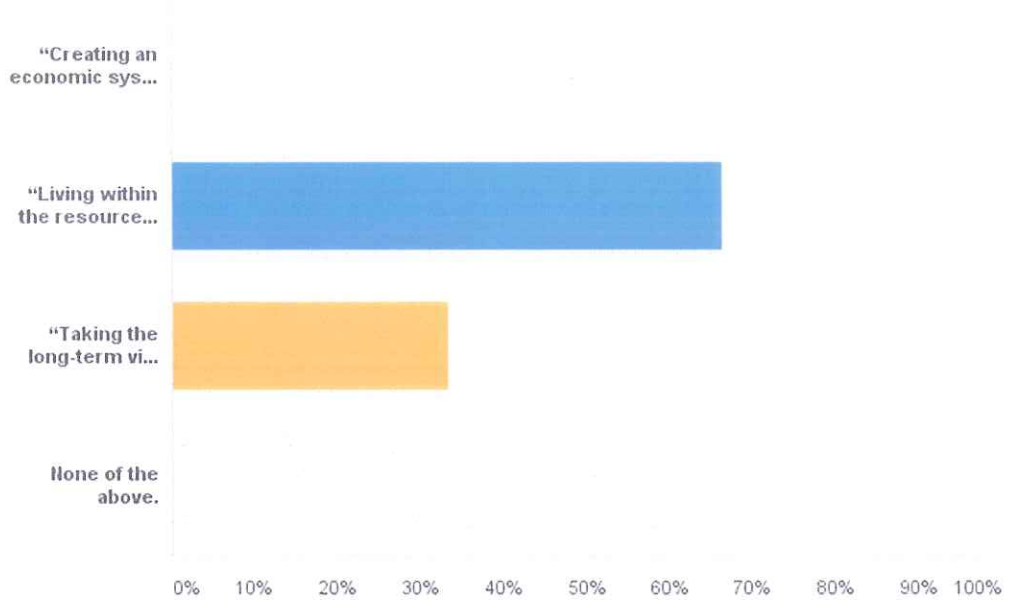
Employees;

Table 5.6. Question 3; Employees Answer



Owners;

Table 5.7. Question 3; Owners Answer

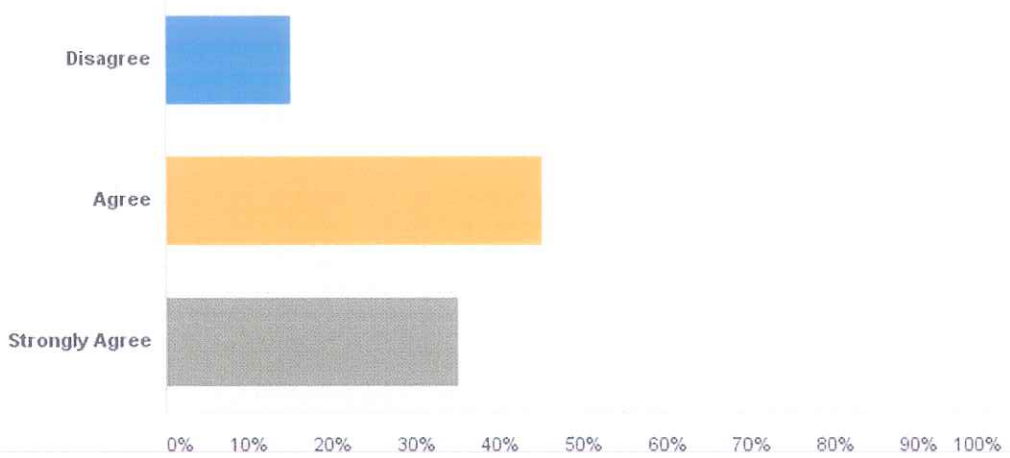


Regarding "creating an economic system that provides for quality of life while renewing the environment and its resources," the awareness rate for the families is 10% (2 people), for the owners 0% (none), and for the employees 40% (4 people). Regarding "living within the resources of the planet without damaging the environment now or in the future," the awareness rate for families is 35% (7 people), while for the owners it is 30% (3 people), and for the employees 30% (3 people)

Q4: I fully understand the meaning of the term "sustainability".

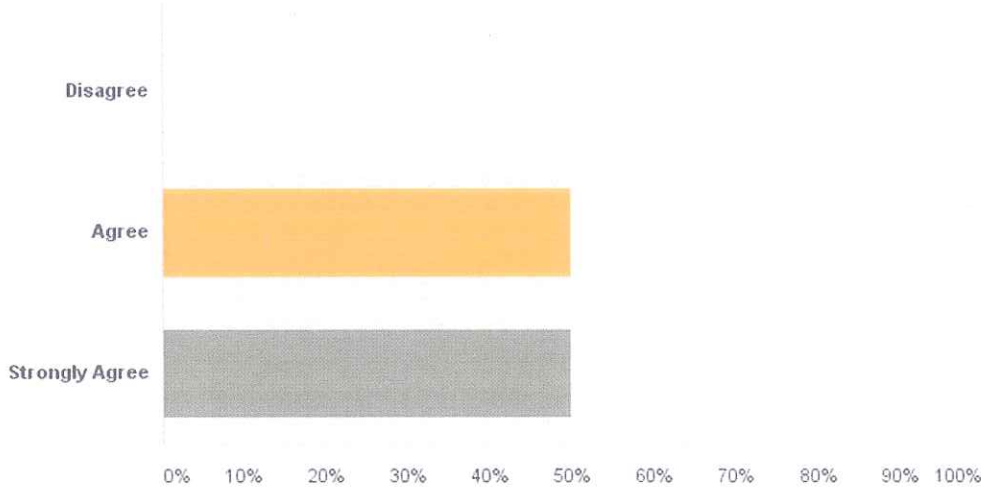
Parents;

Table 5.8. Question 4; Parent Answers



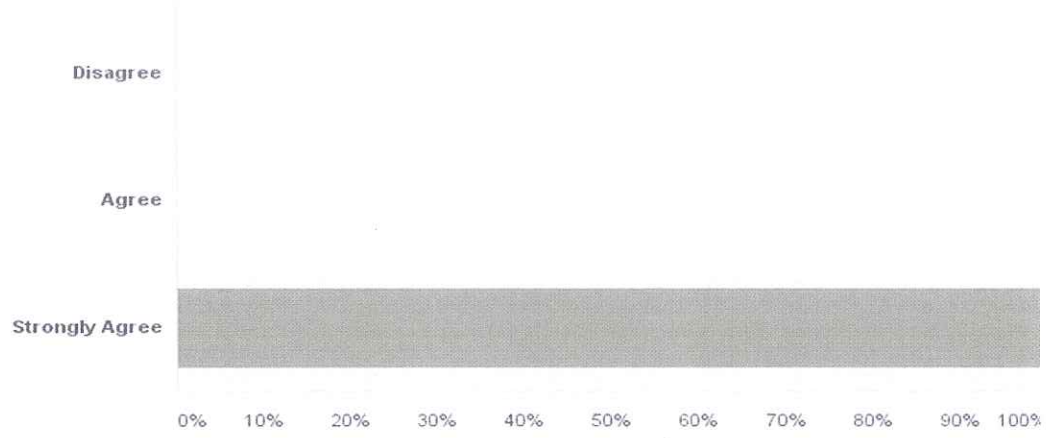
Employees;

Table 5.9. Question 4; Employees Answers



Owners;

Table 5.10. Question 4; Owner Answers

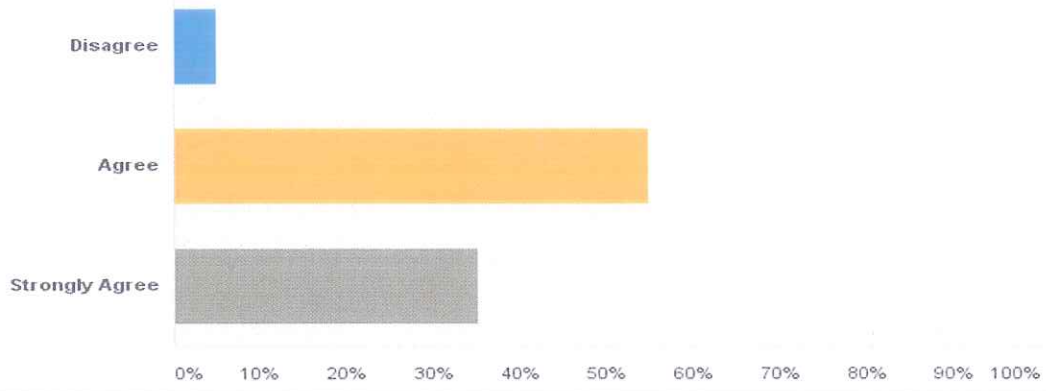


Regarding the statement "I fully understand the meaning of the term 'sustainability'," the 35% of the parents certainly agree, while this rate is 100% for the owners. 50% of the employees answered positive to the same question.

Q5: My concern towards environmental issues has grown due to the events, activities.

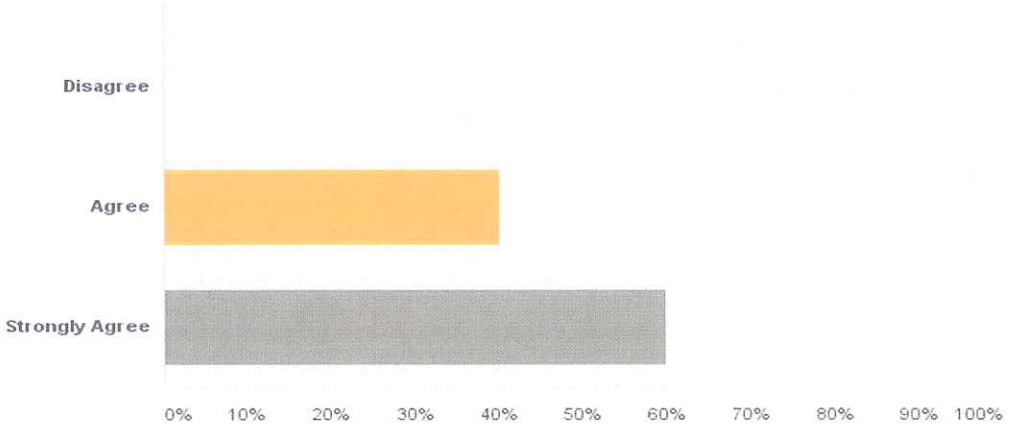
Parents;

Table 5.11. Question 5; Parent Answers



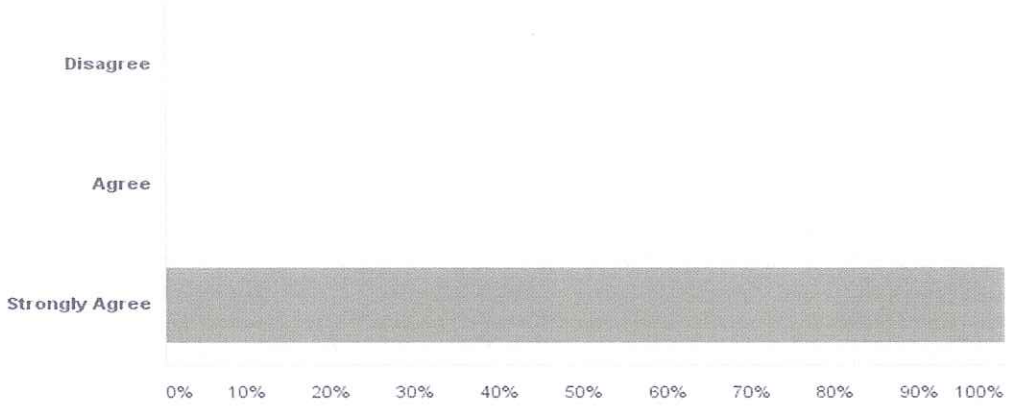
Employees;

Table 5.12. Question 5; Employee Answers



Owners;

Table 5.13. Question 5; Owner Answers

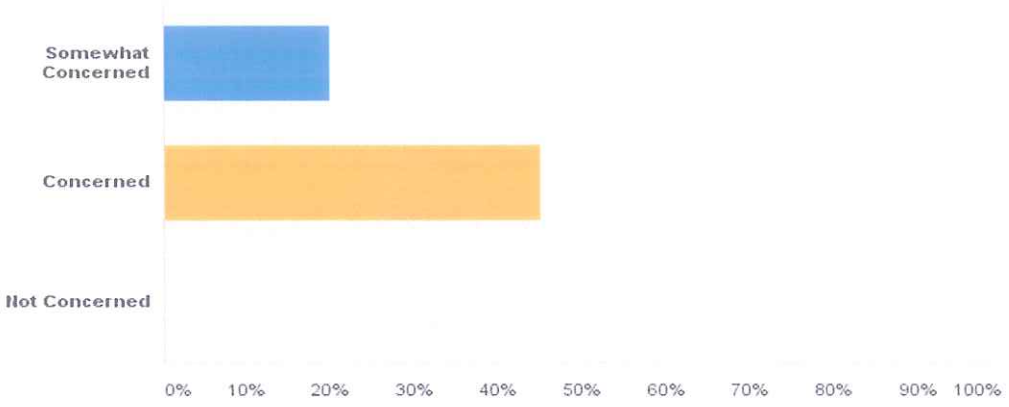


Regarding the statement "My concern towards environmental issues has grown due to the events and activities," 35% of the parents certainly agree, meanwhile 100% of the owners and 60% of the employees agree. It is deduced that 70% of all the people (parents, owners, and employees) who answered all of our questions are aware of the notion of "sustainability."

Q6: How concerned are you about environmental issues?

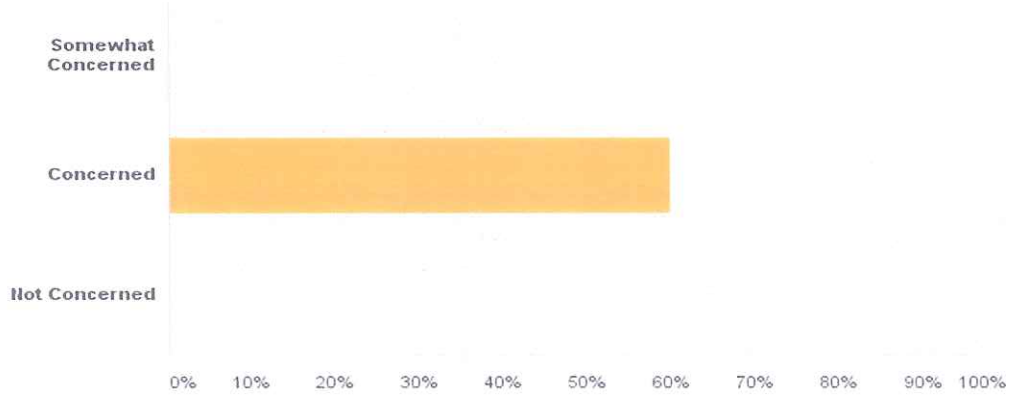
Parents;

Table 5.14. Question 6; Parent Answers



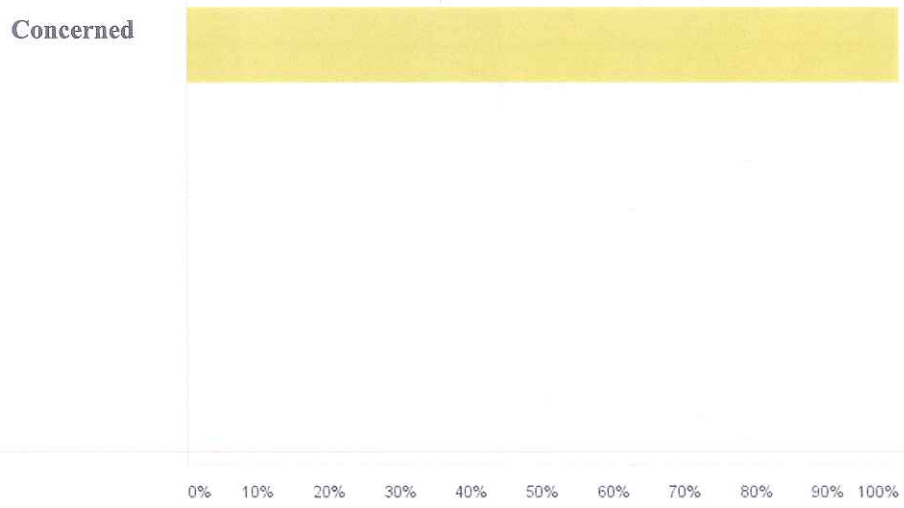
Employees;

Table 5.15. Question 6; Employee Answers



Owners;

Table 5.16. Question 6; Owner Answers

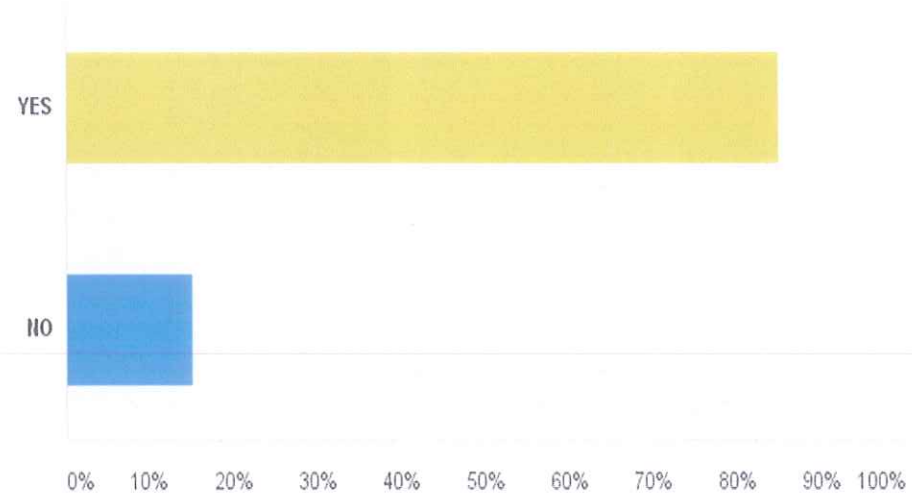


Everybody that participation in the survey said thet were concern abaout the environmental issues. Some parents and employees were not very concerned but they were concerned after all.

Q7: Do you think environmental issues directly affect your life?

Parents;

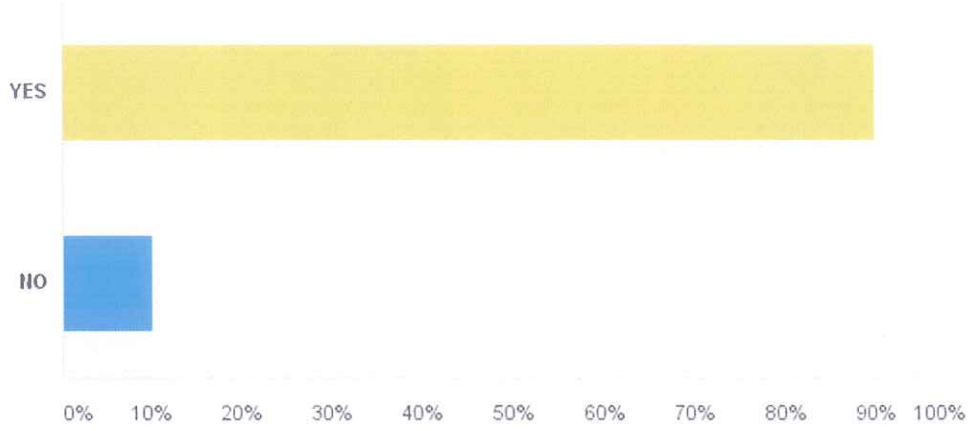
Table 5.17. Question 7; Parent Answers



%85 Yes %15 No

Employees;

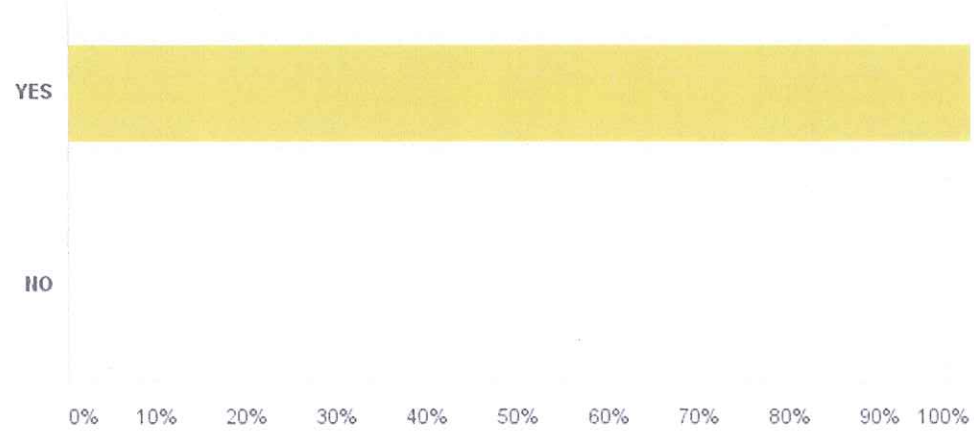
Table 5.18. Question 7; Employee Answers



%90 Yes %10 No

Owners;

Table 5.19. Question 7; Owner Answers

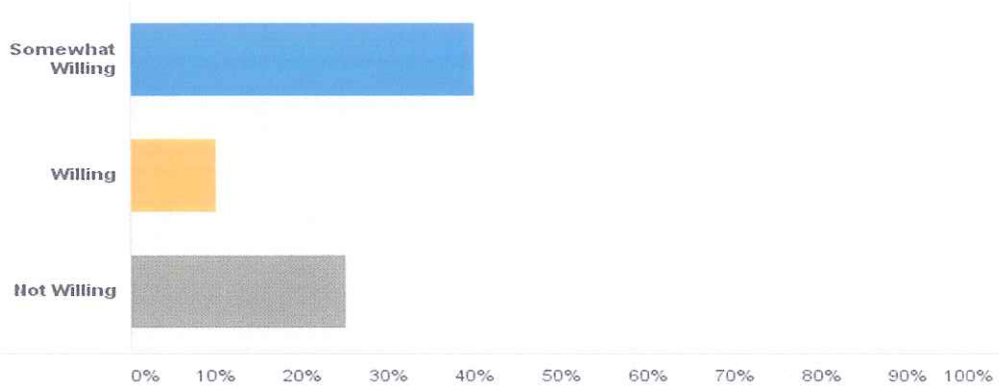


%100 Yes

Q8: How willing are you to participate in sustainability activities this school?

Parents;

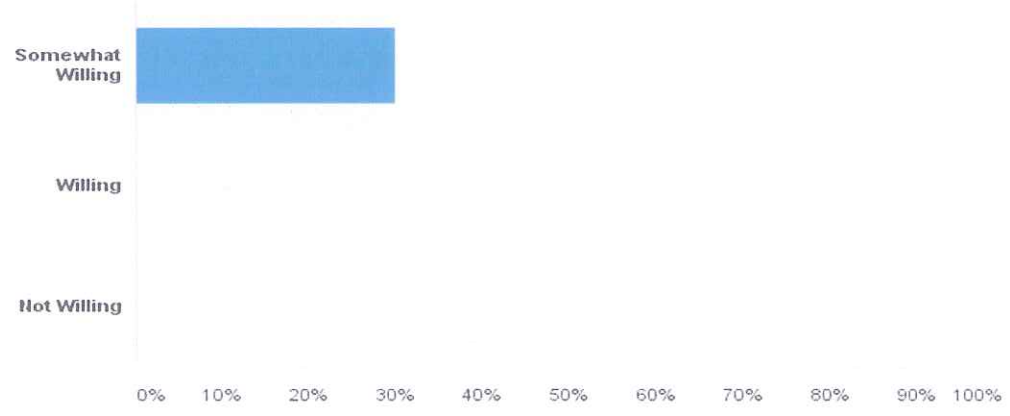
Table 5.20. Question 8; Parent Answers



Somewhat Willing %40 Willing %10 Not Willing %25

Emplooyes;

Table 5.21. Question 8; Employee Answers



Somewhat Willing %30

Owners;

Table 5.22. Question 8; Owner Answers

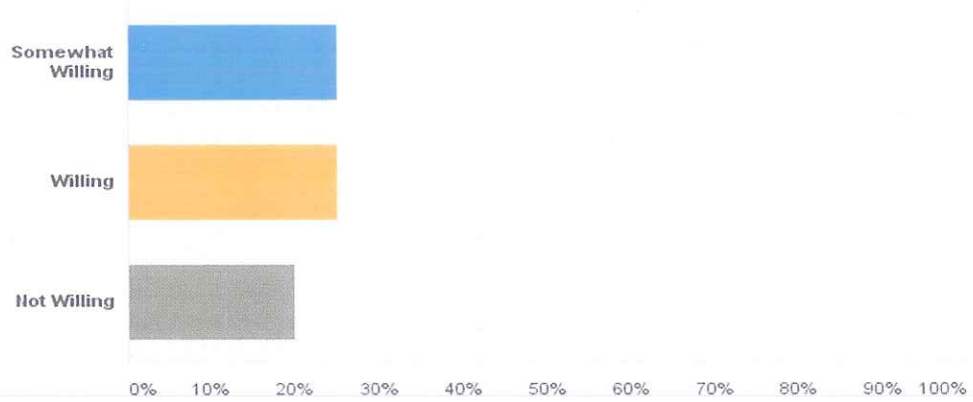
Willing %100

Especially owners and parents willing to participate in the activities and some of were not able to because of their work schedule.

Q9: If you could save money, in your department, on school or personally would you participate in sustainability activities on school?

Parents;

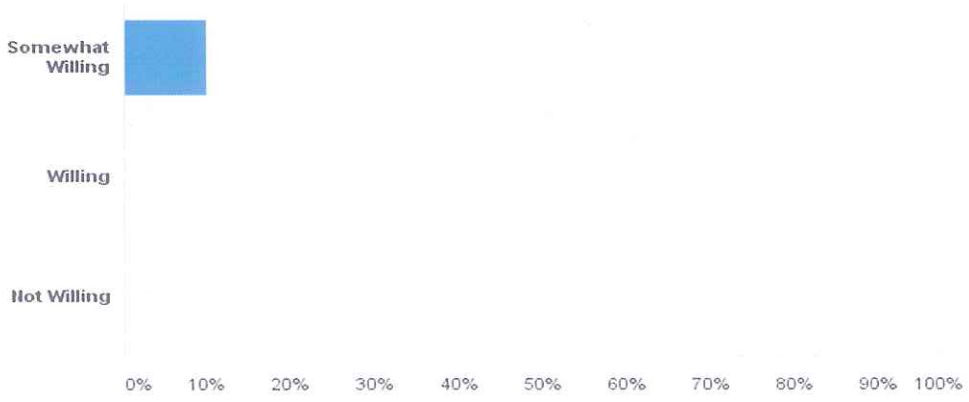
Table 5.23. Question 9; Parent Answers



Somewhat Willing %25 Willing %25 Not Willing %20

Employees;

Table 5.24. Question 9; Employee Answers



Somewhat Willing %10

Owners;

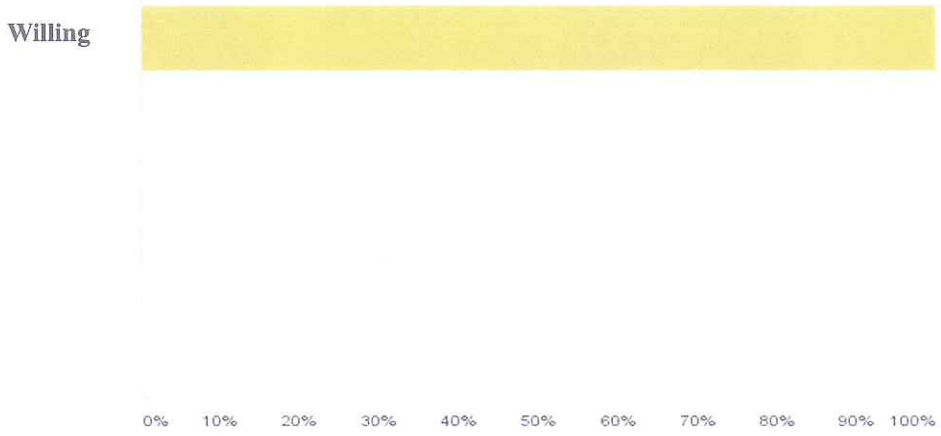


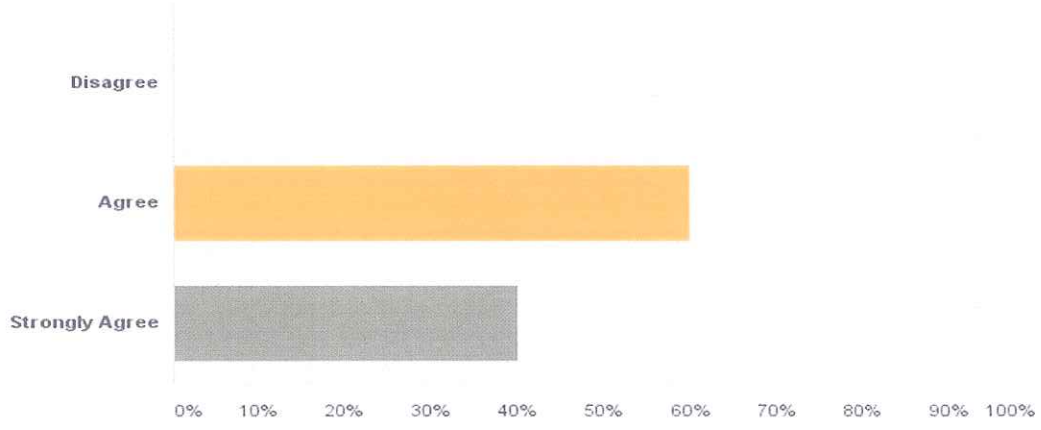
Table 5.25. Question 9; Owner Answers

Willing %100

Q10: This school is leader in sustainable practices among other schools?

Parents;

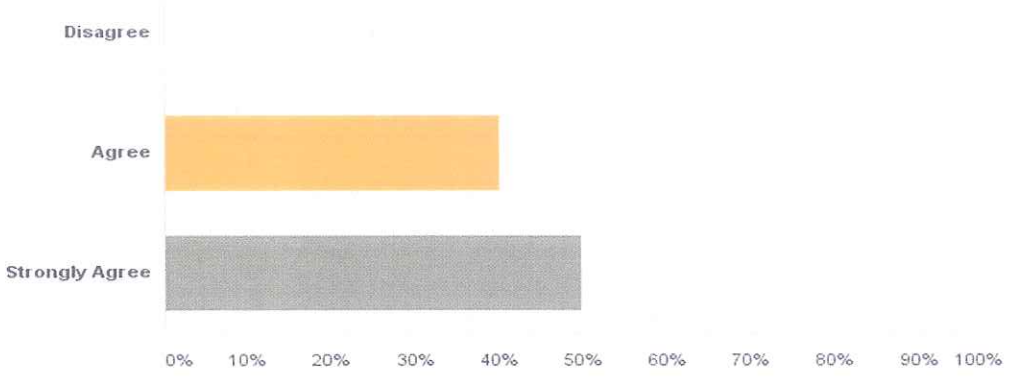
Table 5.26. Question 10; Parent Answers



Agree %60 Strongly Agree %40

Employees:

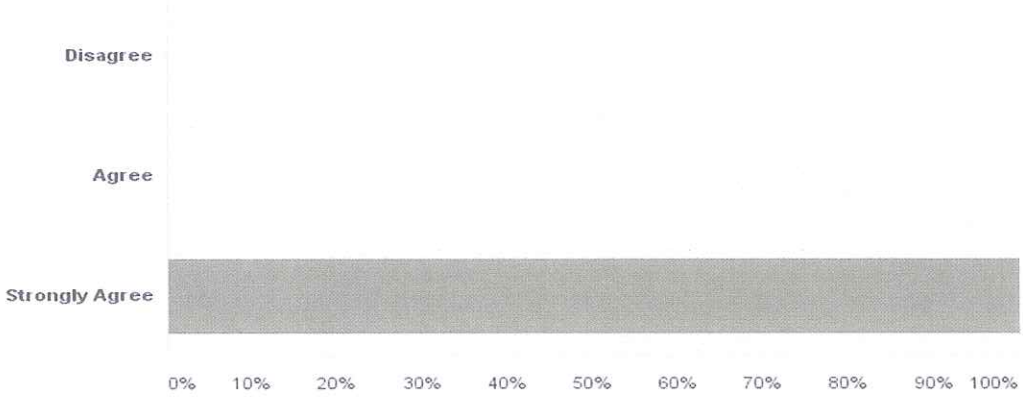
Table 5.27. Question 10; Employee Answers



Agree %40 Strongly Agree %50

Owners;

Table 5.28. Question 10; Owner Answers

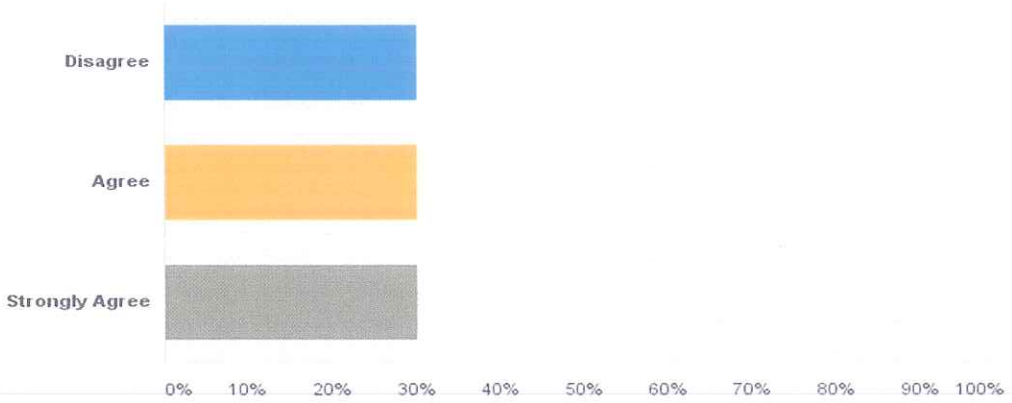


Strongly Agree %100

Q11: This school's community is well informed about what is being done to make the school more sustainable.

Parents;

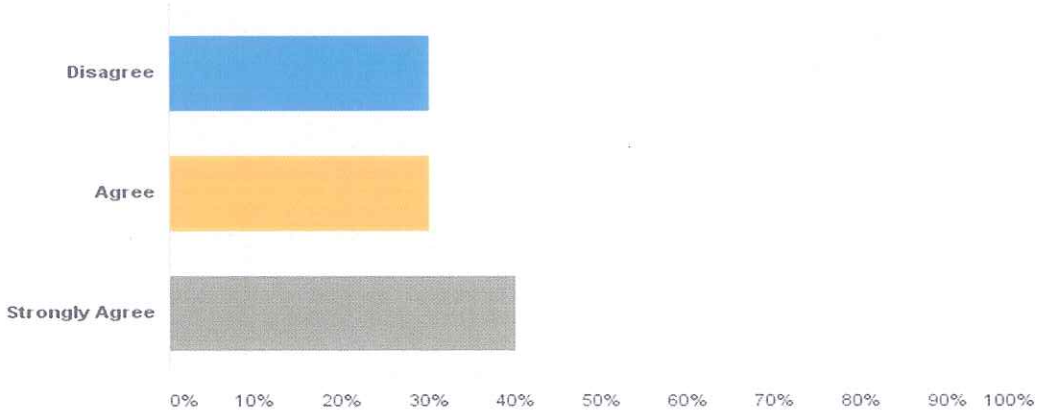
Table 5.29. Question 11; Parent Answers



Disagree %30 Agree %30 Strongly Agree %30

Employees:

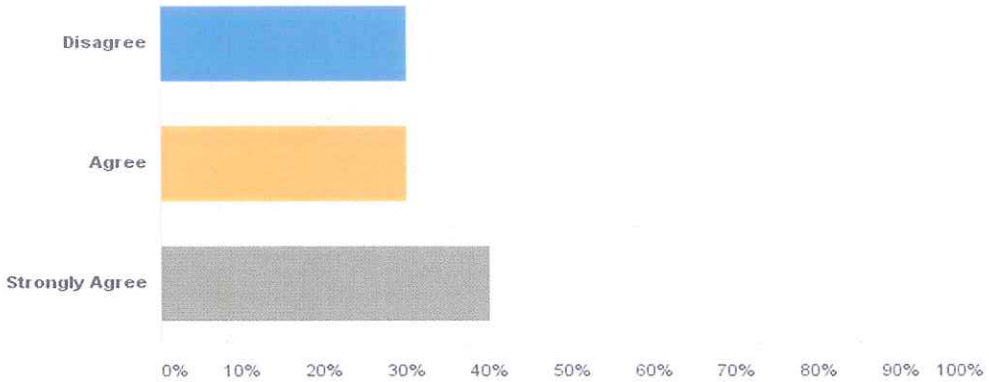
Table 5.30. Question 11; Employee Answers



Disagree %30 Agree %30 Strongly Agree %40

Owners;

Table 5.31. Question 11; Owner Answers

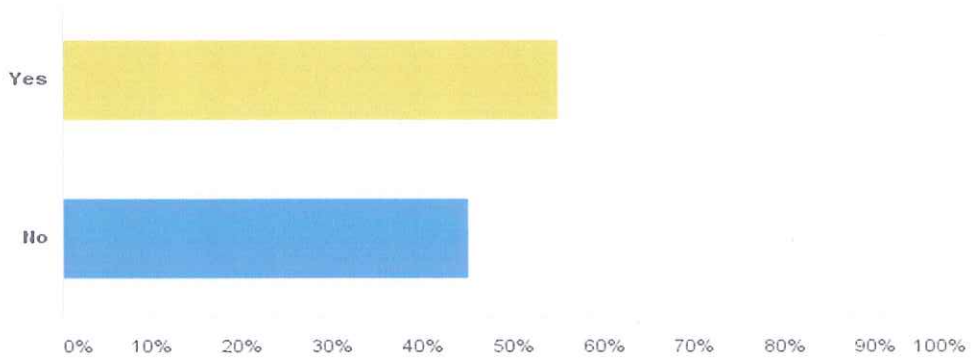


Disagree %30 Agree %30 Strongly Agree %40

Q12: Was Sustainability of this school a factor for choosing it?

Parents;

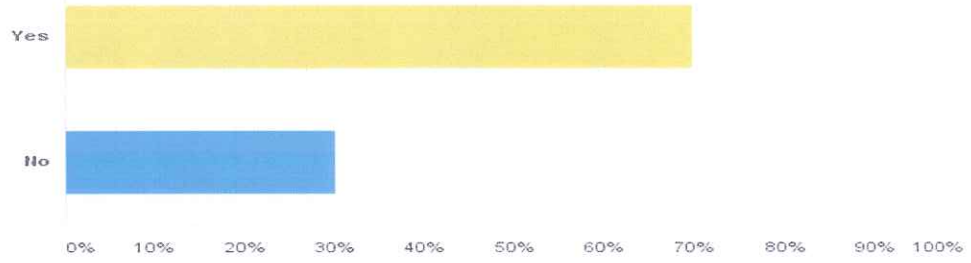
Table 5.32. Question 12; Parent Answers



Yes %55 No %45

Employees:

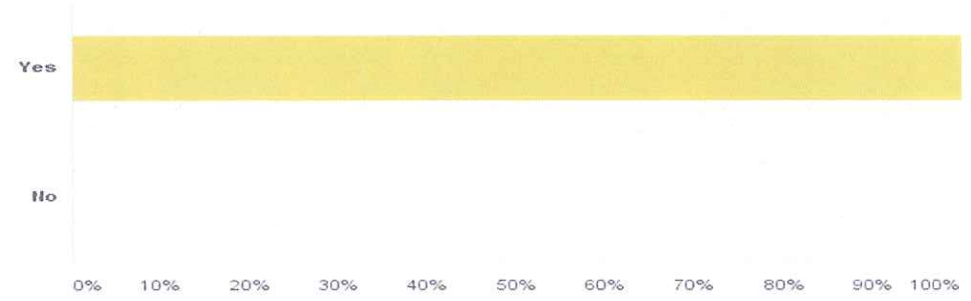
Table 5.33. Question 12; Employee Answers



Yes %70 No %30

Owners;

Table 5.34. Question 12; Owner Answers

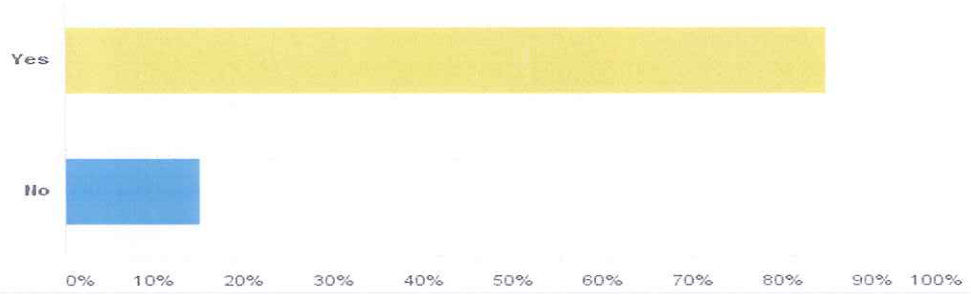


Yes %100

Q13: Are you talking about sustainability and environmental issues with your kids?

Parents;

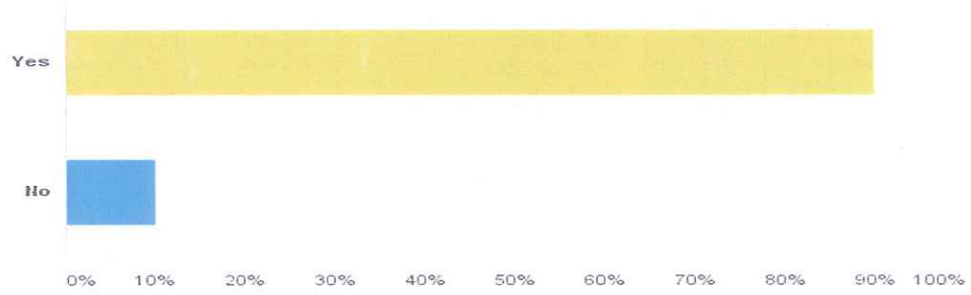
Table 5.35. Question 13; Parent Answers



Yes %85 No%15

Employees;

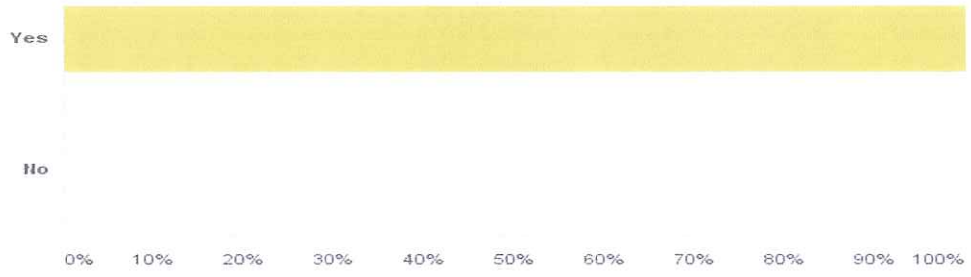
Table 5.36. Question 13; Employee Answers



Yes %90 No%10

Owners;

Table 5.37. Question 13; Owner Answers

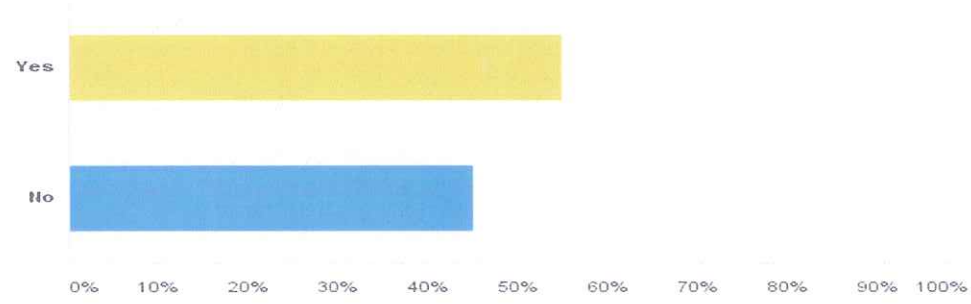


Yes %100

Q14: Are you paying attention to the choice of materials (wall paint, textile, furniture, etc.) used in this school?

Parents;

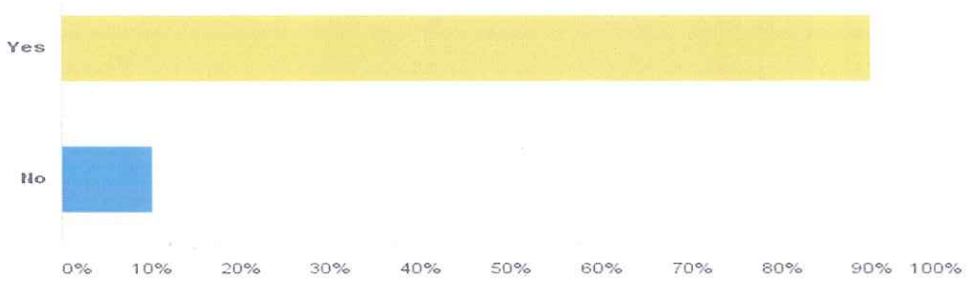
Table 5.38. Question 14; Parent Answers



Yes %55 No%45

Employees;

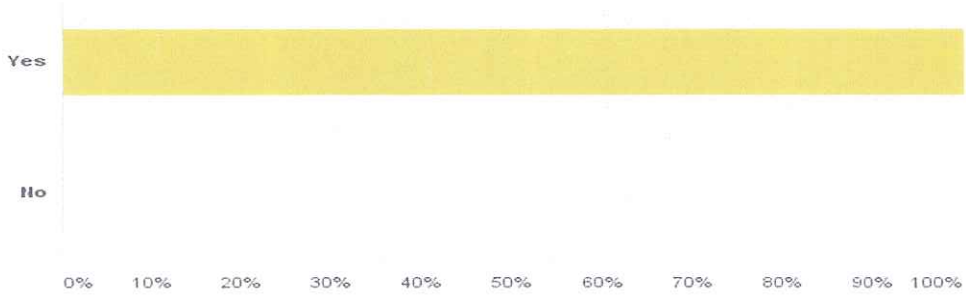
Table 5.39. Question 14; Employee Answers



Yes %90 No%10

Owners;

Table 5.40. Question 14; Owner Answers

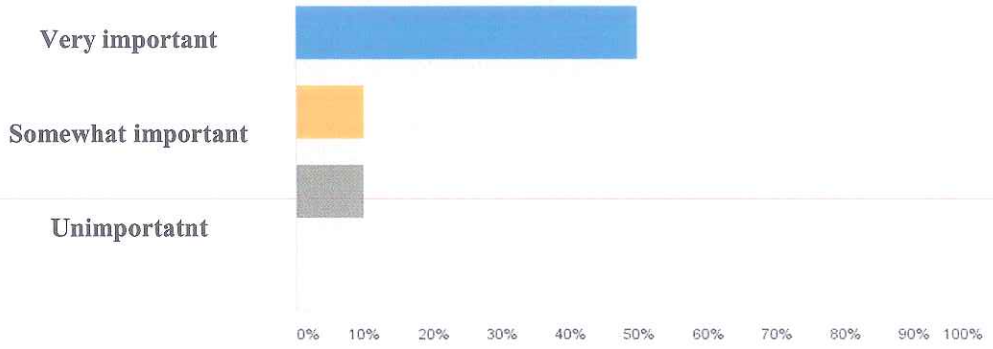


Yes %100

Q15: How important for you the use of materials that will improve the quality of interior?

Parents;

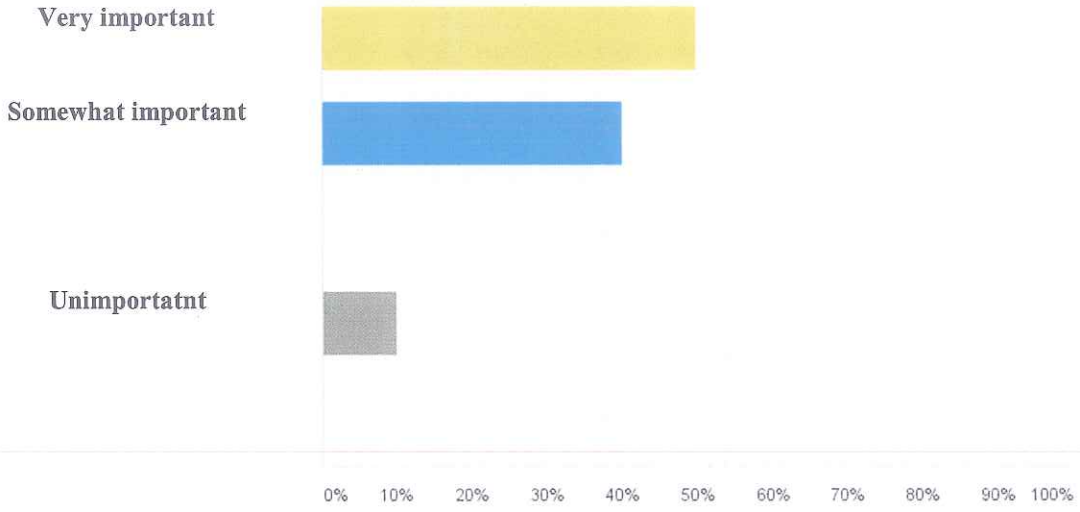
Table 5.41. Question 15; Parent Answers



Very important %50 Somewhat important %10 Unimportant %10

Employees;

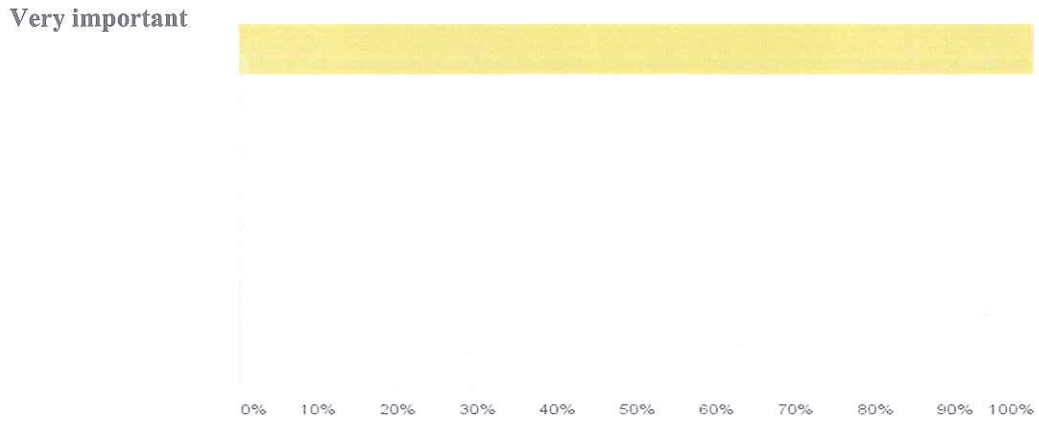
Table 5.42. Question 15; Employee Answers



Very important %50 Somewhat important %40 Unimportant %10

Owners;

Table 5.43. Question 15; Owner Answers

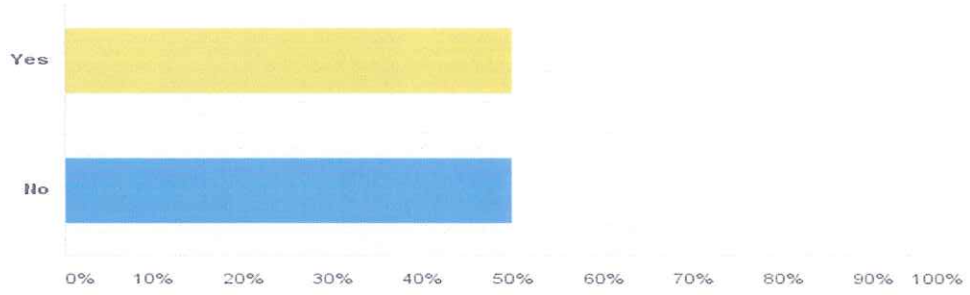


Very important %100

Q16: Are you aware of the use of sustainable furniture?

Parents;

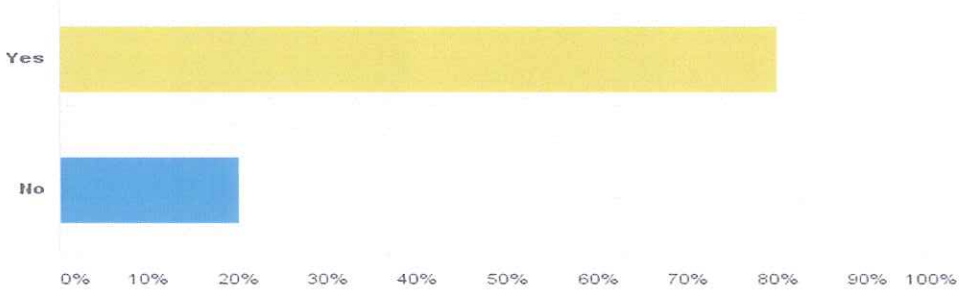
Table 5.44. Question 16; Parent Answers



Yes %50 No %50

Employees;

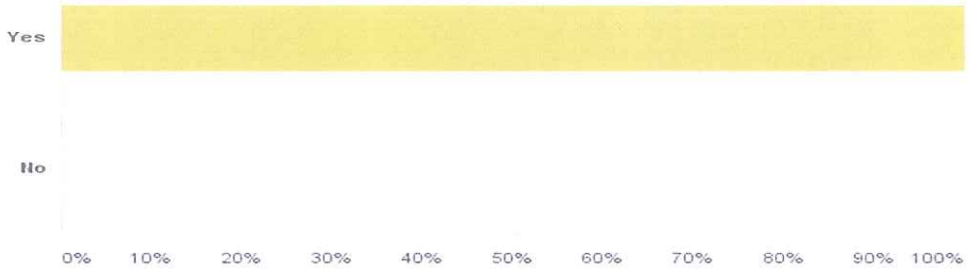
Table 5.45. Question 16; Employee Answers



Yes %80 No %20

Owners;

Table 5.46. Question 16; Owner Answers

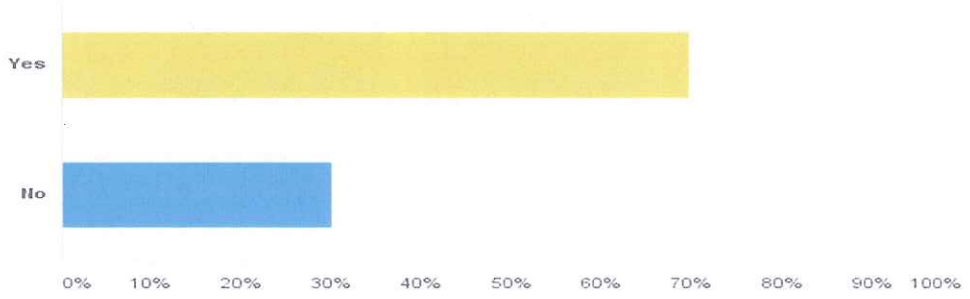


Yes %100

Q17: Are you educating your children at home about sustainable materials?

Parents;

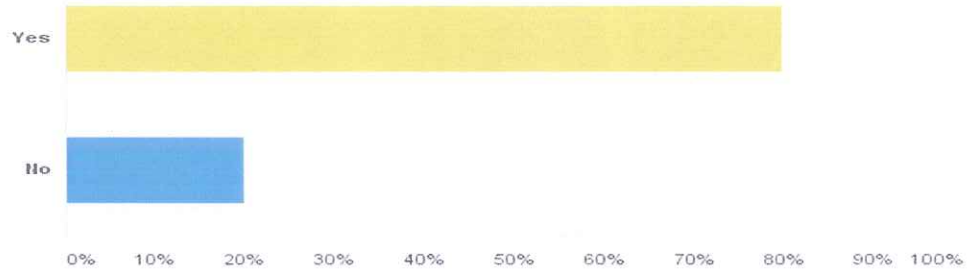
Table 5.47. Question 17; Parent Answers



Yes %70 No %30

Employees;

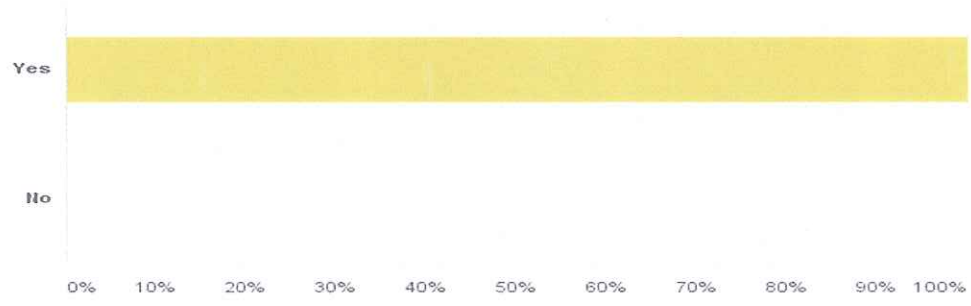
Table 5.48. Question 17; Employee Answers



Yes %80 No %20

Owners;

Table 5.49. Question 17; Owner Answers

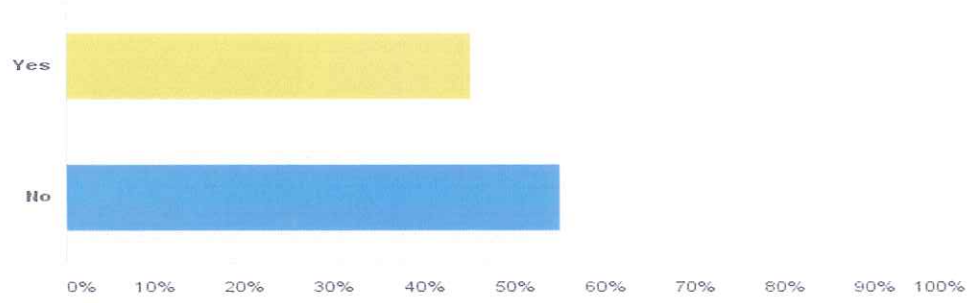


Yes %100

Q18: Do you ever intend to share your ideas about the use of sustainable materials with the school your kids are attending?

Parents;

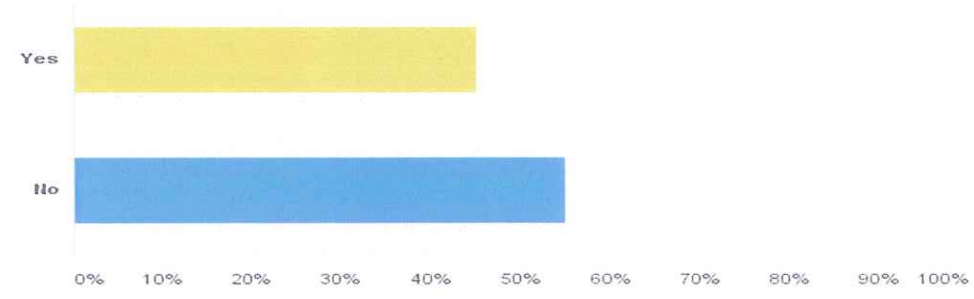
Table 5.50. Question 18; Parent Answers



Yes %45 No %55

Employees:

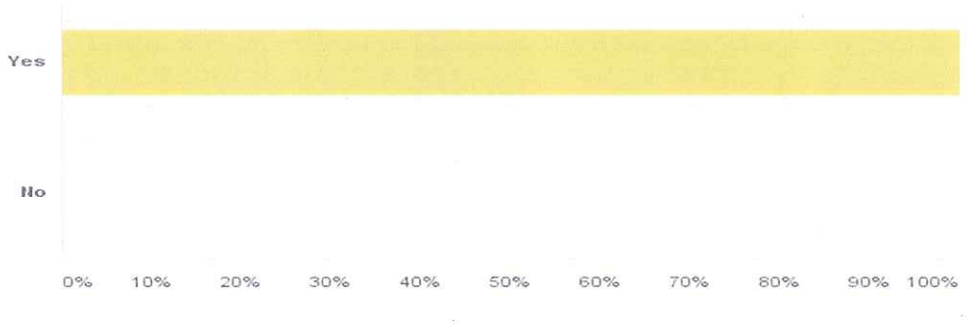
Table 5.51. Question 18; Employee Answers



Yes %45 No %55

Owners;

Table 5.52. Question 18; Owner Answers



Yes %100

As a result of the research conducted, we reach to the suggestions regarding criteria's of sustainable school buildings in a number of articles. If educational buildings were constructed consistently with these standards, we would avoid from the negative impact that the rigid, solid, and commonplace educational buildings deliver to the environment; and we would avert the disadvantageous situation that these buildings create in child education and development. The goal of this study is to support people that who are experts on a variety of issues regarding construction of educational buildings, and their cause in producing sustainable buildings. Thus our children would learn the notion of sustainability in early ages, and they would continue their lives as people who are beneficial to the society.

Discussion Points

- Overall, awareness of sustainability efforts at the school is high across all target groups, and it remains an important factor in school selection
- Not only is awareness high, but these parents are proactively educating their children about sustainability
- Concern about the environment goes hand-in-hand with the decision to put their kids in a sustainable school
- In general those who worked at the school (employees, owners) had a better grasp on all the ways that their school participated in sustainability initiatives.

7. CONCLUSION

As a result of this research; in accordance with the concept of sustainability, history of sustainability is examined, sustainable materials, selecting materials, which are less harmful to the environment, importance of education buildings for sustainability, and importance of material usage in education buildings, are discussed, the principles and methods of those are elaborately examined and explained with examples.

The most critical thing to do in order to prevent environmental problem is to create environmental awareness for societies. Any attempt to achieve this goal would be successful by educating the preschoolers with this awareness. It is certain for a child who is raised with ecological awareness from pre-school ages, to become a more caring person. The most effective method for this process is designing the schools in which they are educated as sustainable buildings. It is inarguably more effective for a child to experience the theoretical knowledge by seeing and living in practical terms. Thus, the awareness for sustainability that pre-school education buildings may give children, and the convenience of this for society, are to be more effective than other type of buildings.

Sustainable design is now of the essential factors of today. Studies about environmentlly-friendly, energy effecient buildings built with advanced technology, showed that, when compared, standard of living in these buildings are far better than the traditional examples.

Building materials fall under architecture and interior design. Using local materials, renewable resources and recyclable materials, preparing the physical conditions for building occupants, are the main requirements of sustainable architecture.

Sustainable building materials add value to the buildings. In the selection process of such materials, sustainability criteria must be provided as well as

criteria like quality, performance, aesthetics, and cost. While deciding the sustainable building materials, the environmental impact of the material or the product, the ecological effects of usage of the product and how to prevent these effects, must be considered elaborately by interior architects.

Projects and applications, which we make as interior architects, are using local materials, renewable resources and recyclable materials, preparing the physical conditions for building occupants. There are also materials, which are not commonly used, other than well-known building materials. Materials like some rubber types, paper, plastic bottles, agricultural wastes, etc., cause dumpsite expansion, and a great damage on environment when threw away without recycling. These materials, which have less total energy than traditional materials, can be used as building materials when put in good use.

Which sustainability criteria (built-up area selection, building structure, usage of proper materials, etc.) do "sustainable pre-school education buildings" in the world and Florida supports from their potential sustainability components (ecological, economical, socio-cultural), and most significant substances (pedestrian and bicycle way designs, material selection in outdoor design, usage of rainwater for landscape watering, etc.) of those criteria are shown in order to create a general evaluation table in the table 4.1, 4.2, 4.3 According to this, classifying all properties that are seen in 8 sustainable pre-school education buildings attains following results:

A. Criterias About Ecological Sustainability are;

- Built-up Area Selection: proper design for land grade, adequate observation of human-vehicle movement by school authorities, optimization according to the climate, conservation of present land, using natural substances in the land as playground, compatible design of the building with the land in which it is positioned

- Conservation of Water: Using endemic plant specie, selection of plants with less need for water, refinement and usage of grey water, recycling

the waste water, storage and usage of rainwater, reducing the usage of clean water for landscape watering

- Providing Natural Lighting and Natural Ventilation: Controllable ventilation system, by designing the window bays and opening directions, using light-colored paints, using skylights and sunroofs, well-designed passageways for utilization of sunlight, partitioning the building in thermal zones

B. Criterias About Economical Sustainability are;

- Building Structure: Designing the aspect ratio according to climatic data, optimal building structure selection in terms of climate, deciding the story height by considering the natural lighting, designing the structure by considering the catch of sun and wind, and sheltered areas

- Material: Using durable materials, using material with low maintenance cost, using recyclable materials, using materials that are supplied from natural and local resources, using quickly renewable materials, using materials that can enhance the inner-space quality

- Transportation: Providing alternative transportation, projects about alternative transportation and designing bicycle stands, priority of low emission vehicles for service

C. Criterias About Socio-Cultural Sustainability are;

Compatibility with the environment, informing the people about conservation of and natural resources and, handing them down to the next generations, understanding the social needs and demands, contribution to the society in means of meeting a requirement with the function, building's contribution to the reputation of the city, spiriting up the immediate vicinity with its user movement

It is observed that buildings do not meet all the sustainability criteria because of positioning all of the buildings in different climate zones and land conditions, differences between the potentials in the immediate vicinity of the buildings, variability of budgets for buildings, etc. The most important reasons why buildings meet different sets of sustainability criteria particularly, are different climate zones and land conditions, in which they are positioned. In the scope of this thesis, it is tried to understand how each criterion effects the space planning. When effects of sustainability criteria on space planning is examined, it is revealed that passive ways for effective energy usage create multi-purpose functional spaces as spatial solutions. By this designing decision, both sustainability criteria is met, and it is possible to have functional solutions in spatial organization by those criteria.

Some examples of this designing decision are given below:

- Getting enough sunlight to the building without overheating in northern classes, by a corridor lies unevenly in the direction of east-west axis. (Kingsmead)

- Having winter gardens related with a playground for each class (Kingsmead)

- Using spaces which decrease the heat loss as gardens, storerooms, and planting areas (Kingsmead)

- Having an underground part in the design when the school is located on a narrow area surrounded by houses (St. Assisi)

- Having deeper windows on north and south walls against uncontrollable azimuth degrees due to being located in one of the biggest and hottest cities, which is located approximately 10° north of the equator, of the world, and catching enough sunlight and air from both sides by these windows, despite the frequent power cuts. (Anglo-American school)

- Doubling the caught sunlight by filtering unnecessary unnatural lights by roof monitors. (Anglo-American school)

With the data attained at the end of the thesis, how schools are designed in different climate zones and residential areas from the world, how sustainability criteria are approached for buildings and in which way they contribute to spatial solutions, which ones of the sustainability components from sustainability criteria are mostly used for those buildings, are revealed.

The new negative improvements on technology and rising energy usage make countries to take action. Countries head to sustainable solutions (certificates and future schools) to decrease these effects. Sustainability is not just for today; it has to be well considered for the future generations. In this matter, sustainable school projects are providing healthier and better life styles. When we assess the issue according to this study:

- Choosing design and material to decrease energy needs
- Using the natural and local materials
- Creating solution according to the climate and location
- Presenting buildings that increase the life quality of kids
- Decreasing energy usage on passive (solar energy, greenhouse, roof windows) and active systems (solar collectors, photovoltaic systems)
- Using traditional architectural elements
- Working together and creating links with shareholder and specialists
- Using the building as learning tool and linking to curriculum

We see all these features all above matters.

The first study should be completed are getting aware of improving the existing buildings and including the sustainability concept to design criteria. Instead of creating new building, trying find a solution for decreasing the dependency on fossil fuels; using public transportation for coming and going to school; encouraging students improve school gardens; decreasing water demand by collecting rainwater; recycling materials and reusing them; and most important teaching new generations about sustainable life style, adding it to curriculum. This was we can make a new start for sustainable growth.

It takes a long time to apply new technologies, especially in developing countries like Turkey. This is because, a very long processes is necessary to create financial resources, and to acquire background information to create a infrastructure for architectures, interior architectures and operators, or technological equipments and teams, in order to achieve those technologies.

The most important stage of this attempt is to be the reconsideration of design-technology relation, in scope of interior architecture. Since design is the most powerful tool, which is given to the mankind, to give shape to products and environment, he should consider the possible consequences of his actions by analyzing the past and the possible future.

It is possible for the buildings to become beneficial to human health and to the environment with the help of a design that is suitable for the criteria's of sustainability. In this context, suggestions for constructing sustainable educational buildings are put forward in this thesis.

As a result, an interior architecture must put into practice the 'sustainable building', which is becoming more important every day in the world, with an intent to "fulfill the basic needs without causing devastating damage to the environment; providing economical development and continuity", and make sustainable building materials put in use in educational buildings sector.

In Turkey, a development about sustainable architecture is mostly limited with office and housing sectors, and educational buildings fall behind these

developments. When examined in scope of educational buildings, our country is still in the stage of gathering and analyzing information. Yet, in a world, where all our resources are quickly coming to an end, the awareness for sustainable architecture in developed countries must be also raised in our country, in where the sustainability criteria can be applied most effectively due to its climatic variety and location.

BIBLIOGRAPHY

Akyüz Y., (2009), "Türk Eğitim Tarihi", 14. Baskı, Ankara: Pegem Akademi.

Anderson, W. (2006). Diary of Eco-Builder, Green Books, Michigan. Anderson, W. (2008). Green up! An A-Z of Environmentally Friendly Home Improvements, Green Books, Cornwall.

Aral N., (2002), "Okul Öncesi Eğitim ve Okul Öncesi Eğitim Programı", Ya-Pa Yayınları, İstanbul.

Başal H., (2007), "Okul Öncesi Eğitim", Morpa Kültür Yayınları, 2. Baskı, İstanbul, 12-40.

Baykan S., (1996), "Başarılı Bir Okul Öncesi Eğitim İçin İşbirliği Gerekir", Milli Eğitim Yayınevi, Ankara, 132.

Becker E., (1999), "Exploring Uncommon Ground: Sustainability and the Social Sciences, in Sustainability and the Social Sciences", Eds., Becker, E. and Jahn, T., Zed Books, London, 4-14.

Bilge C., (2007), "Sürdürülebilir Çevre ve Mimai Tasarım: Mimariye Eleştirel Bir Bakış", Yüksek Lisans Tezi, İstanbul Teknik Üniversitesi Fen Bilimleri Enstitüsü, İstanbul, 15-16.

Calkins M., (2009), "Materials for Sustainable Sites", John Wiley & Sons Inc.

Candace S., (2008), "Sustainable Rating Systems around the world," CTBUH Journal, Vol. 2.

Carroll D. T., (2006), "Using LCA Methods to Evaluate the Ability of LEED to Compare Green Buildings", Master Thesis, Arizona State University.

Cevik U., Damla N., Van Grieken R. ve Vefa Akpınar, M., (2011), "Chemical composition of building materials used in Turkey," Construction and Building Materials, Vol.25.

Cole R. J., (1999). "Building Environment Assessment Methods: Clarifying Intensions", Building Research&Information.

Davis, J. M. (2010). "What is Early Childhood Education for Sustainability", Young Children and the Environment, Early Education for Sustainability, Editör: Davis, J. M., Cambridge University Press, New York, 21-42.

Day, C. (2007). Environment and Children, Passive Lessons from the Everyday Environment, Architectural Press, Oxford.

Demirarslan K.O., (2009), "Interior Design For Sustainability", Kocaeli Universty Architectural And Design Faculty.

Demiray, N., (2002), "Bebeğinizin Odasını Hazırlarken", http://gebelik.org/dosyalar/bebek odası.html., (09.05.2016)

Dixit M.K., Solís J.L.F., Lavy S., Culp C.H., (2010), "Identification of Parameters for Embodied Energy Measurement:" Energy and Building, Vol. 42.

Dumitraş A. (2008), "Pollution Effects Upon The Environment Degradation".

Fiksel T. (1999), "Living Spaces Ecological Building And Design", Könemann.

Foster N., (2001), "Lord Foster of Thames Bank", Architectural Design, 32.

Gelfand, L., Freed, E.C. (2010). Sustainable School Architecture: Design for Elementary and Secondary Schools, John Wiley & Sons, New Jersey.

Gilberg, Lynne, (1996) *Ideas for Great Kids Rooms*. USA: Sunset Books, 4th printing.

Güneş M., (2004), "Yerel Gündem 21 'Ulusal' Kentlerden 'Küresel' Köylere", Detay Yayıncılık, Ankara.

Gürkan T., (2003), "İdari Yapı ve Yönetişim Açısından Değerlendirme: Erken Çocukluk Eğitimi Politikaları: Yaygınlaşma, Yönetişim ve Yapılar Toplantısı Raporu", AÇEV, UNICEF, Eğitim Reformu Girişimi, Ankara, 77-81.

Halliday, S. (2010). Sustainable Construction, Elsevier Press, Oxford. http://www.cedbik.org, Erişim Tarihi:10.08.2014, Konu: Çevre Dostu Yeşil Binalar Derneği Çalışmaları.

Haynes R., (2010), "Embodied Energy Calculations within Life Cycle Analysis of Residential Buildings".

Kayıhan K., (2006), "Sürdürülebilir Mimarlığın Yarı Nemli Marmara İkliminde Tasarlanacak Temel Eğitim Binalarında İrdelenmesi Ve Bir Yöntem Önerisi", Doktora Tezi, Yıldız Teknik Üniversitesi Fen Bilimleri Enstitüsü, İstanbul.

Keleş R., (1998), "Kentbilim Terimleri Sözlüğü", İmge Kitabevi.

Kibert C. J., (2008), "Sustainable Construction: Green Building Design and Delivery"

Kim J. J. ve Rigdon B., (1998), "Sustainable Architecture Module: Introduction to Sustainable Design", National Pollution Prevention Center for Higher Education, University of Michigon, USA, 5-8.

Koçak N., (1996), "Okulöncesi Eğitim Kurumlarında Sağlık", Milli Eğitim Yayınları, Ankara, 30-32.

Kohler N., (1999), "The Relevance Of The Green Building Challenge: An Observer's Perspectivel", Building Research & Information.

Lee T., (2009), "Minimising Resource Consumtion İn Constraction Industry Throught Sustainable Practice".

Marmara A., "Sürdürülebilir Kalkınma Çerçevesinde İşletmelerin Sosyal Sorumluluğu", Yüksek Lisans Tezi, Sakarya Üniversitesi Sosyal Bilimler Enstitüsü, 31, (2006).

MEB, (1993), "Milli Eğitim Bakanlığı Talim ve Terbiye Kurulu Başkanlığı Şura Sekreterliği, 14. Milli Eğitim Şurası, Okul Öncesi Eğitim Komisyon Raporu, MEB Yayınları, Ankara.

Mialeret, G., (1997), "Okul Öncesi Eğitimi", Çeviren: V. Örs, Unesco Türkiye Milli Komisyonu, Ankara, 3.

Morel J. C., Mesbah A., Oggero M. ve Walker P., (2001), "Building Houses with Local Materials: Means to Drastically Reduce the Environmental Impact of Construction," Building and Environment, Vol. 36.

Murphy, C., Thorne, A. (2010). Health and Productivity Benefits of Sustainable Schools: A Review, Brepress, Watford.

NSTC, (2008), "Federal Research and Development Agenda for Net-Zero Energy, High performance Green Buildings", Report of the Subcommittee on Buildings Technology Research and Development.

Oğuzkan F., (1981), "Eğitim Terimleri Sözlüğü", 2. Baskı, Türk Dil Kurumu, Ankara.

Oğuzkan Ş. ve G. Oral, (1983), "Okul Öncesi Eğitimi", Milli Eğitim Yayınevi, İstanbul.

Oktay A., (1999), "Yaşamın Sihirli Yılları: Okul Öncesi Dönem", 1. Baskı, Epsilon Yayınları, İstanbul.

Ortiz O., Castells F. ve Sonnemann, G., (2009), "Sustainability in the Construction Industry: A Review of Recent Developments Based on LCA," Construction and Building Materials, Vol. 23.

Our Common Future, (1987), "World Commission on Environment and Development", Oxford University Press, Londra, 8.

Özkubat, S., Okul Öncesi Kurumlarında Eğitim Ortamlarının Düzenlenmesi ve Donanım, Adnan Menderes Üniversitesi Eğitim Fakültesi Eğitim Bilimleri Dergisi, Aralık 2013, 4(2), 58-66, http://dergi.adu.edu.tr/egitimbilimleri/)

Pressoir, E., (2008), "Preconditions for young children's learning and practice for sustainable Development: The contribution of early childhood development for sustainable societies", UNESCO, Paris, 57-62.

Reddy B.V. ve Jagadish K.S., (2003), "Embodied Energy of Common and Alternative Building Materials and Technologies," Energy and Buildings, Vol. 35.

Sachs I., (1999), "Social Sustainability and Whole Development: Exploring the Dimensions of Sustainable Development, in Sustainability and the Social Sciences", Eds., Becker, E., Jahn, T., Zed Books, London, 25-36.

Savaş Ülküer N., (1985), "Dünya'da ve Türkiye'de Okul Öncesi Eğitimin Yaygınlaştırılması", YA-PA Okul Öncesi Eğitimi ve Yaygınlaştırılması Semineri 2-3, İstanbul, 7-12.

Sev A., (2010), "Sürdürülebilir Mimarlık", Yapı Endüstri Merkezi, İstanbul, 14.

Shukla A., Tiwari G.N. ve Sodha, M.S., (2009), "Embodied EnergyAanalysis of Adobe House," Renewable Energy, Vol. 34.

Tönük S., (2008), "Benzin Bitti, Kelle Görüldü!", Arrademento Mimarlık, sayı:3, Mart.

Turaşlı N., (2006), "6 Yaş Çocuklarda Benlik Algısını Destekleyen Duygusal-Sosyal Hazırlık Programının Etkinliğinin İncelenmesi", Yayınlanmamış Doktora Tezi, Marmara Üniversitesi Eğitim Bilimleri Enstitüsü, İstanbul.

USGS, (1998), "Materials Flow and Sustainability", Fact Sheet, FS-068-98.

Yapıcı M., (2003), "Sürdürülebilir Eğitim ve Kalkınma", Cilt V, Afyon Kocatepe Üniversitesi Sosyal Bilimler Enstitüsü, Haziran.

Yavuzer, H., (1990), "Çocuk Psikolojisi", Beşinci Baskı, Remzi Kitabevi, İstanbul.

Yazar H., (2006), "Sürdürülebilir Kentsel Gelişme Çerçevesinde Orta Ölçekli Kentlere Dönük Kent Planlama Yöntem Önerisi", Yayınlanmamış Doktora Tezi, Ankara Üniversitesi Sosyal Bilimler Enstitüsü, Ankara, 3-4.

Yılmaz N., (2003) "Türkiye'de Okul Öncesi Eğitimi", Morpa Kültür Yayınları, İstanbul, 12.

Zenbat, R., (1998), Okul Öncesi Eğitim Kurumları, 0-6 Yaş Anne-Baba ve Çocuk Rehberi, İstanbul: Beyaz Gemi Yayınları.

MEGEP, (2008), Sanat ve Tasarim, Organik İç Mekân Malzemeleri, http://hbogm.meb.gov.tr/modulerprogramlar/kursprogramlari/sanat/moduller/organik_ic_mekan_malzemeleri.pdf, Ankara (erişim tarihi)

Commerzbank-Tower - Commerzbank-Tower information and pictures, http://www.gothereguide.com/commerzbank+tower+frankfurt-place/, 02/05/2014

http://www.scotland.gov.uk/Resource/Doc/920/0034304.pdf, Erişim Tarihi:10.08.2014,

Çocuk Odasi Nasil Düzenlenir, http://www.yedigun.com/cocuk-odasi-nasil-duzenlenir

http://www.scotland.gov.uk/Resource/Doc/920/0034304.pdf; 2014).

(Uludağ Üniversitesi Mühendislik Fakültesi Dergisi, Cilt 20, Sayı 1, 2015)

(www.aisch.org)

(www.atelierpro.nl/n/projects/108/trias-vmbo-school)

(www.buildingoftheyear.bg)

(www.cabe.org.uk/case-studies/st-francis-of-assisi)

http://chesafutura.blogspot.com.tr/2009/03/chesa-futura.html, 01/05/2014

http://inhabitat.com/jean-marie-tjibaou-cultural-center-inspired-by-native-%20%20architecture/, 02/05/2014

Liggett, Brit., (2010), World's Greenest Skyscraper: Pearl River Tower Almost Complete, http://inhabitat.com/worlds-greenest-skyscraper-pearl-river-tower-almost-complete/, (02/05/2016)

http://mustafaonurakin.blogspot.com/2010/03/surdurulebilir-tasarim-malzemeleri-ve.html

http://www.fldoe.org/schools/safe-healthy-schools/healthy-schools/green-schools.stml

http://www.greenbooklive.com/search/buildingsearch.jsp?from=0&partid=10023&subsche

http://www.gyte.edu.tr/hebe/AblDrive/75357016/w/Storage/326_2010_2_533_75357016/Downloads/ekoloji-ve-ekolojik-mimarligin-donum-noktalari-2.pdf, 01/05/2014

http://www.herzog-und-partner.de/, 01/05/2014

http://www.icmimarlarodasi.org.tr/, 01/05/2014

http://www.turkeco.com/tr/index.htm; Erişim Tarihi:10.08.2014, Konu: Sürdürülebilir Tasarım ve Uygulama Desteği.

http://www.usgbc.org/leed#certification; Erişim Tarihi: 10.01. 2015, Konu: Leed (Leadership in Energy & Environmental Design) Sertifikasyon Sistemi.

http://www.yapkat.com/images/Malzeme/Dosya/828350245952691501581668885.pdf

http://www.yesilkutu.net/surdurulebilir-kalkinma.aspx, 01/05/2014

https://polen.itu.edu.tr/bitstream/11527/8166/1/7348.pdf

https://www.education.gov.uk/publications/eOrderingDownload/BB-101.pdf, Erişim Tarihi: 10.08.2014, Konu: Eğitim Kalitesi.

https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/276711/Buil

http://archrecord.construction.com/schools/0701_CS6_benFranklin-1.asp)

http://www.sapa-solar.com/turkey/Fotovoltaik/

http://www.sustainabilitydegrees.com/what-is-sustainability/

https://www.epa.gov/sustainability/learn-about-sustainability#what

http://www.mimarizm.com/makale/surdurulebilirlik-kavraminin-taraflari_114782

CURRICULUM VITEA

Kişisel Bilgiler

Adı Soyadı : Tuğçe ATAKAN

Doğum Yeri ve Tarihi : Yeşilköy– İSTANBUL - 14.02.1989

Ev Adresi : Kalemkar sok. No: 2 Yeşilköy – İSTANBUL

Tel : +1(954)-648-8049

Mail: tugceatakan@hotmail.com

Eğitim

Lisans - 2012 Beykent Üniversıtesi- Mimarlık Mühendislik Fakültesi- İç Mimarlık Bölümü

Yüksek Lisans (Tezli) - 2012 Yaşar Üniversıtesi – Fen Bilimleri Enstitüsü/İç Mimarlık Yüksek Lisans Programı / %50 Burslu - Halen Devam Etmekteyim.

Lisans - Miami Dade University- 2016 Mimarlık Mühendislik Fakültesi- Peyzaj Tasarımı

İş Tecrübesi

20011 – Ertek Mimarlık/ Yeşilköy HSBC Banka Binası

2015 – Makeverything Design/ Miami

2016- S&A HOMES LLC./ West Palm Beach- Halen Çalışmaktayım.

Sertifikalar

2008- ECDL European Computer Driving License

2009- Mikrosis Bilgisayar Akademisi 3d max Sertifikasi

2009- Bilgi Teknolojileri Autocad Sertifikasi

APPENDIX 1 SURVEY QUESTIONS

Sustainability Kindergarten Survey Questions

Subject: A Survey For Sustainable Kindergartens In South Florida USA

School Name: Beachside Montessori Village

1. Are you a parent, employees or owner with a child who goes to a sustainable kindergarten school?

2. Which of the following sustainability efforts are you aware of on this school?

a. Waste (i.e. Recycling and Waste Reduction, Reduce and Reuse, etc.)

b. Energy (i.e. Conservation efforts, alternative energy use, etc.)

c. Dining Services (i.e. Local Food, Community Gardens, food composting etc.)

d. Water (i.e. rooftop gardens, rain gardens, clean streams, rain barrels)

e. Transportation (i.e. Bike/Ped, Transit, Alternative Fuels, etc.)

f. Building (i.e. Green Building, LEED, etc.)

g. Grounds (i.e. Right Tree, Right Place, green space management, composting organics, etc.)

h. Purchasing (i.e. Energy Star, green cleaning, recycled content, Forest Certified, etc.)

i. Climate (i.e. carbon reduction, air quality, etc.)

3. Sustainability means:

a. "Creating an economic system that provides for quality of life while renewing the environment and its resources."

b. "Living within the resources of the planet without damaging the environment now or in the future."

c. "Taking the long-term view of how our actions affect future generations and making sure we don't deplete resources or cause pollution at rates faster than the earth is able to renew them."

d. None of the above.

4. I fully understand the meaning of the term "sustainability".

a. Strongly Disagree

b. Disagree

c. Agree

d. Strongly Agree

5. My concern towards environmental issues has grown due to the events, activities.

a. Strongly Disagree

b. Disagree

c. Agree

d. Strongly Agree

6. How concerned are you about environmental issues?

a. Very Concerned

b. Somewhat Concerned

c. Concerned

d. Not Concerned

7. Do you think environmental issues directly affect your life?

a. YES

b. NO

8. How willing are you to participate in sustainability activities on this school?

a. Very Willing

b. Somewhat Willing

c. Willing

d. Not Willing

9. If you could save money, in your department, on school or personally would you participate in sustainability activities on school?

a. Very Willing

b. Somewhat Willing

c. Willing

d. Not Willing

10. This school is leader in sustainable practices among other schools?

a. Strongly Disagree

b. Disagree

c. Agree

d. Strongly Agree

11. This school's community is well informed about what is being done to make the school more sustainable.

a. Strongly Disagree

b. Disagree

c. Agree

d. Strongly Agree

12.Was Sustainability of this school a factor for choosing it?

13.Are you talking about sustainability and environmental issues with your kids ?

14.Are you paying attention to the choice of materials (wall paint, textile, furniture, etc.) used in this school?

15.How important for you the use of materials that will improve the quality of interior?

16.Are you aware of the use of sustainable furniture?

17.Are you educating your children at home about sustainable materials?

18.Do you ever intend to share your ideas about the use of sustainable materials with the school your kids are attending?

APPENDIX 2 SURVEY MONKEY PROGRAMME

Surveymonkey is an online survey site that simplifies the survey process considerably. In the survey design phase, Surveymonkey offers 17 formats for asking questions (multiple choice, true false, open-ended, etc). Surveymonkey also has a diverse color palette for changing the appearance of the survey. As for implementation, Surveymonkey has the ability to track respondents so you can recontact non-respondents and avoid pestering those who have already participated. Surveymonkey can generate frequencies for each question and allows you to export data into programs like SAS or SPSS for more complex analysis. The Surveymonkey site will send out the survey and subsequent reminders for you if you furnish a list of e-mail addresses and will also provide you with a link to the survey which can then be posted on your website or included in an e-mail for you to send to participants. Surveymonkey does have its limitations. Even with many question formats, it can be restrictive with regard to how you can ask a question or set up your answer sets. Although most e-mail servers allow messages from Surveymonkey, institutions that maintain high security and intense spam blockers may block email from Surveymonkey. An additional limitation is that only email sent by Surveymonkey can track respondents. Participants who take the survey from any link other than the direct link to the Surveymonkey site cannot be traced.

Survey Monkey is a useful online tool for creating and administering surveys as well as managing and analyzing data. To use the service, you'll first need to create a survey monkey account. While free accounts are available (with a ten questions limit), paid accounts are affordable and well-worth the price. This tool will walk you through the basics of using Survey Monkey from creating a survey in survey monkey to downloading your data.

Creating a Survey;

One of the best things about survey monkey is that you can completely design your survey online, using Survey Monkey's interface. To begin, simply click the green "Create Survey" button on the upper right of your Survey Monkey home screen. After choosing a title for your survey and selecting a category, you're ready to start entering questions!

- Enter content (questions, images, text, etc) in the center of the page. Be sure to carefully review and consider the question types as this will affect data analysis later.
- Here are examples of each question type: http://www.surveymonkey.com/QuestionBuilder_Examples.aspx

Some important question types to highlight;

1. Multiple Choice (only one answer): Use this for traditional multiple choice questions, including "yes"/"no" questions
2. Multiple Choice (multiple answers): Use this for "check all" questions
3. Rating Scale: Use for rating questions ("On a scale of 1 to 10...")
4. Matrix of Choice: Use this for consolidating several rating questions into one chart
5. Numerical Textbox: Use this for questions with a numerical response, such as age or income
6. Single Textbox: Use this for open-ended questions
7. Demographic Information (U.S. or International): Generally, do NOT use these questions as they are primarily "Contact Information"

Once you've entered all your questions, customize your survey by adding additional pages, selecting a theme (at the top), and moving around questions. Further visual adjustments are available by clicking on Survey Options on the left column. A grey button at the top right allows you to preview the survey.

Collecting Survey Responses;

Be sure to completely finalize your survey before you begin to collect survey responses. Survey monkey will generally let you make edits after you've done so, but it could seriously impact your data.
To collect data in survey monkey, you can either have respondents fill out the survey online or you can collect paper surveys and manually enter them into the online database. There are pros and cons to both options.

Online;

On the top right, navigate to and click on the "Collect Responses" grey tab.

There are four collection options:

1. Web Link to send via email
2. Email to send email invitations and track who responds via Survey Monkey
3. Website to embed the survey in a website
4. Share on Facebook to post the survey to wall or embed on a page

Once you decide on the collection method, you'll have to select a name for this collector. This can be a very helpful way to track how you are getting responses if you choose multiple methods. Once you've named the collector, click next. Depending what you choose as your collection method, the next page will vary, but generally you'll be able to customize the message or link or display.
Pros: Crowd-sources data entry
Cons: Not accessible for respondents without internet or without understanding of the internet, difficult to ensure integrity of data collected

Manual Data Entry ;

To enter data manually, you'll need to create a web link using the method above (be sure to name the collector). Once that is done, simply click on the manual data entry link.

on the left column. Then click the blue "Add New Response" button to begin entering new surveys. Be sure to always use the manual data entry link (i.e. don't just use the link you just created) so that you can go back and edit the surveys if you make a mistake.

Pros: You can edit a survey after you enter it

Cons: Slightly more time-consuming

Noteworthy Collector Settings:

Each time you set up and create a new collector, you can adjust the settings for that particular collector. Here are some key settings you should check:

1. Use SSL encryption? Enable SSL to ensure secure transfer of data.
2. Survey Completion: Use this setting to redirect respondents to your website when they have completed the survey.
3. Allow Responses to be Edited? There are three options here, but generally the last one should never be used for formal surveys ("Yes, respondents can re-enter the survey at any time to update their responses"), since this can impact the integrity of the data. Either of the other two options is fine depending on your particular survey.
4. Allow Multiple Responses: If you are collecting responses via a kiosk or computer lab, allow multiple responses. If not, don't allow multiple responses. Note: If you are manually entering hard copy surveys (meaning you plan to enter several surveys from one computer), you do NOT need to enable multiple responses. Simply use the Manual Data Entry protocol above.

Access your data by clicking on the grey "Analyze Results" tab on the top right. This will bring up multiple options for viewing and analyzing your data along the left column with the summary as the default initial page. If you want to analyze the data in Survey Monkey there are a number of tools available to analyze both quantitative (closed questions) and qualitative data (open-ended questions).

Important Note: At the top of the page, there is a pull down menu that says "Default Report." At the beginning this will simply be the number of total surveys

collected. Once you begin analyzing though, this can easily be changed. Every time you enter this page, make sure you are viewing all of the surveys collected and not a filtered subset.

1. Quantitative Data: Viewing the data in the summary is usually sufficient to get frequencies and counts for each question. The "Browse Responses" Tab allows you to look at each survey individually. Use the "Crosstab Responses" button on the left to crosstab different questions (e.g. crosstab income by education to see if there is a difference in education levels between income levels). The "Filter Responses" Tab allows you to create a subset of the full data for separate analysis (e.g. to analyze responses from only the female respondents).

2. Qualitative Data: In the summary view, scroll down to a qualitative question (includes "Other" responses). Click on "X replies," where X is the number of responses for that question. This will bring up three tabs with all the responses, an automated text analysis from Survey Monkey and categories. On the first tab, go through all the responses and sort each response into categories that you define. To get started use the automated text analysis tab that pulls out the most used words. Then click on the categories tab to review the final counts and frequency for each category of responses.

Downloading to Other Programs for Analysis;

Begin by clicking the grey "Analyze Results" tab on the top right. On the left column navigate to the "Download Responses" tab. Generally, you'll want to download all the responses and not just the summary report, but there are a number of options depending on the software you have available. The best option is probably downloading all the responses in SPSS format. Just enter your email address and you will be sent the file.

Additional Resources

- Survey Monkey Manual: http://help.survey-monkey.com/euf/assets/docs/pdf/UserManual.pdf?noIntercept/1
- Survey Monkey Help Center: http://help. surveymonkey.com/app/home
- Survey Monkey Templates: http://www. surveymonkey.com/mp/use-cases/